Journal of the Virtual Explorer

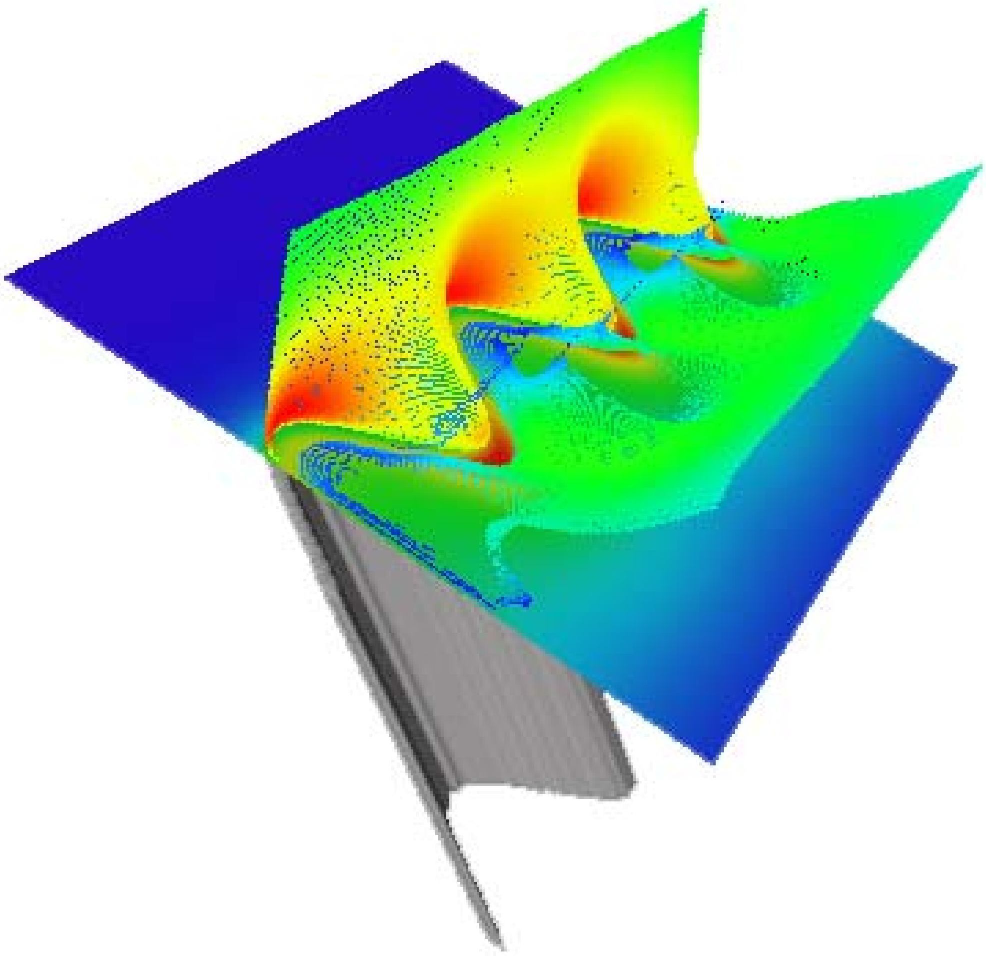
Volume 5

An Atlas of Structural Geophysics II

M. W. Jessell & Fractal Graphics Pty Ltd

Table of Contents (Northern Hemisphere)

Table of Contents (Southern Hemisphere)



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The aim of this atlas is to provide examples of the relationship between three-dimensional structure and potential-field response. We have used the Noddy modelling system, which was developed as a result of an AGCRC/AMIRA/ARC project. This allowed us to create a variety of structural models which allow interpretive skills to be developed, through the specific comparison of structures and their responses. These models also provide a starting point for the interpretation of actual survey results. All of the history files used to create these models are provided in digital form, so that in combination with the *Noddy* software, variations to the models can be easily examined. In addition this addition of the atlas contains wavelet transforms of the data so that the interpretive skills needed for this new visualisation technique can be learned.

In order to reduce printing problems, a PDF version of this Atlas is also available.

This Table of Contents lists each page in text form, the Image Index (much slower to load) contains one example image from each page, and the Help page describes the meaning of each element in a page, and how to configure your browser to load the various file types. The atlas contains a complete set of images models calculated for both Southern and Northern Hemispheres, and each set can be accessed separately from the home page of the Atlas.

SECTION 1 BASIC INTERPRETATION PRINCIPLES In this section a number of basic intepretation principles are reviewed. The model geometries are kept very simple so that the effects of depth, latitude, and possible causes of potential-field anomaly asymmetries can be separated from the more complex issues of three-dimensional structures. Many of these principles can in fact be demonstrated in two-dimensions using profiles, and the reader is encouraged to draw profiles across the data sets in order to see these effects.

1.1 The effect of depth on anomaly dimensions in gravity data
1.2 The effect of depth on anomaly dimensions in magnetic data
1.3 A cross section through the gravity and magnetic fields
1.4 Vector components of a magnetic field
1.5 The effect of changing latitude on anomaly shapes in magnetic data
1.6 Asymmetries in magnetic and gravity data
1.7 Magnetic inclination and declination effects for complex structures

SECTION 2 SIMPLE STRUCTURAL TYPES In this section the potential-field response of simple structures is displayed. In some cases some earlier feature, such as a dyke, has been added to clarify the point being made. This chapter concentrates on contrasting different deformation geometries and demonstrating the effects of structurally controlled or field inclination controlled anomaly asymmetries.

2.1 FOLDS
2.1.1 Variation in fold profile
2.1.2 Variation in fold plunge direction of sinusoidal folds
2.1.2b Variation in fold plunge direction of sinusoidal folds (continued)
2.1.3 Variation in fold plunge of sinusoidal folds
2.1.4 Ambiguities in the interpretation of sinusoidal folds
2.2 FAULTS
2.2.1 Variation in fault geometry
2.2.2 Variation in fault dip direction of low susceptibility footwall faults
2.2.2b Variation in fault dip direction of low susceptibility footwall faults (continued)
2.2.3 Variation in fault dip direction of high susceptibility footwall faults
2.2.3b Variation in fault dip direction of high susceptibility footwall faults (continued)
2.2.4 Variation in fault dip
2.2.5 Interpretating fault offsets
2.3 UNCONFORMITIES
2.3 Unconformity Geometries
2.4 INTRUSIONS
2.4.1 Simple Plug Geometries
2.4.2 Variation in Dip Direction for a Thin Dyke
2.4.2b Variation in Dip Direction for a Thin Dyke (continued)
2.4.3 Variation in dyke dip

SECTION 3 COMPLEX STRUCTURES This section provides a number of examples of the interaction of two or more episodes of deformation, some derived from specific locations, others simply to demonstrate scenarios which may or may not be resolved by using the magnetic or gravity data sets.

3.1 Faulted dyke
3.2 Faulted Fold
3.3 Basin Setting (Flat-lying sediments)
3.4 Block faulted, rifted and folded region
3.5 Fold and Thrust setting
3.6 Dome and Basin setting
3.7 Fold Interference Patterns

SECTION 4 TOPOGRAPHIC EFFECTS This section provides two simple examples of the effects of topography on potential-field data. The two normal survey modes of draped and barometric flying are compared.

4.1 Horizontal stratigraphy
4.2 Dipping stratigraphy

SECTION 5 REMANENCE AND ANISOTROPY This section demonstrates the effects of a uniform or variable remanent magnetisation component, and a uniform or variably oriented magnetic anisotropy. A comparison of alteration haloes and remanent magnetisation haloes around igneous bodies is also made.

5.1 A remanently magnetised sphere
5.2 Remanence and folding
5.3 Anisotropy and folding
5.4 Concentrically zoned plugs

SECTION 6 ALTERATION ZONES In this section two examples are given which compare the effects results of having alteration haloes associated with igneous intrusion, for regions with pre-existing structure.

6.1 Depletion alteration halo around a dyke
6.2 Enrichment alteration halo around a plug

APPENDIX A: GEOLOGICAL MODELLING In this appendix the geometries resulting form each type of structural event are displayed for a chequerboard model.

Appendix A: Geological Modelling Events

APPENDIX B: Wavelet Transforms This appendix includes two papers describing the basis for the wavelet transforms models are given. In addition, a number of VRML models of 3D structures are provided which can be viewed interactively..

Appendix B: Wavelet Transforms

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Help

Northern Hemisphere Edition

- Page Structure
- Dynamic Links to Noddy
- File Naming Conventions

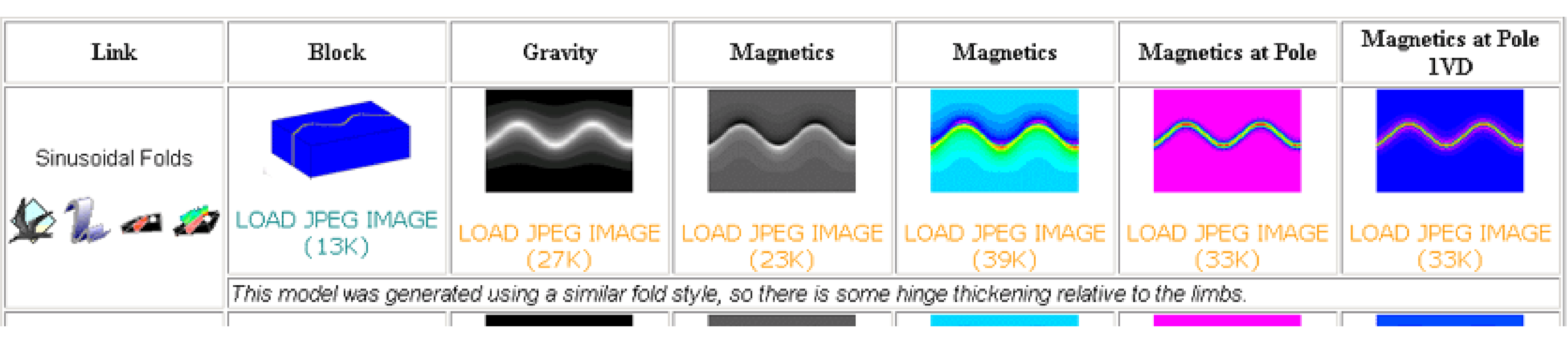
- The Noddy Modelling System
- Geological Modelling
- Geophysical Modelling
- Geophysical Parameters
- Geophysical Images

- VRML Viewers

- AVI Movie Viewers
- Acknowledgements

Page Structure

Each page of the atlas consists of a table made up of a number of rows and columns of images, generally one row per geological model, with each column showing one type of representation:



Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Sinusoidal Folds	LOAD JPEG IMAGE (13K)	LOAD JPEG IMAGE (27K)	LOAD JPEG IMAGE (23K)	LOAD JPEG IMAGE (39K)	LOAD JPEG IMAGE (33K)	LOAD JPEG IMAGE (33K)
	This model was generated using a similar fold style, so there is some hinge thickening relative to the limbs.					

Each cell in the table provides an active link to at least one file that may be loaded into a helper application (see next section for details). The table below explains what links are avaiable for each column type:

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Loads *Noddy* with history file Loads *FracViewer* animation with block model Loads Geology Model as VRML file Loads Wavelet Transform Model as VRML file	LOAD JPEG IMAGE of geological model into browser	Load gravity data into *Noddy* - Load gravity image as jpeg file	Load magnetics data into *Noddy* - Load magnetics image as jpeg file	Load magnetics data into *Noddy* - Load magnetics image as jpeg file	Load magnetics at pole data into *Noddy* - Load magnetics image as jpeg file	Load magnetics at pole first vertical derivative data into *Noddy* - Load magnetics image as jpeg file

Table showing the effects of clicking on an image from each column

Dynamic Links to *Noddy*

To get your computer to load the appropriate files into *Noddy* dynamically you obviously need those this programs (see links at the bottom of this page), and you also need to set your browsers helper applications settings for various file types as shown in the table below. These settings can be set as you load in a file type for the first time.

File Suffix	File Type	Helper Application	Mime Type
his	Noddy History File	**Noddy**	**x-application/his**
mag	Noddy magentics image	**Noddy**	**x-application/mag**
grv	Noddy gravity image	**Noddy**	**x-application/grv**
avi	Animation of wavelet transform model	**FracView**	**video/avi**
jpeg	Noddy geophysics image in jpeg format	**xv (*for example)***	**image/jpeg**
wrz	"Gzipped" VRML model of wavelet transform model	**3D Exploration (*for example*)**	**x-world/x-vrml**

UNIX On the UNIX platform you will also need to inform the program where to look for the licence and UID files by adding the following to your *.cshrc* file (changing the path as appropriate):

setenv NODDY_HOME /usr/local/noddy
setenv UIDPATH /usr/local/noddy/%U

PC On the PC platform you will also need to inform the program where to look for the licence file by adding the following to your *autoexec.bat* file (changing the path as appropriate):

set NODDY_HOME=c:\winprgs\noddy
path=c:\winprgs\noddy

File Naming Conventions

The jpeg and gif files for each section are contained in a number of directories divided up according to calculation and display type, so that for example, pseudocolour and gray scale look up table displays of the same data are stored separately.

jpeg image file names are of the form model name+*image type*.jpeg (and similarly for gifs) where *image type* is generally one of the following:

gl	geology image
gg	gravity image , gray scale look up table raster image
mg	magnetic image calculated at an inclination of -50°, gray scale look up table raster image
mr	magnetic image calculated at an inclination of -50°, rainbow look up table raster image
mc	magnetic image calculated at an inclination of -50°, rainbow look up table colour contour image
mpr	magnetic image calculated at the South Pole, rainbow look up table raster image
mpc	magnetic image calculated at the South Pole, rainbow look up table colour contour image
mp1vdr	magnetic image calculated at the South Pole, 1st vertical derivative, rainbow look up table raster image
mp1vdc	magnetic image calculated at the South Pole, 1st vertical derivative, rainbow look up colour contour image

The *Noddy* Modelling System

Clicking on this icon opens up Noddy with the appropriate history file, and clicking on the geophysics images loads up the appropriate geophysical data into Noddy. The Noddy modelling system has been developed jointly by Monash and the CSIRO within the Australian Geodynamics Cooperative Research Centre (with major funding through AMIRA). It is a kinematic forward-modelling system which builds up a three-dimensional geometry through the imposition of a sequence of deformation events on a initial stratigraphy, and then calculates the gravity and magnetic responses for this structure. Noddy is based on two types of algorithms, those that deal with forward modelling the geology, and those that deal with forward modelling the potential-field response. For the latest demo version, visit the Encom Web Site

Geological Modelling

The geological modelling is achieved by superimposing a series of deformations, described as parameterised displacement equations acting on an initial stratigraphy.

The choice of deformation "events" includes folding, faulting, unconformities, shear zones, dykes, plugs, homogeneous strains, tilts, and imported geometries: voxel (or *Volume Element*) models and some triangulated forms, and these events may be combined in any order in any number. The starting stratigraphy for the modelling is not only geological, but also represents a geophysical rock property stratigraphy, and this allows us to calculate sophisticated geophysical behaviour such as alteration zones around faults, where the susceptibilities are modified systematically as a function of distance away from the fault, and also remanence vectors which are deflected around fold hinges.

Geophysical Modelling

The geophysical modelling is accomplished by dividing the final geological structure into voxels, and using a modification of Hjelt's dipping prism equations to calculate the potential-field response of the 3D volume (Hjelt, S.E. 1972. Magnetostatic anomalies of dipping prisms. Geoexploration, 10, 239-246. and Hjelt, S.E. 1974. The gravity anomaly of a dipping prism. Geoexploration, 12, 29-39.). We have also implemented a Fourier domain calculation of potential-field response, based on the same voxel model of the geology, and the results presented here make use of the most suitable scheme for a particular model geometry. Both gravity and magnetic models are calculated as airborne surveys, typically at an altitude of 80 m.

Geophysical Parameters

The c.g.s. unit system is used in this atlas, and magnetic calculations are either performed at the South Pole with a field strength of 70,000 gamma (or nT) or at an inclination of -50° with a field strength of 50,000 gamma. The magnetic declination is always set to 0, and North is up in all geophysical images. The magnetic images show the true anomalous component of the total field, and the gravity images show the vertical component of the field. In the key ***k*** is used as the symbol for magnetic susceptibility, and ρ for density .

Geophysical Image Display

The gravity and magnetic images in this atlas are displayed as either grayscale or pseudo-colour raster images, or pseudo-colour contour plots. In all cases the look up table is linear, and is in general clipped to the maximum and minimum range for the particular data set, which maximises the clarity of anomaly shapes. Where absolute anomaly intensities need to be viewed, profiles across the data or an absolute look up tables are applied, and these cases are noted in the text.

VRML Viewers

Clicking on these icons opens up a window with a VRML (Virtual Reality Meta Language) model in it. There are many different VRML Viewers available, and the availability of any one piece of software is not very stable, however *at the time of production of this site* 3D Exploration (PC only); CORTONA VRML CLIENT Cortona VRML Browser Plugin (most Platforms) or VRML Viewer (PC Only) can be used. In order to reduce download times, all the VRML models are compressed using a package called gzip. (Most unzip utilities will be able to use uncompress this format). The Cortona Browser plugin is happy with this format.

AVI Viewers

Clicking on this icon opens up a window with a AVI format movie in it. There are many different AVI Viewers available, and the availability of any one piece of software is not very stable, however *at the time of production of this site* Quicktime (PC & MAC only) or MediaPlayer (PC Only) can be used.

Acknowledgements

I would like to acknowledge the contribution of Rick Valenta, whose idea this was, and who produced the first examples, some of which are included here. The Fractal Graphics team, and especially Darren Holden are thanked for all of their work in producing the wavelet transform models. I would also like to thank Maurice Craig, Paul Manser, Stewart Rodregues, Alla Geiro and George Jung who all worked on aspects of the Noddy code. Ian Neilson and Ian Brayshaw were invaluable in generating their help in generating the HTML code. Finally I would like to thank Joe Cuccuzza from AMIRA for his support during this project, and the many sponsors who helped fund it (Aberfoyle, Australian Geological Survey Organisation, BHP Co Ltd, GENCOR, CRA Exploration Pty Ltd, Department of Mines and Energy, South Australia (MESA), North Ltd, MIM Exploration Pty Ltd, Newcrest Mining Limited, Pasminco Exploration, RGC Exploration Pty Ltd, RTZ Ltd, Sumitomo Metal Mining Oceania, Western Mining Corporation Ltd). I would finally like to thank Dave Gamble for his careful review.

All models created using Noddy

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Image Index
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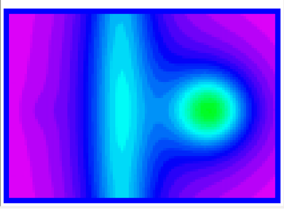
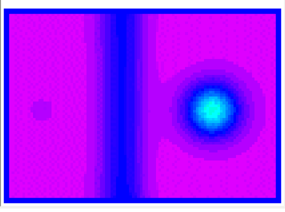
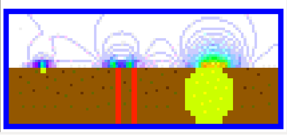
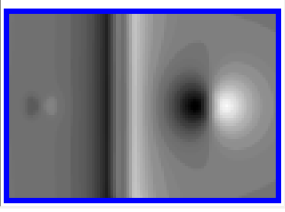
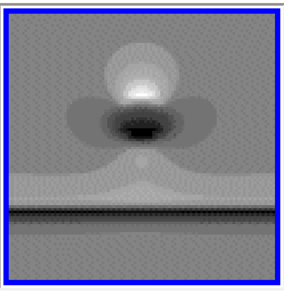
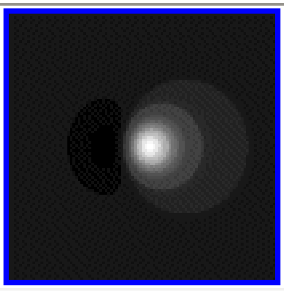
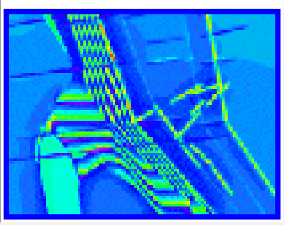
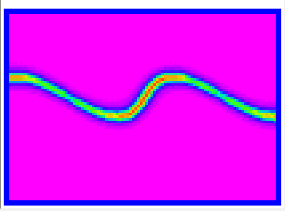
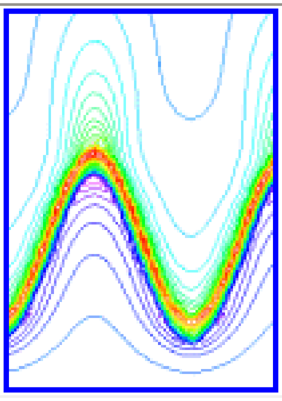
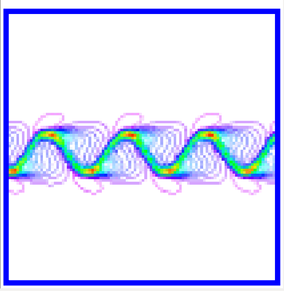
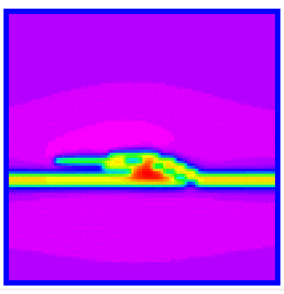
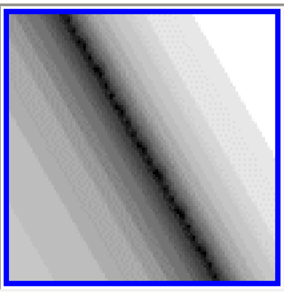
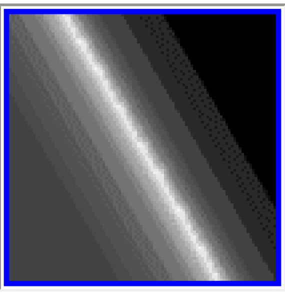
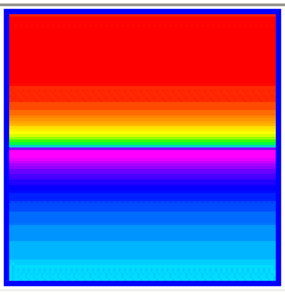
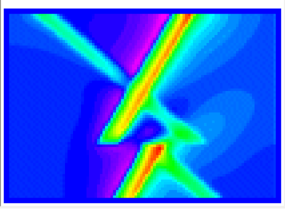
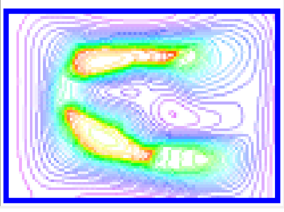
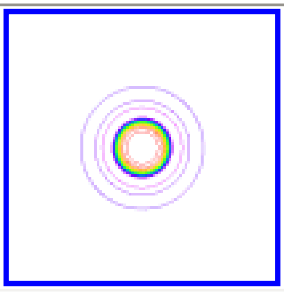
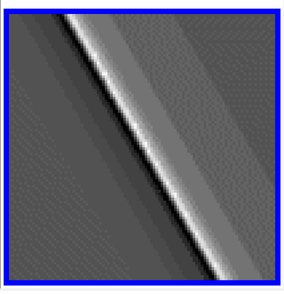
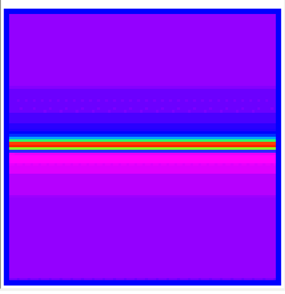
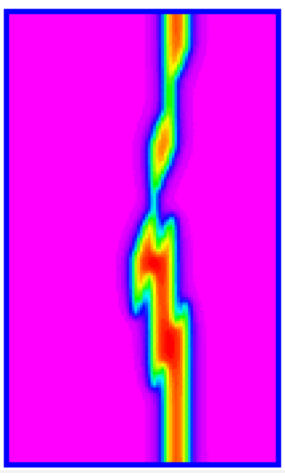
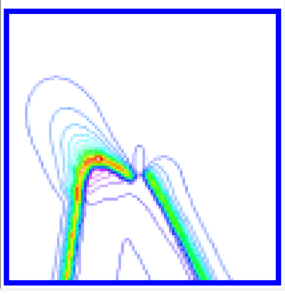
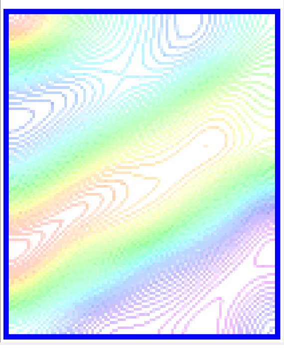
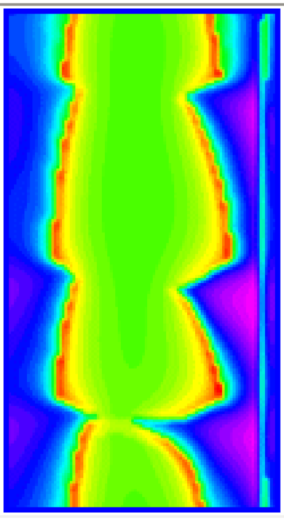
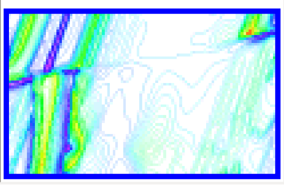
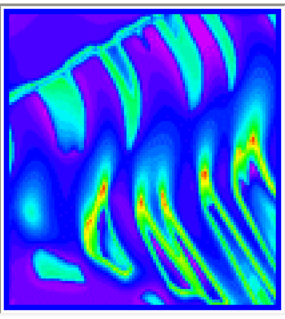
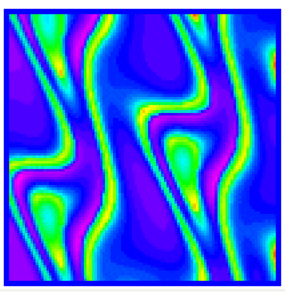
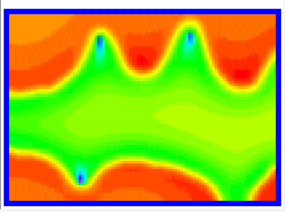
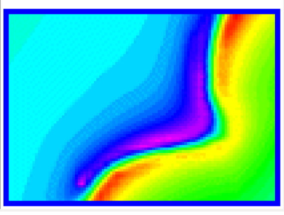
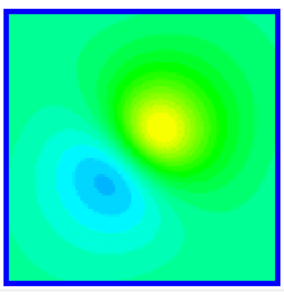
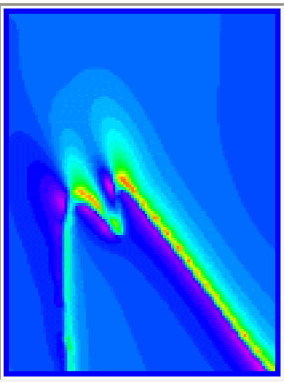
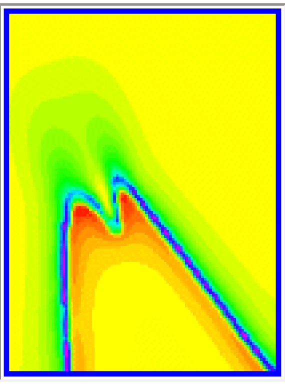
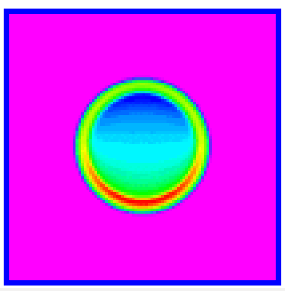
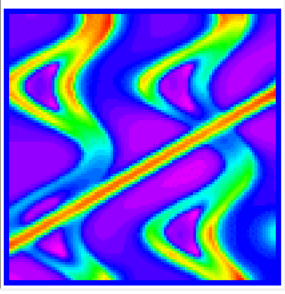
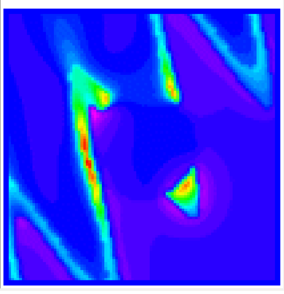
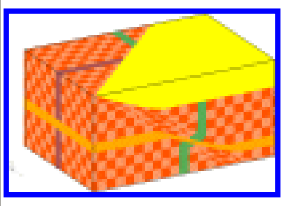
This sequence of images show the scope of the models contained in this Atlas.

Clicking on any image brings up the appropriate page showing the full ranges of related models

					
Depth effects-grav	Depth effects-mag	Section through field	Vector Components	Latitude effects	Causes of asymmetry
					
Inclination & Declination	Fold profiles	Plunge direction	Fold plunge	Ambiguous folds	Fault styles
					
Fault dip direction:a	Fault dip direction:b	Fault dip	Fault offsets	Unconformities	Ambiguous plutons
					
Dyke dip directions	Dyke dip	Faulted Dyke	Faulted Fold	Basin Setting	Block Faults
					
Fold & Thrusts	Dome & Basins	Refolded Folds	Topographic effects:a	Topographic effects:b	Remanent sphere
					
Folded Remanence	Folded Anisotropy	Remanent haloes	Alteration effects:a	Alteration effects:a	Geological Modelling Scheme

All models created using Noddy

Appendix B: Wavelet Transforms

This page contains links to a series of VRML format files showing 3D structures and their corresponding wavelet transforms. The transforms are lower resolution that the animations in the bulk of the Atlas, so that they can be loaded easily into a VRML viewer.

This page contains links to a series of VRML format files showing 3D structures and their corresponding wavelet transforms. The transforms are lower resolution that the animations in the bulk of the Atlas, so that they can be loaded easily into a VRML viewer.

The wavelet transforms display the position of the local maxima in the horizontal gradient in gravity field at various heights above the Earth's surface (as calculated by upward continuation). The colours for each position reflect the intensity of the local maximum. Additional information on wavelet transforms of potential field data can be found in the following Exploration Geophysics articles:

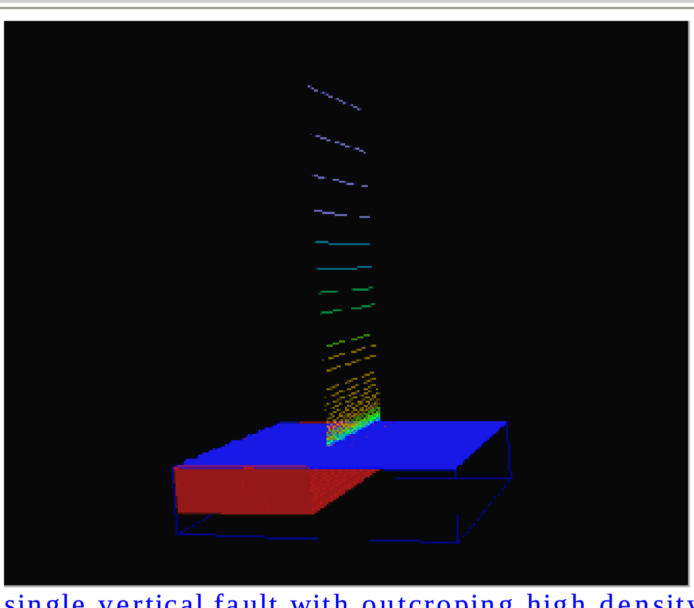
Archibald, N.J., P. Gow, and F. Boschetti, "Multiscale edge analysis of potential field data", Exploration Geophysics, 1999, 30, 38-44.

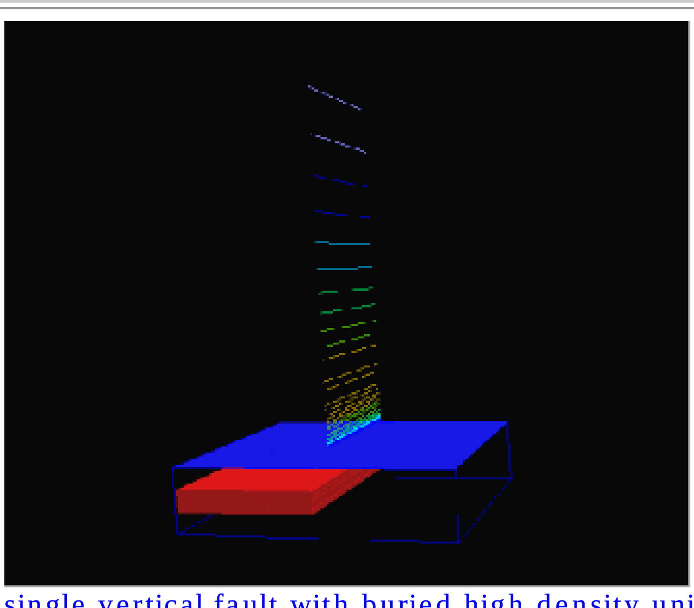
D. Holden, N. Archibald, F. Boschetti, M. Jessell “Inferring Geological Structures Using Wavelet-Based Multiscale Edge Analysis and Forward Models”, Exploration Geophysics, 2000, 31, 617-621.

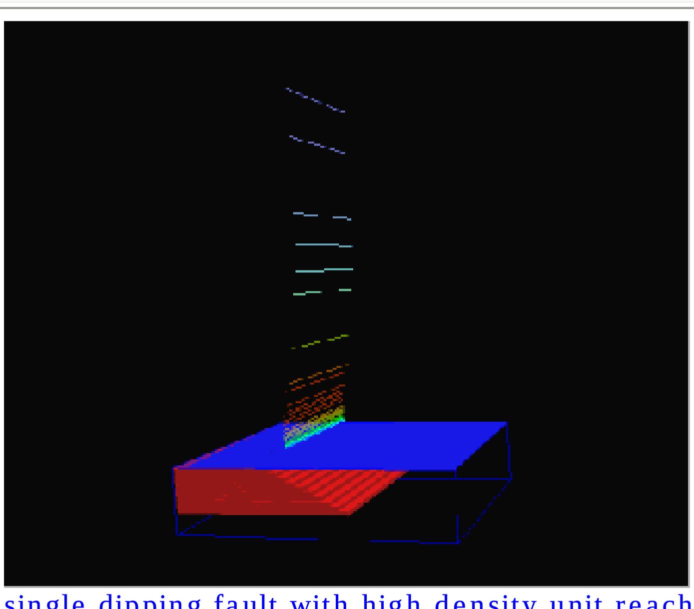
Click on the images to launch a VRML viewer. There are many different VRML Viewers available, and the availability of any one piece of software is not very stable, however *at the time of production of this site* 3D Exploration is a good one.

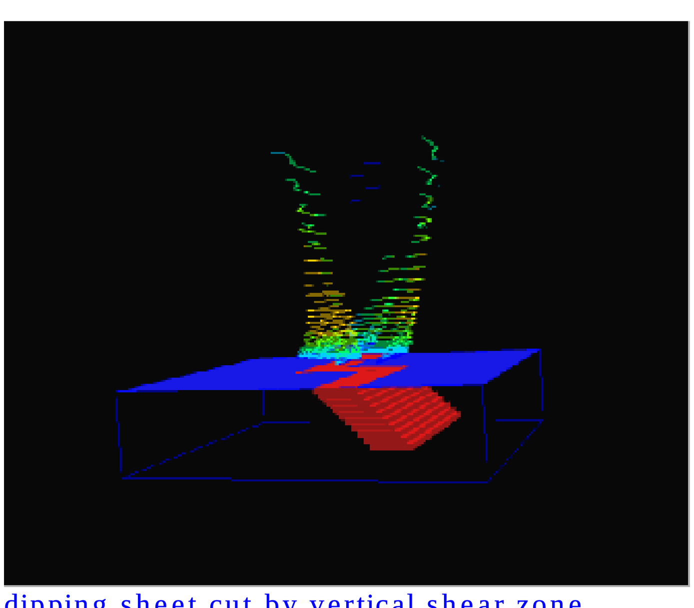
A legend is provided at the end of this page.

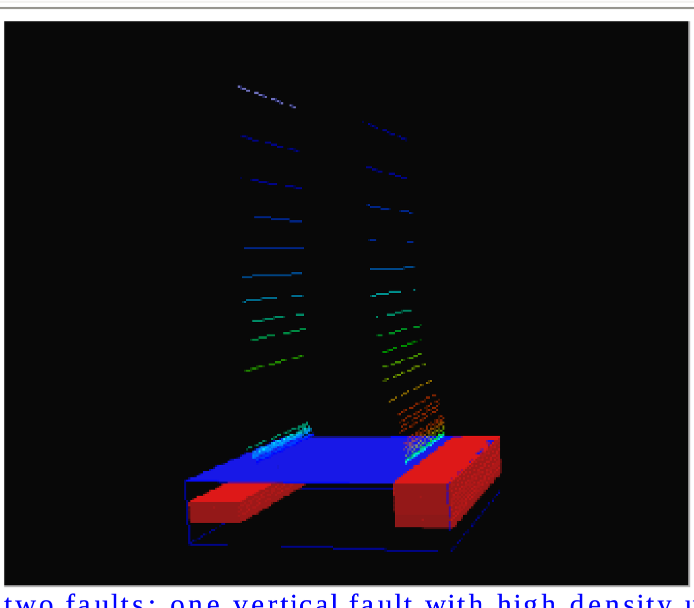
Faults and Shear zones


single vertical fault with outcroping high density unit

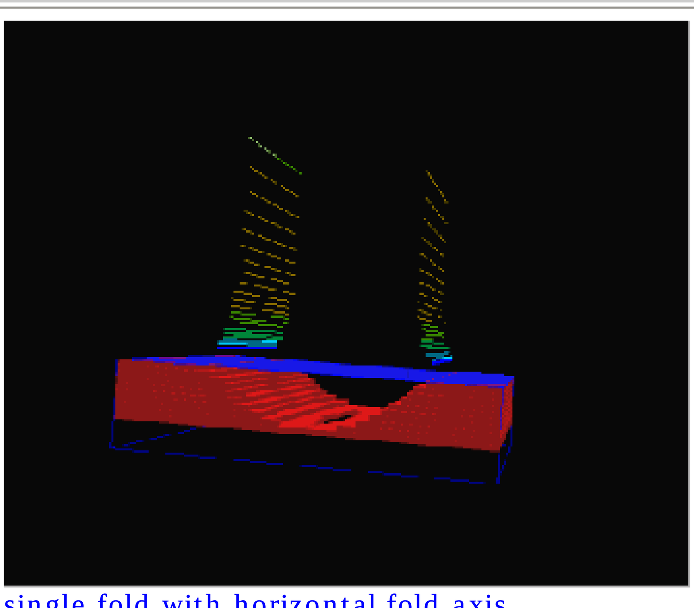

single vertical fault with buried high density unit

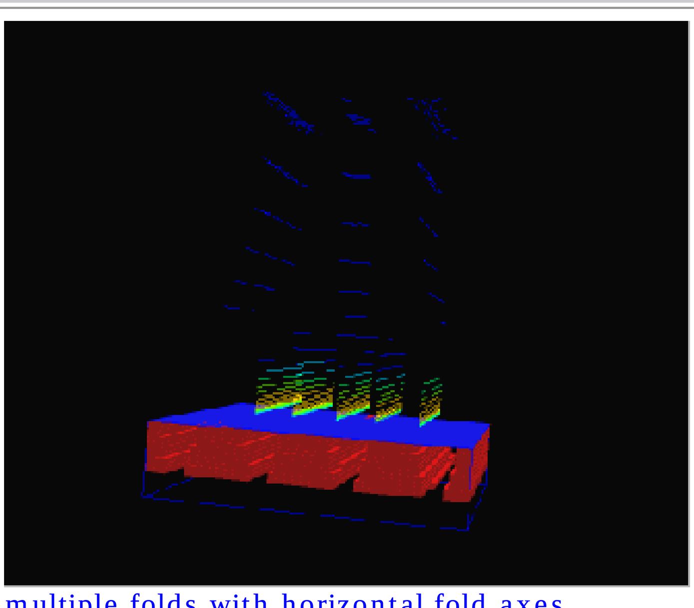

single dipping fault with high density unit reaching surface

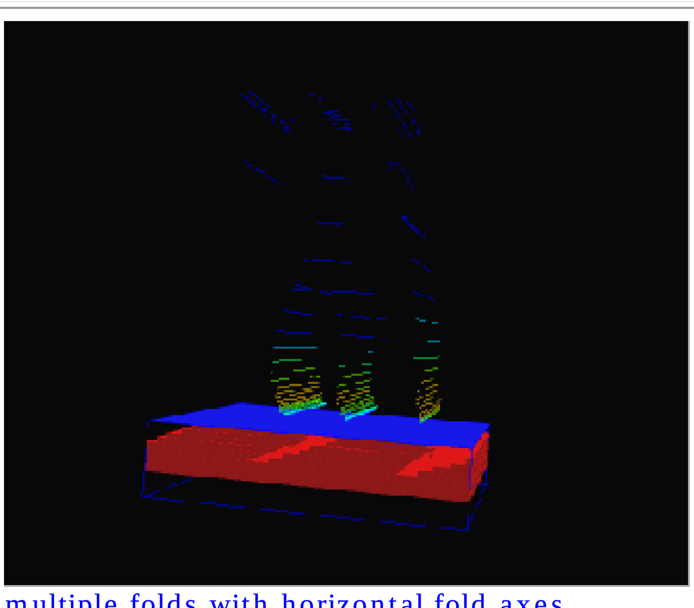

dipping sheet cut by vertical shear zone

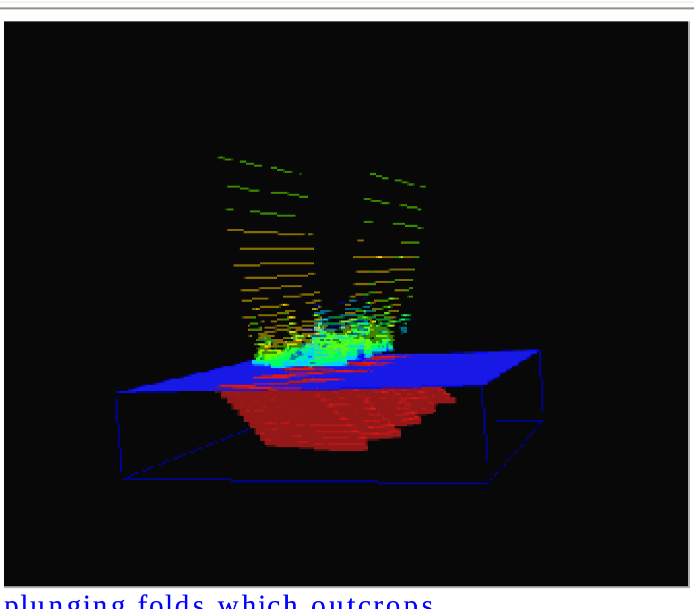

two faults: one vertical fault with high density unit that outcrops and one vertical fault which does not outcrop

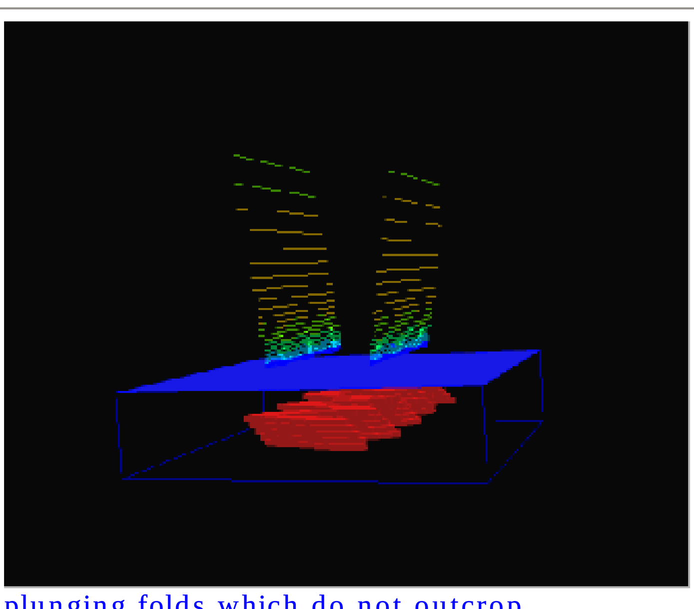
Folds


single fold with horizontal fold axis

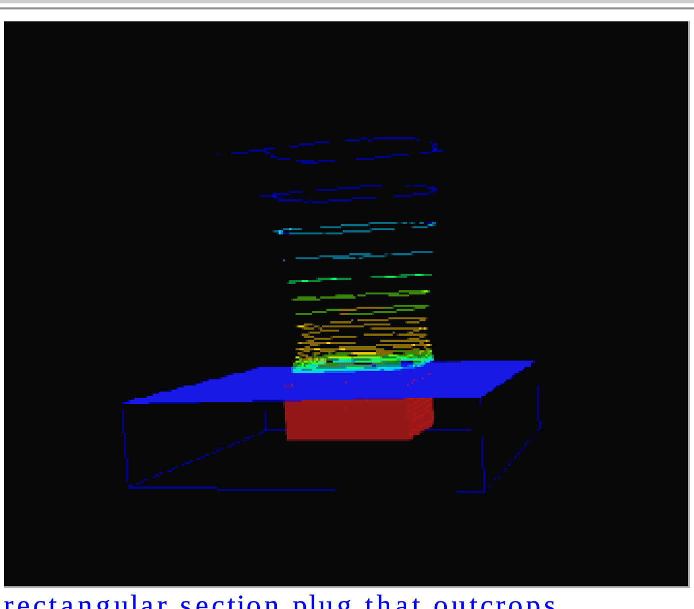

multiple folds with horizontal fold axes

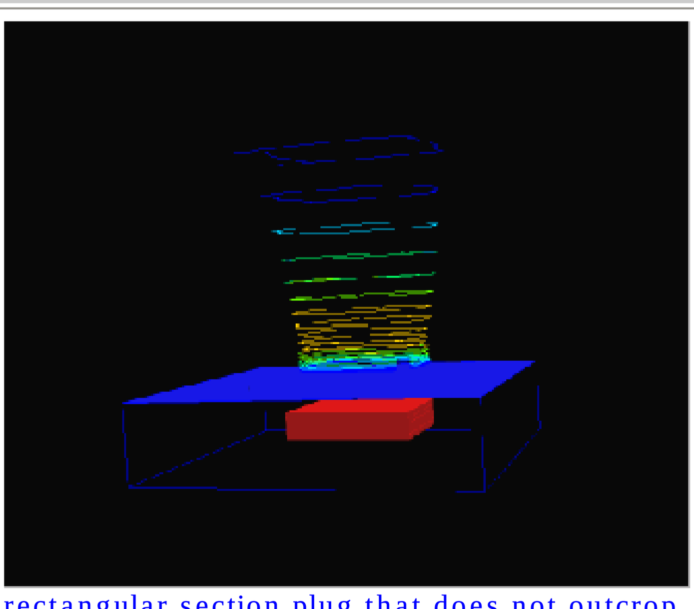

multiple folds with horizontal fold axes

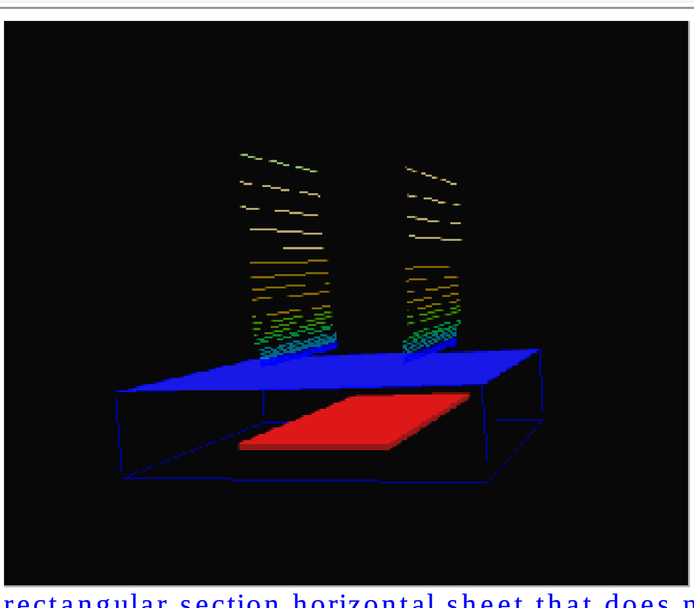

plunging folds which outcrops

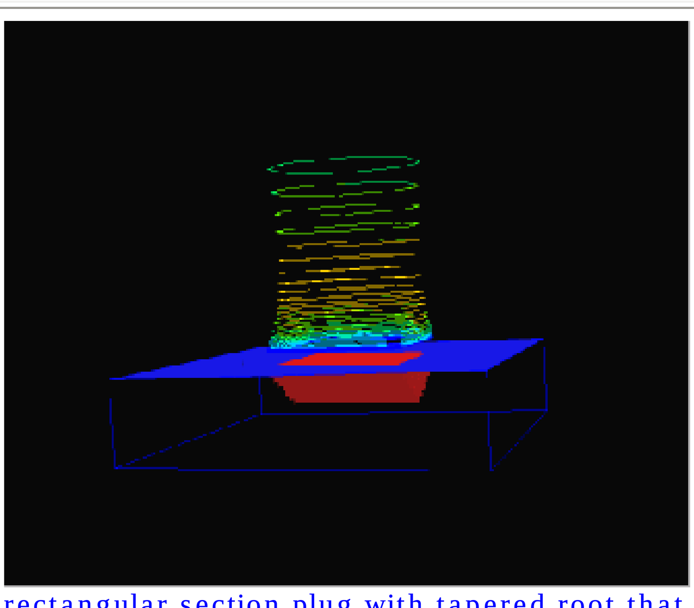

plunging folds which do not outcrop

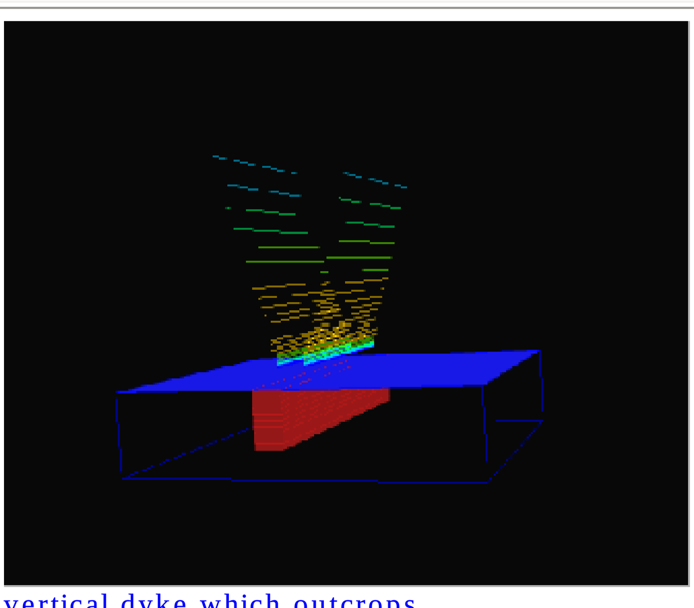
Intrusions

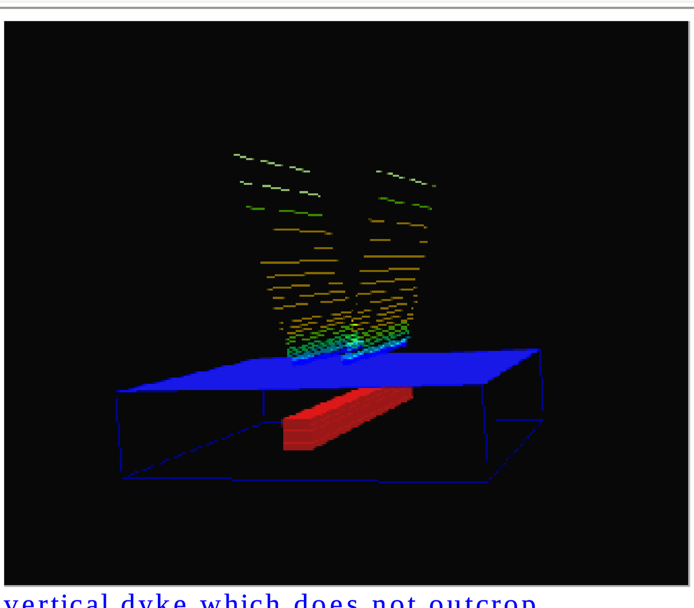

rectangular section plug that outcrops

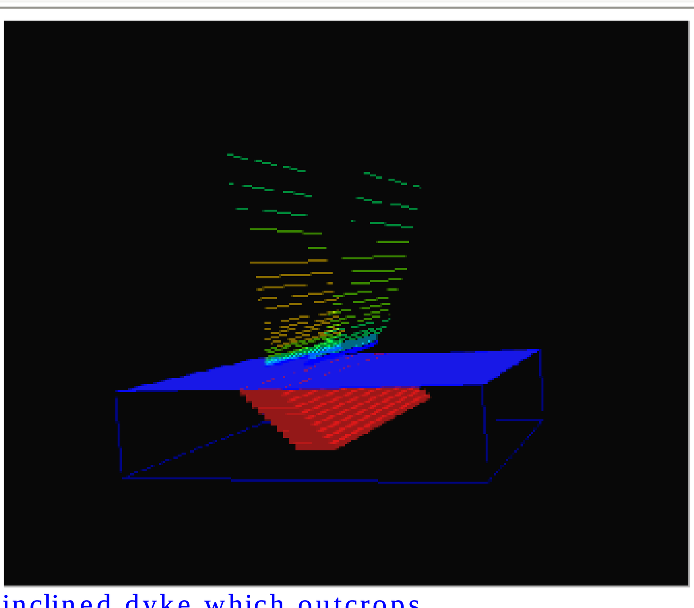

rectangular section plug that does not outcrop

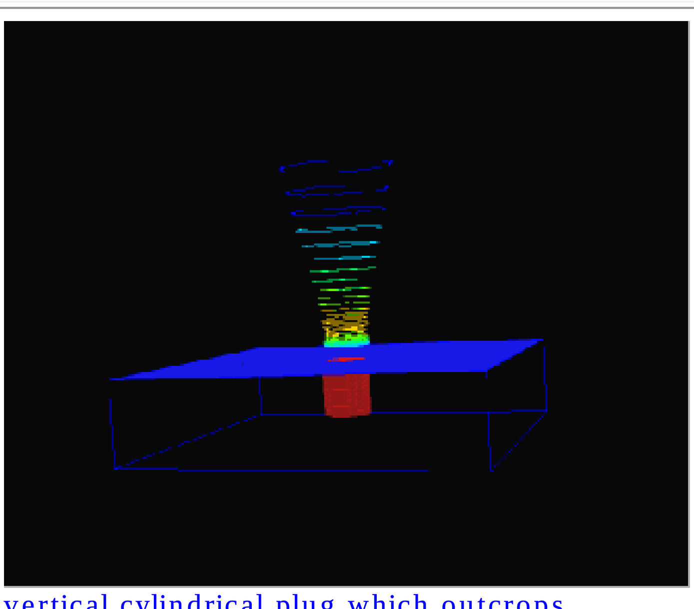

rectangular section horizontal sheet that does not outcrop

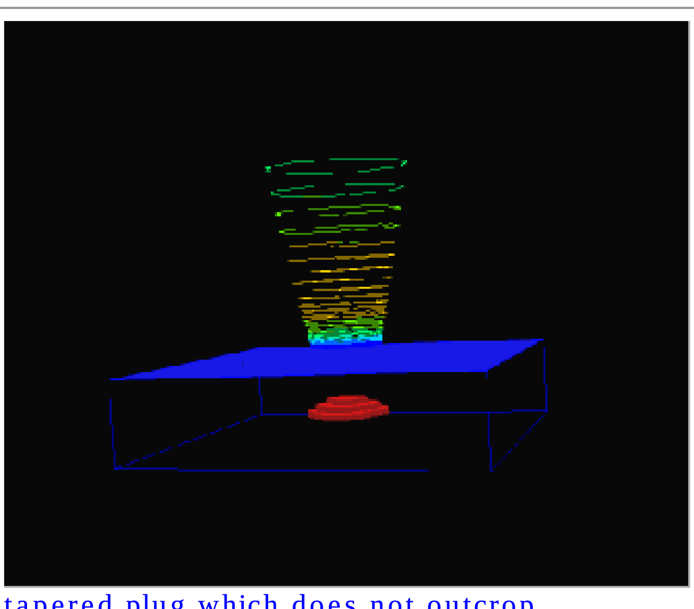

rectangular section plug with tapered root that outcrops

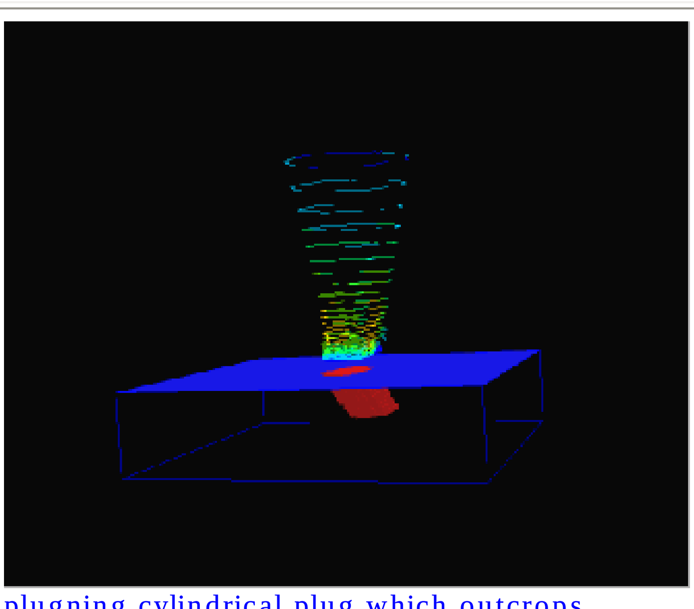

vertical dyke which outcrops

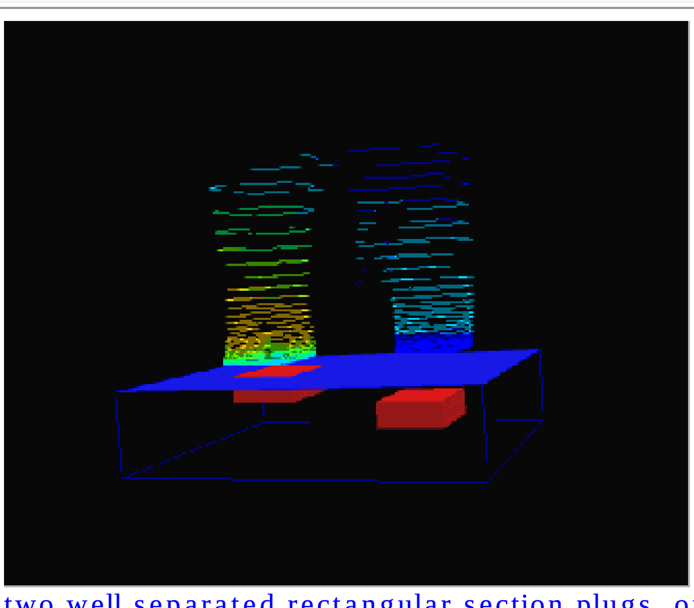

vertical dyke which does not outcrop

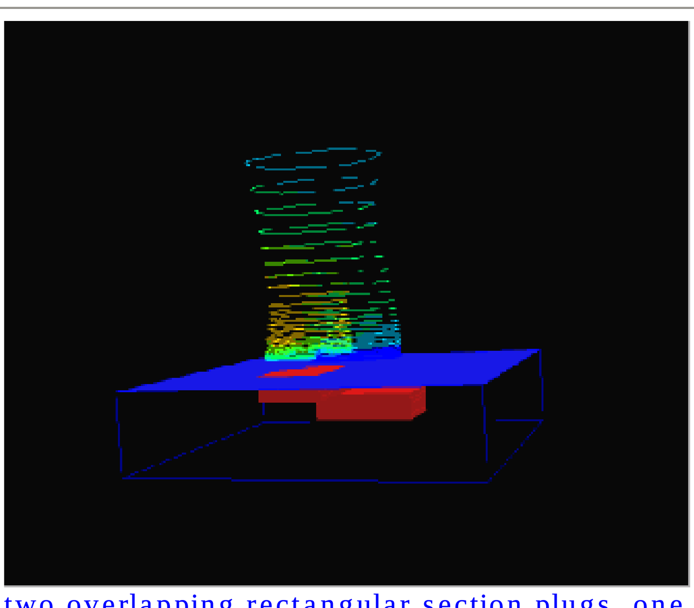

inclined dyke which outcrops


vertical cylindrical plug which outcrops


tapered plug which does not outcrop


plugging cylindrical plug which outcrops


two well separated rectangular section plugs, one outcrops


two overlapping rectangular section plugs, one outcrops

Key	Survey Parameters	Scales
high ρ = red background ρ = transparent image width 10,000 m		wavelet intensity max [colour bar] min

All models created using Noddy

WWW conversion by Ian Brayshaw

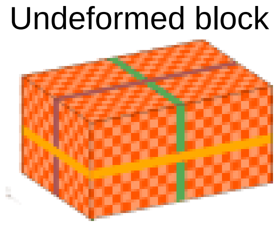
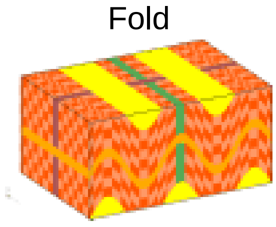
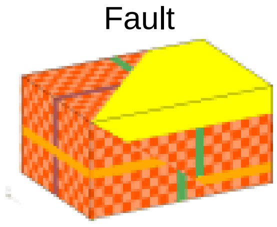
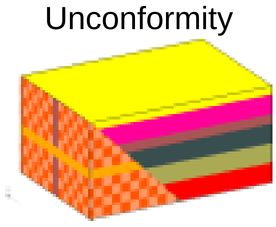
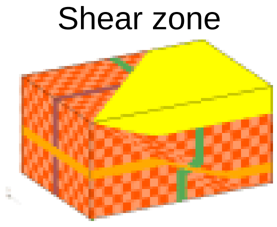
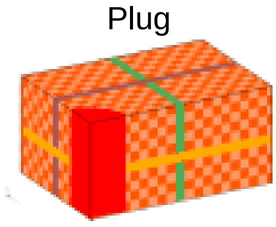
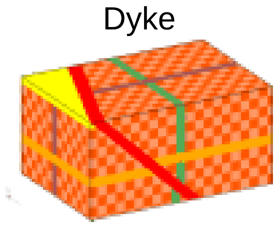
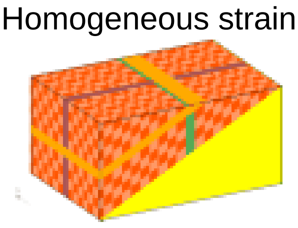
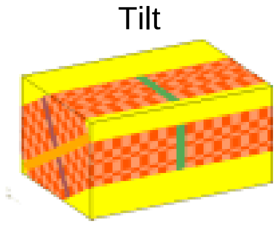
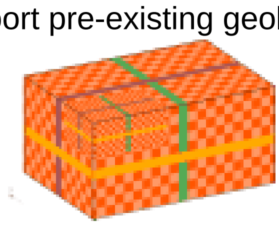
Appendix A: Geological Modelling Events

The following images show examples of all the distinct types of geological modelling events available within Noddy. With each type of event, there is a wide range of parameters which can be varied to alter its affect on the pre-existing geology. For these examples a base geology was used consisting of a three dimensional chequerboard of red and beige cubes, cut by three orthogonal planar bodies.

The chequerboard volume is in turn embedded in a uniform pale green unit which makes an appearance as a result of deformation of the line of the original volume.

Click on the images to launch Noddy.

In order to use these history files you will also need to download the following two files! chequer.g00 chequer.g12

Undeformed block  LOAD JPEG IMAGE Each cube and layer is 500 m wide. Outside the currently visible volume, there is a uniform yellow material.	Fold  LOAD JPEG IMAGE
Fault  LOAD JPEG IMAGE Normal fault.	Unconformity  LOAD JPEG IMAGE Very steep, graben wall like unconformity.
Shear zone  LOAD JPEG IMAGE Normal displacement chear zone.	Plug  LOAD JPEG IMAGE Vertical cylindrical plug.
Dyke  LOAD JPEG IMAGE	Homogeneous strain  LOAD JPEG IMAGE
Tilt  LOAD JPEG IMAGE	Import pre-existing geology  LOAD JPEG IMAGE Chequerboard re-imported with smaller cube size.

All models created using Noddy

WWW conversion by Ian Brayshaw Sunday 26 April 1998

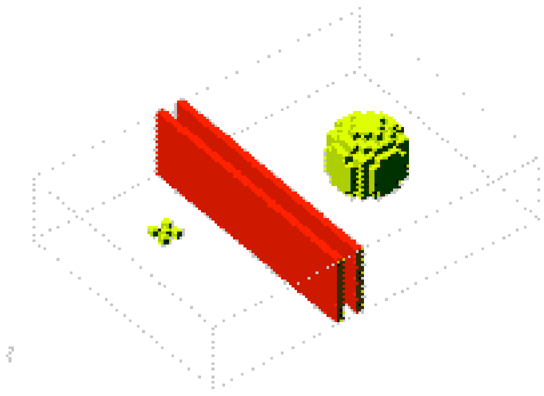
1.1 The effect on anomaly dimensions in gravity data

This sequence of images show the effect on anomaly amplitude and width of progressively burying a 1 km diameter sphere, two 200 m wide dykes and five 200 m on a side cubes by increments of 200 m.

The first row of images have the same absolute range, so this sequence shows the effect of depth on amplitude. The second row of images on have been clipped to the maximum and minimum values for each image, so this sequence shows the effect of depth on wavelength.

Click on the images to launch Noddy. A legend is provided at the end of this page.

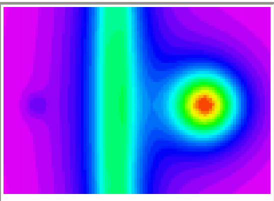
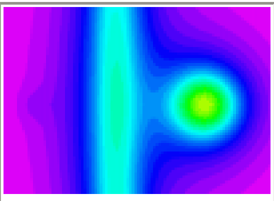
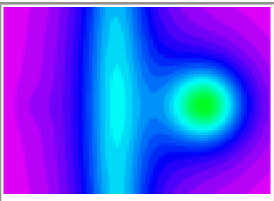
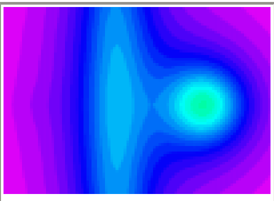
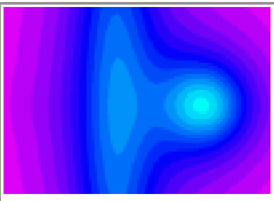
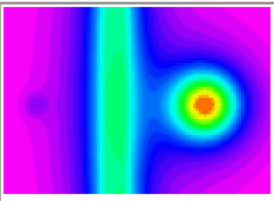
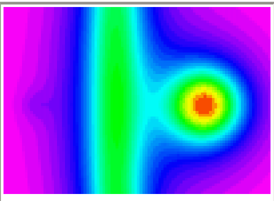
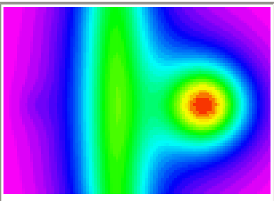
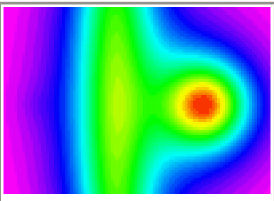
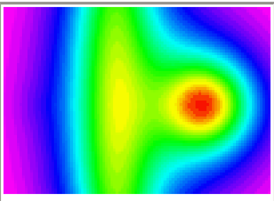
3D view of geology, looking from SW.



LOAD JPEG IMAGE

View VRML Geology Model

Summary wavelet transform animation comparing 3 different depths

	Pseudo colour gravity images at various depths measured from top				
	200 m	400 m	600 m	800 m	1000 m
Link					
Effect of depth on amplitude	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Effect of depth on wavelength	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Survey Parameters	Scales
plug & dyke ρ = 1 background ρ = 0 image width 10,000 m	flying height 200 m to 1000 m	100 [colour bar] 0 max [colour bar] min

All models created using Noddy

WWW conversion by Ian Brayshaw

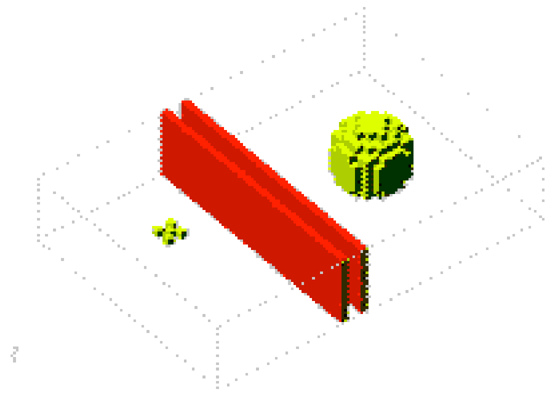
1.2 The effect on anomaly dimensions in magnetic data

This sequence of images show the effect on anomaly amplitude and width of progressively burying a 1 km diameter sphere, two 200 m wide dykes and five 200 m on a side cubes by increments of 200 m.

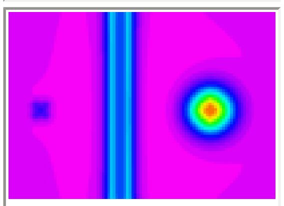
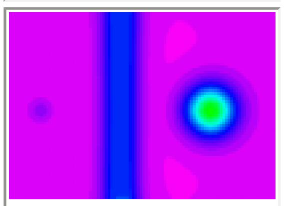
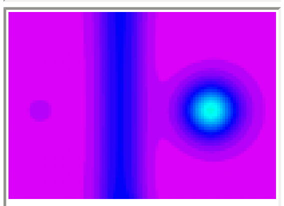
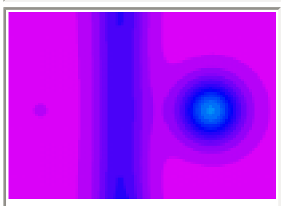
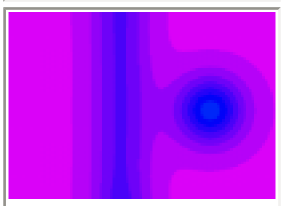
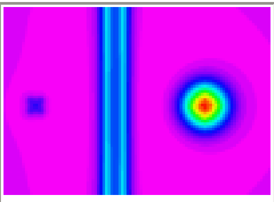
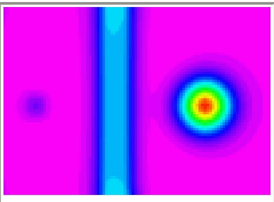
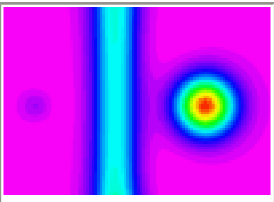
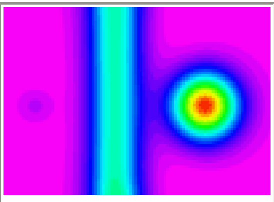
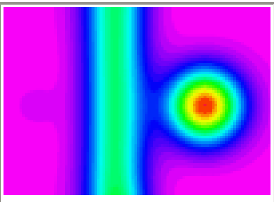
The first row of images have the same absolute range, so this sequence shows the effect of depth on amplitude. The second row of images on have been clipped to the maximum and minimum values for each image, so this sequence shows the effect of depth on wavelength.

Click on the images to launch Noddy. A legend is provided at the end of this page.

3D view of geology, looking from SW.



LOAD JPEG IMAGE

	Pseudo colour magnetic images at various depths measured from top				
Link	200 m	400 m	600 m	800 m	1000 m
Effect of depth on amplitude	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Effect of depth on wavelength	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key		Survey Parameters		Scales	
plugs & dykes	$\kappa = 10^{-2}$	inclination	90°	2500	-200
background	$\kappa = 0$	intensity	70,000 gamma	max	min
image width	10,000 m	flying height	200 m to 1000 m		

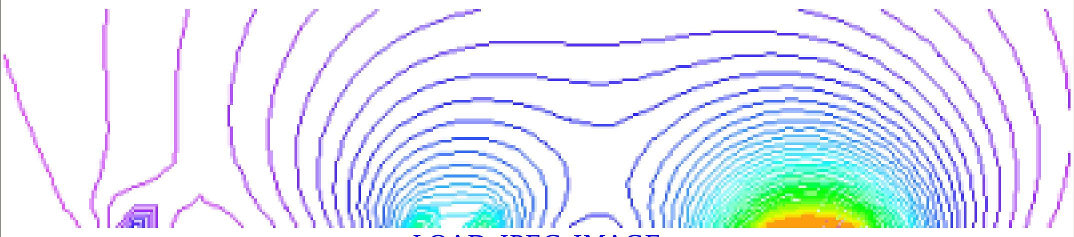
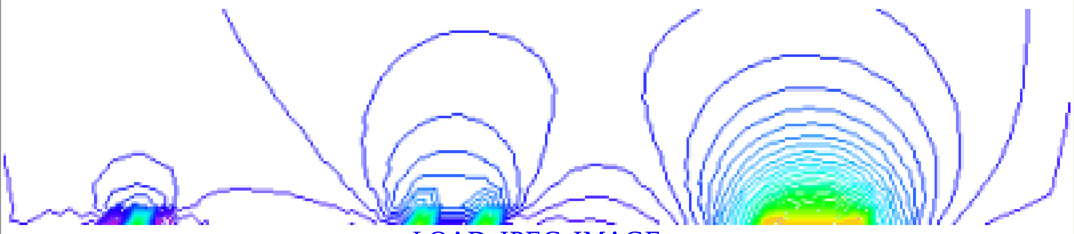
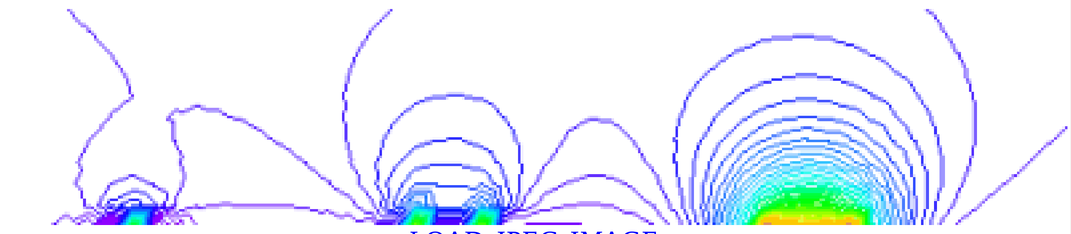
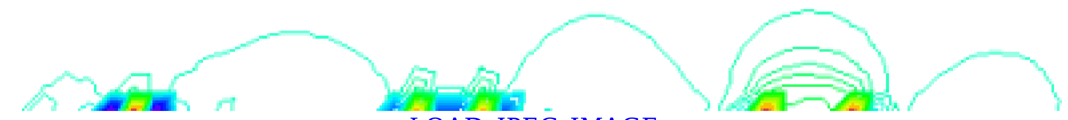
All models created using Noddy

WWW conversion by Ian Brayshaw

1.3 A cross section through the gravity and magnetic fields

These models show a vertical section through the gravity and magnetic fields, and their respective derivatives. The section is an East-West section drawn through the middle of the models used in sections 1.1 and 1.2. Each section (at equal horizontal and vertical scale) shows how the intensity of the field decays with height above the body, and at what height the distinct anomalies associated with each body merge with each other.
Notice the correlation between the first vertical derivative of the gravity field and the total field magnetics.

Click on the images to launch Noddy. A legend is provided at the end of this page.

East-West sections with altitude variations from 0 m to 2000 m	
Gravity 0 m · 200 m · 400 m · 600 m · 800 m · 1000 m · 1200 m · 1400 m · 1600 m · 1800 m · 2000 m	 LOAD JPEG IMAGE
Gravity First Vertical Derivative 0 m · 200 m · 400 m · 600 m · 800 m · 1000 m · 1200 m · 1400 m · 1600 m · 1800 m · 2000 m	 LOAD JPEG IMAGE
Magnetics 0 m · 200 m · 400 m · 600 m · 800 m · 1000 m · 1200 m · 1400 m · 1600 m · 1800 m · 2000 m	 LOAD JPEG IMAGE
Magnetics First Vertical Derivative 0 m · 200 m · 400 m · 600 m · 800 m · 1000 m · 1200 m · 1400 m · 1600 m · 1800 m · 2000 m	 LOAD JPEG IMAGE
Geology	 LOAD JPEG IMAGE

Key			Survey Parameters		Scale
plugs & dykes	ρ = 1	κ = 10^{-2}	inclination	90°	max [colour bar] min
background	ρ = 0	κ = 0	intensity	70,000 gamma	
image width	10,000 m		flying height	0 m to 2000 m	
image height	2,000 m				

All models created using Noddy

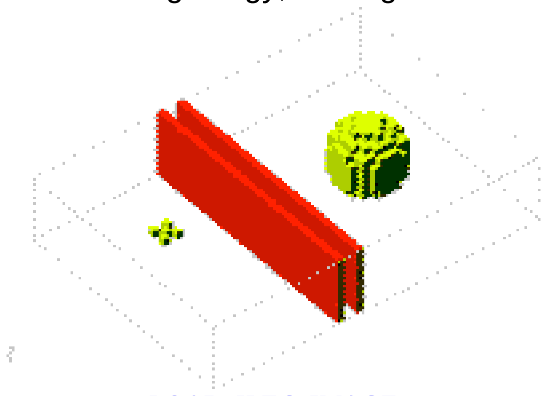
WWW conversion by Ian Brayshaw

1.4 Vector components of a magnetic field

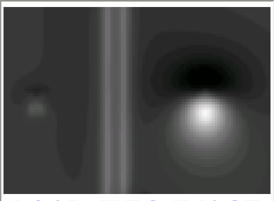
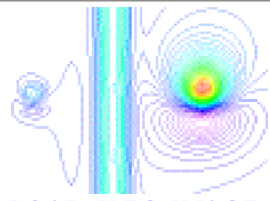
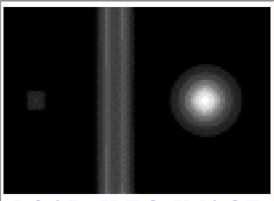
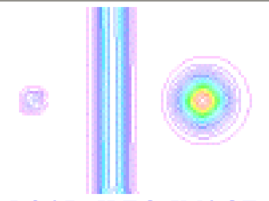
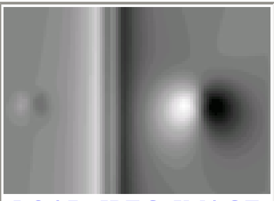
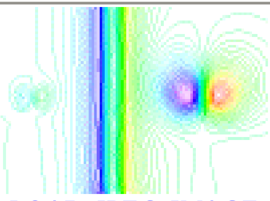
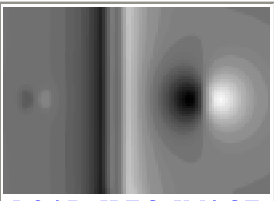
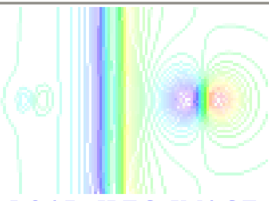
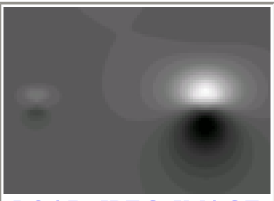
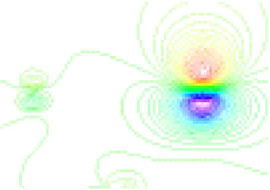
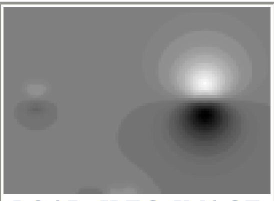
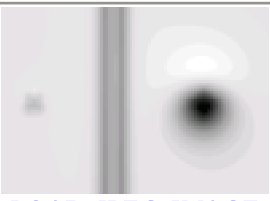
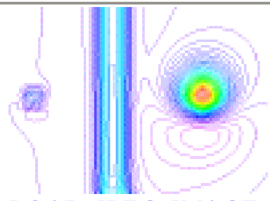
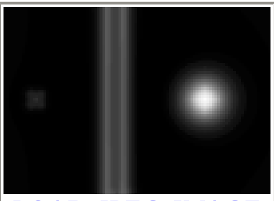
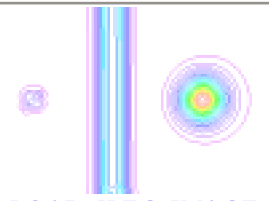
These models use the same base geology as the previous sections, but compare the total magnetics with the three vector components of the field, for a model calculated first at an inclination of -50° and then at -90°. The assymetries in the vector and total field images arise from a combination of obliquity of the Earth's field (for the first two columns of images) combined with the superposition of the symmetric anomalies for all images.

Click on the images to launch Noddy. A legend is provided at the end of this page.

3D view of geology, looking from SW.



LOAD JPEG IMAGE

	Inclination of 50°		Inclination of 90°	
Link	**Grey Scale**	**Pseudo Colour Contours**	**Grey Scale**	**Pseudo Colour Contours**
Anomalous component of total field	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
X component of total field	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Y component of total field	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE
Z component of total field	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key		Survey Parameters		Scales
plugs & dykes	κ = 10^{-2}	inclination	50° or 90°	max [grey scale bar] min
background	κ = 0	intensity	50,000 or 70,000 gamma	max [colour scale bar] min
image width	10,000 m	flying height	200 m	

All models created using Noddy

WWW conversion by Ian Brayshaw

1.5 The effect of changing latitude on anomaly shapes in magnetic data

The sequence of images show the effect on anomaly shape of calculating the TMI for an East-West dyke and vertical cylinder, at different southern hemisphere latitudes. For latitudes between 30°N and 60°N the anomaly shapes are quite similar, with the main changes being the increasing anomaly amplitude with higher latitudes (because the Earth's field increases in intensity towards the poles). At latitudes near the pole and the equator the anomaly shape starts to become noticeably more symmetric, with highs over the bodies at the pole and lows over the bodies at the equator.

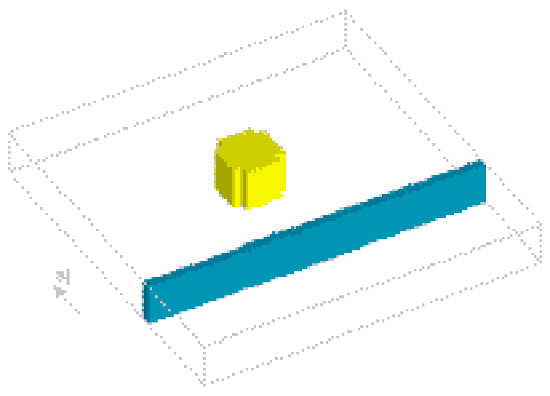
The cylindrical plug shows only orthogonal symmetry at the equator, whereas at the pole it shows radial symmetry.
Note how the offset of the magnetic high varies with latitude.

The grey scale images share a fixed look up table to illustrate the anomaly amplitude variations.
The colour images each have a look up table clipped to their maximum and minimum values to highlight the anomally shapes.

The plug is centred at 4800N 4000E and the dyke is centred on 2100N. The grid overlay has 1000 m spacing.

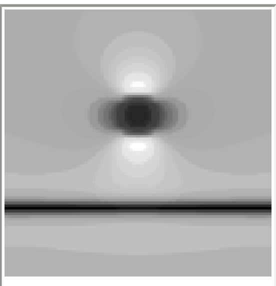
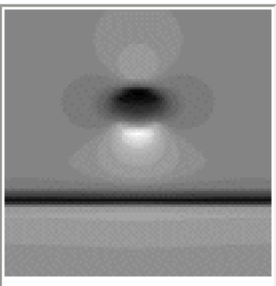
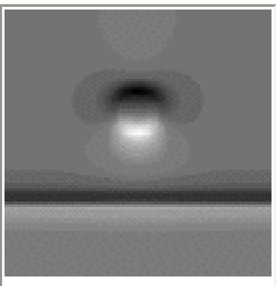
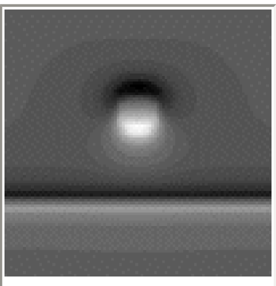
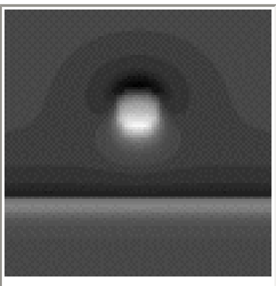
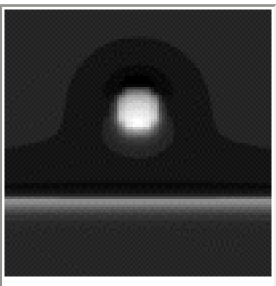
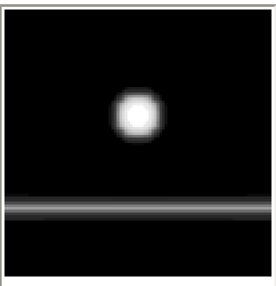
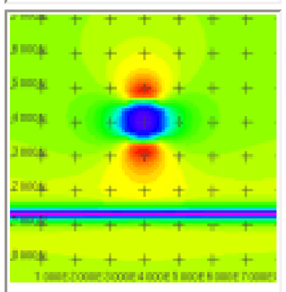
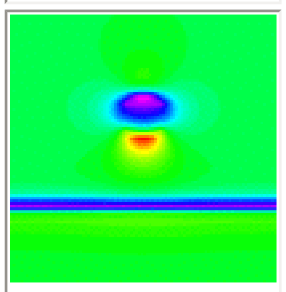
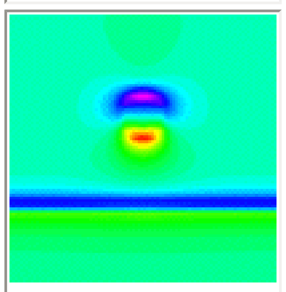
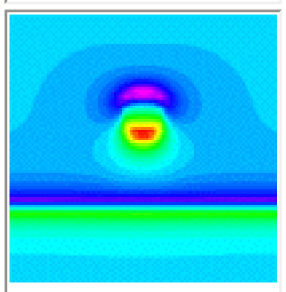
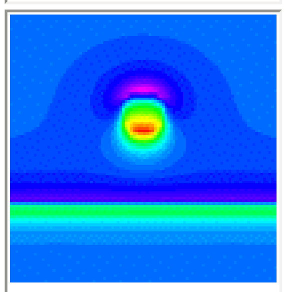
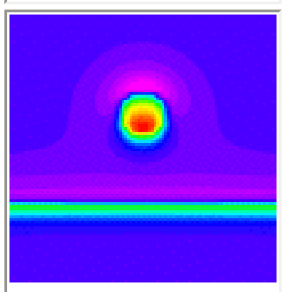
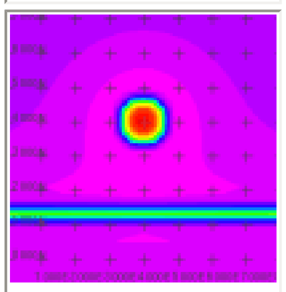
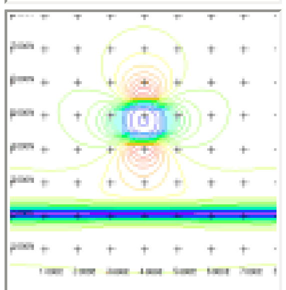
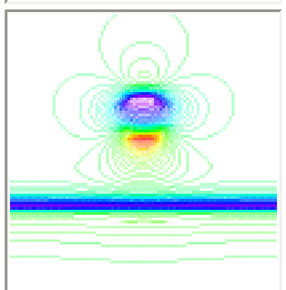
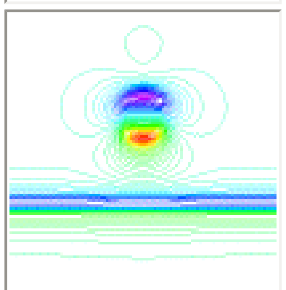
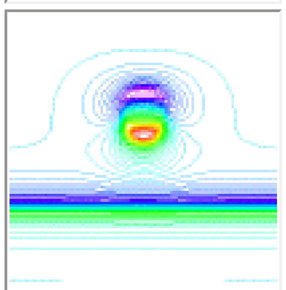
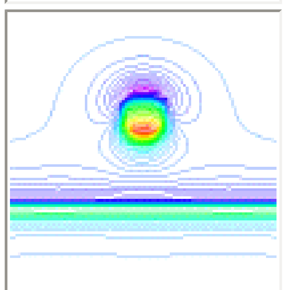
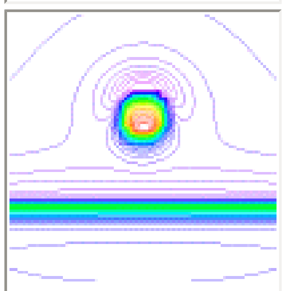
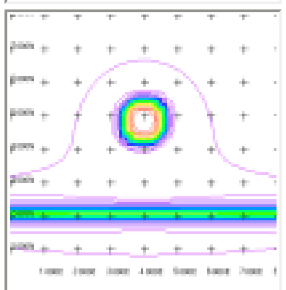
Click on the images to launch Noddy. A legend is provided at the end of this page.

View of 500 m wide East-West dyke and 1000 m radius vertical cylindrical plug.



LOAD JPEG IMAGE

View direction is from SW.

	TMI at different latitudes with varying intensity of the Earth's magnetic field						
Link	0° eg Jakarta	15° eg Dakar	30° eg New Orleans	45° eg Minneapolis	60° eg Shetland Islands	75° eg New Siberian Islands	90° eg North Pole
Grey Scale	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE
Psuedo Colour	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE	 LOAD JPEG IMAGE
Psuedo Colour Contours	 LOAD TIFF IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE	 LOAD JPEG IMAGE
Earth's Field	25,000 gamma	35,000 gamma	44,000 gamma	50,000 gamma	56,000 gamma	64,000 gamma	70,000 gamma
Comment	*Notice the orthogonal plug symmetry.*						*Notice the radial plug symmetry*

Key	Survey Specifications	Scales
plug $\kappa = 10^{-2}$ dyke $\kappa = 10^{-2}$ background $\kappa = 0$ image width 10,000 m	flying height 80 m	3000 [grey scale bar] -2000 max [colour scale bar] min

All models created using Noddy

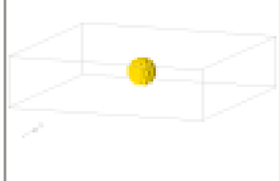
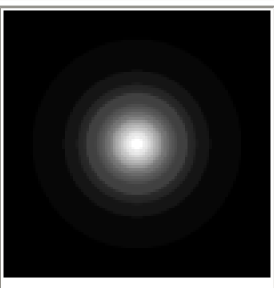
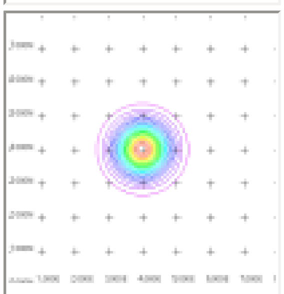
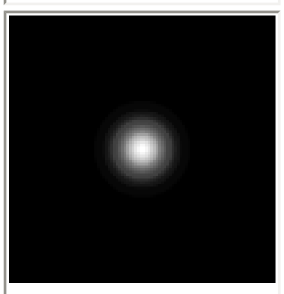
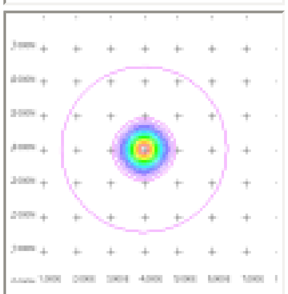
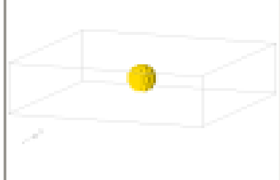
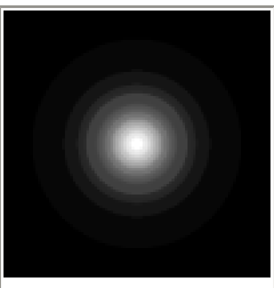
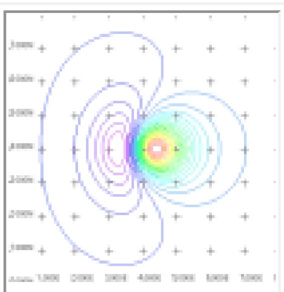
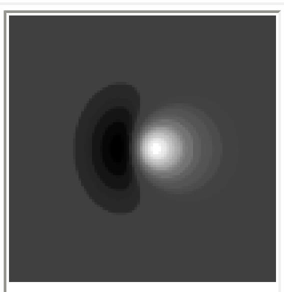
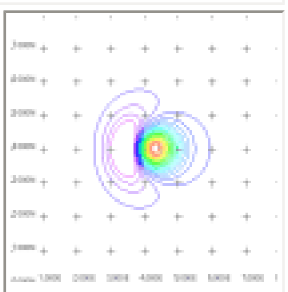
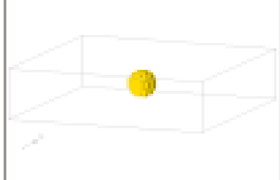
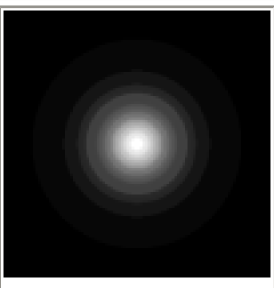
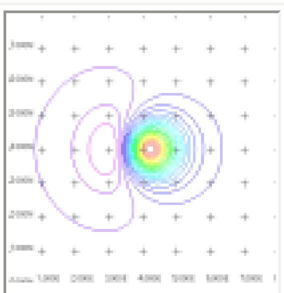
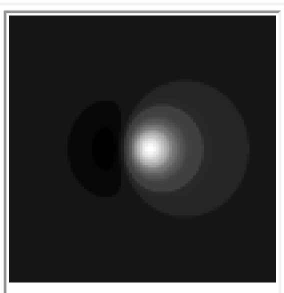
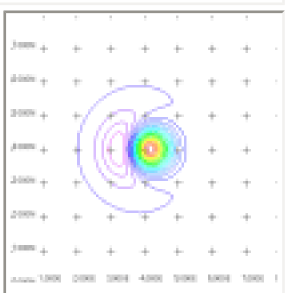
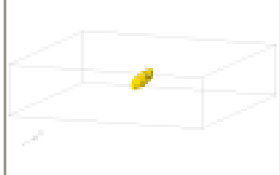
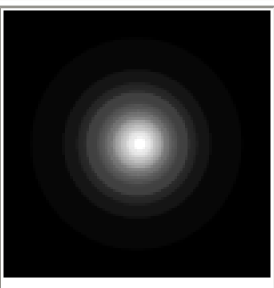
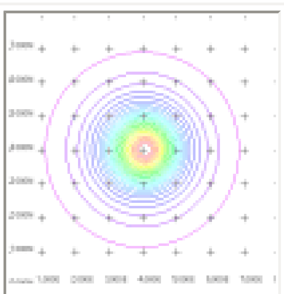
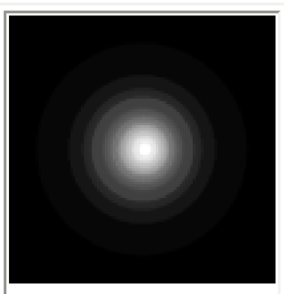
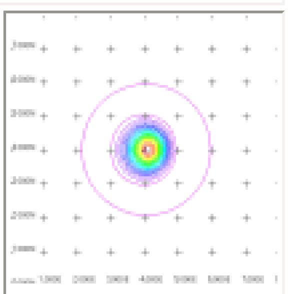
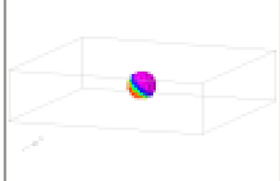
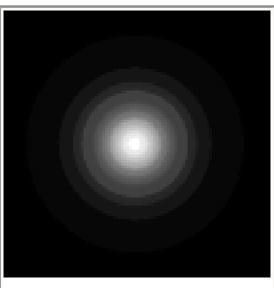
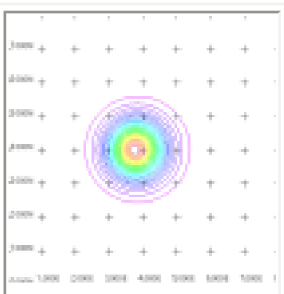
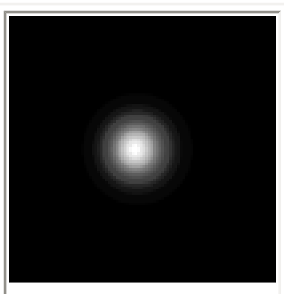
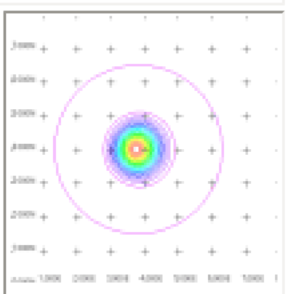
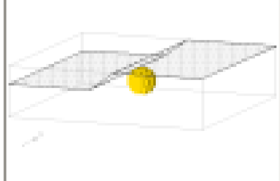
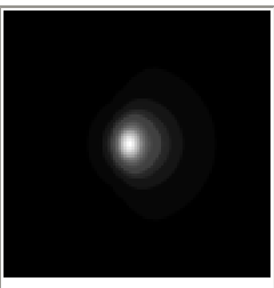
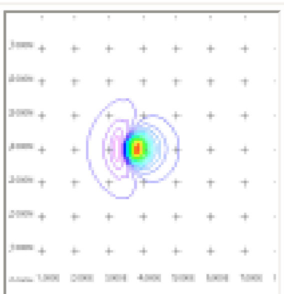
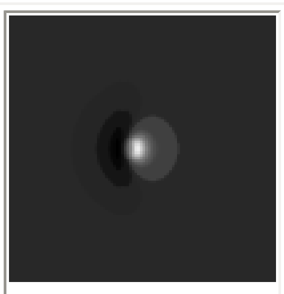
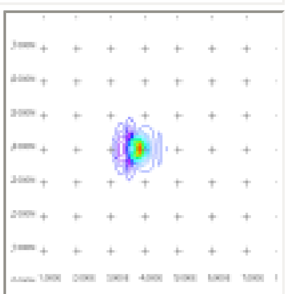
WWW conversion by Ian Brayshaw

1.6 Asymmetries in magnetic and gravity data

These models show some of the possible causes of asymmetry in gravity and magnetic anomalies. The first shows the symmetric anomaly due to a uniformly magnetised sphere at the South Pole and the subsequent images show the effect of individually varying the inclination of the Earth's magnetic field, adding a remanent magnetisation to the sphere, changing the shape of the body to an ellipsoid, varying the rock properties within the sphere and finally measuring the field at a non-uniform height above the body. The grid spacing is 1000 m and the sphere is centred over 4000E 4000N.
Similar images are also displayed for gravity models.

Geology is viewed from SE.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics 1VD
Spherical body calculated at South Pole	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows radially symmetric gravity and magnetic fields.				
Spherical body calculated at an inclination of 50° and a declination of 90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows a radially symmetric gravity and an asymmetric magnetic field with an EW symmetry plane.				
Spherical body calculated at South Pole with remanent magnetisation	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows a radially symmetric gravity and an asymmetric magnetic field with an EW symmetry plane. The remanent vector has an inclination of 45° and a declination of 90°.				
Elliptical body calculated at South Pole	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows asymmetric gravity and magnetic fields with an EW symmetry plane. Body dips at 45° towards 270°.				
Spherical body calculated at South Pole with asymmetric alteration pattern	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows asymmetric gravity and magnetic fields with an EW symmetry plane. Panels of equal rock properties dip at 45° towards 90° (red is high density/susceptibility).				
Spherical body calculated at South Pole with variable survey heights	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows asymmetric gravity and magnetic fields with an EW symmetry plane. The survey heights are displayed as a stippled plane.				

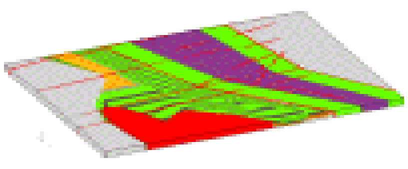
Key	Survey Parameters	Scales
sphere ρ = 1 κ = 10^{-2} background ρ = 0 κ = 0 image width 8,000 m	inclination 50° or 90° declination 0° or 90° intensity 50,000 or 70,000 gamma flight height 80 m or variable	max min max min

All models created using Noddy

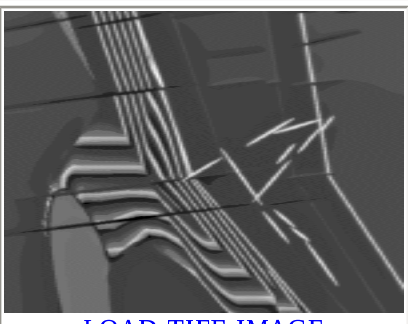
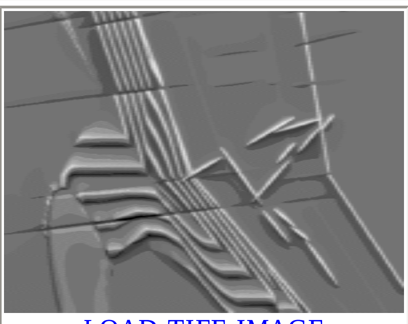
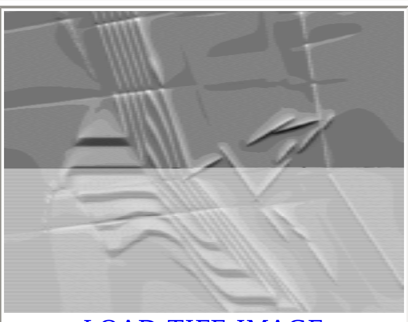
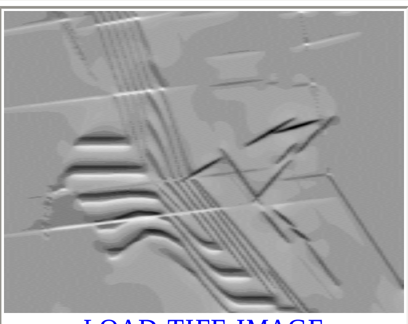
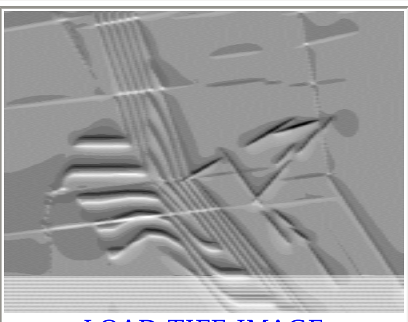
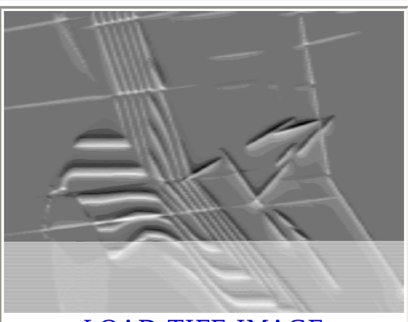
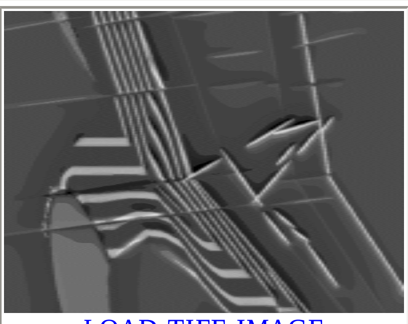
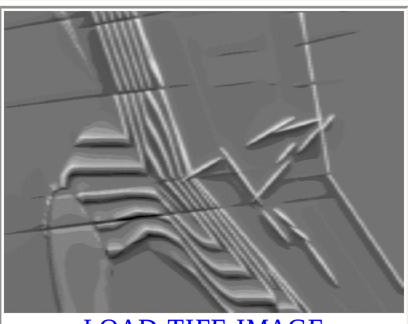
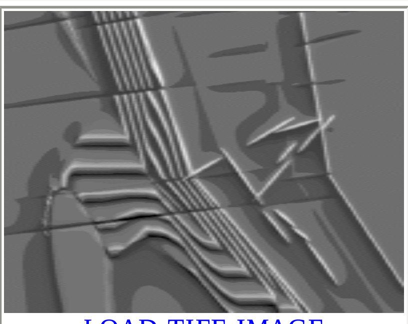
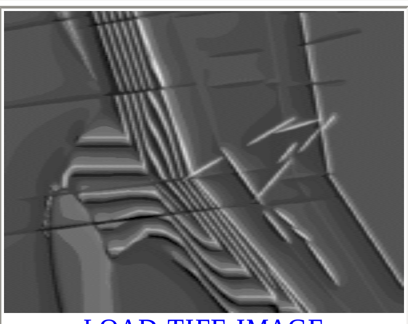
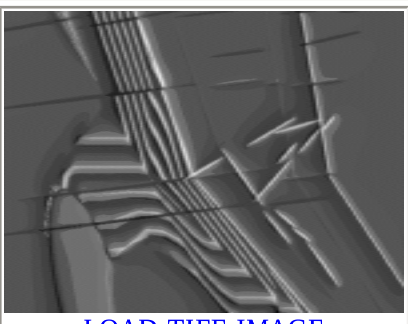
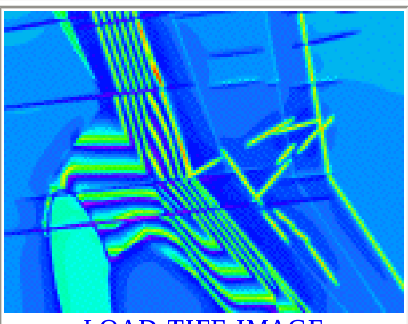
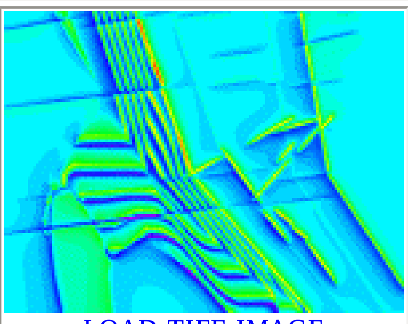
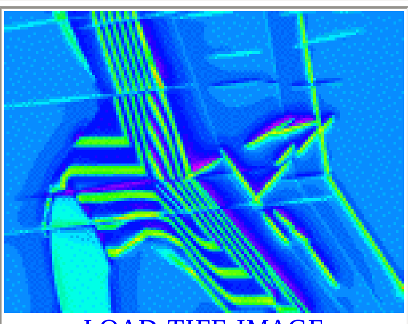
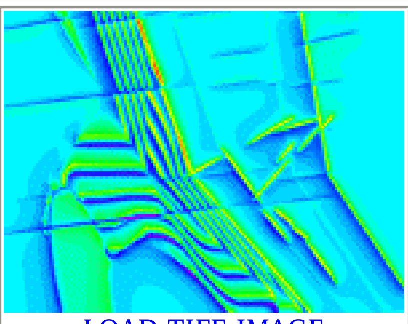
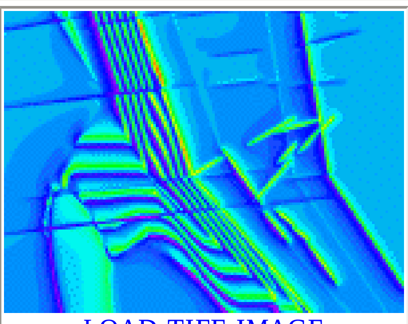
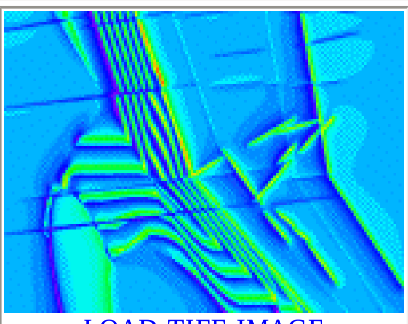
1.7 Magnetic inclination and declination effects for complex structures

This sequence shows the variations in anomaly patterns in an area of complex structure, resulting from systematically varying the magnetic inclination and declination. The original model is based on the geology seen at the North end of the Widgiemooltha Dome in the Yilgarn Craton of Western Australia, and was developed by Rick Valenta.

Click on the images to launch Noddy. A legend is provided at the end of this page.



LOAD TIFF IMAGE

Link	Magnetics	Magnetics	Magnetics	Magnetics
Widgiemooltha model at various magnetic inclinations - greyscale image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination 90 Declination 0	Inclination -60 Declination 0	Inclination -30 Declination 0	Inclination -15 Declination 0
Widgiemooltha model at various magnetic inclinations - greyscale image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination +0 Declination 0	Inclination +15 Declination 0	Inclination +30 Declination 0	Inclination +60 Declination 0
Widgiemooltha model at various magnetic inclinations - greyscale image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination -60 Declination 0	Inclination -60 Declination 30	Inclination -60 Declination 60	Inclination -60 Declination 90
Widgiemooltha model at various magnetic declinations - colour image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination 90 Declination 0	Inclination -60 Declination 0	Inclination -30 Declination 0	Inclination -15Declination 0
Widgiemooltha model at various magnetic inclinations - colour image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination +00 Declination 0	Inclination +15 Declination 0	Inclination +30 Declination 0	Inclination +60 Declination 0
Widgiemooltha model at various magnetic declinations - colour image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination -60 Declination 0	Inclination -60 Declination 30	Inclination -60 Declination 60	Inclination -60 Declination 90

Key	Survey Parameters		Scales
image width 28,000 m	Inclination	varied	max [greyscale bar] min
	Intensity	63,000 gamma	max [colour bar] min
	Flight height	60 m	

All models created using Noddy

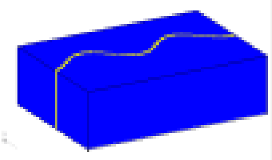
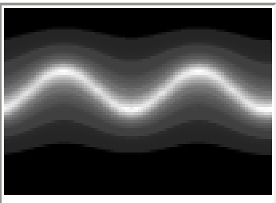
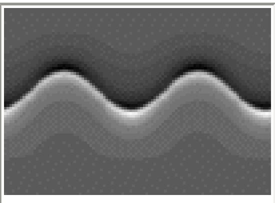
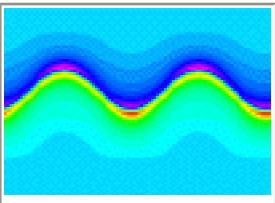
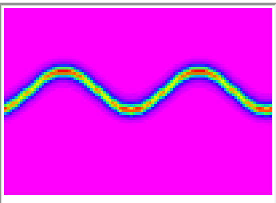
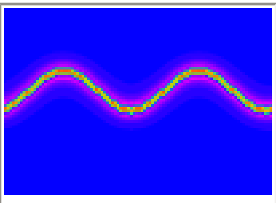
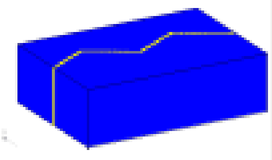
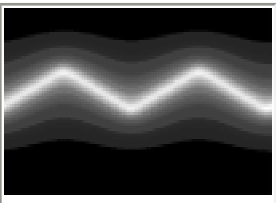
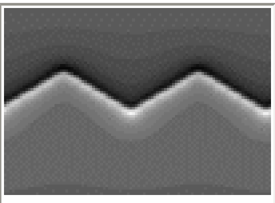
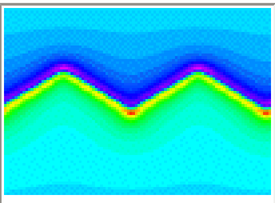
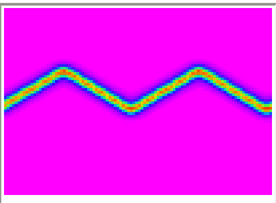
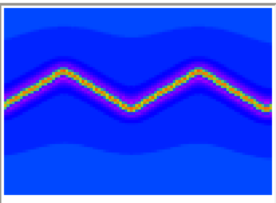
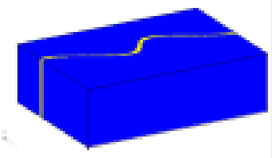
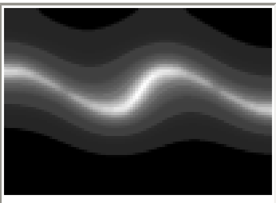
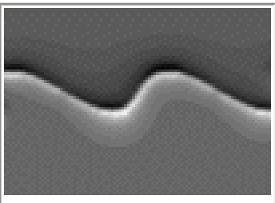
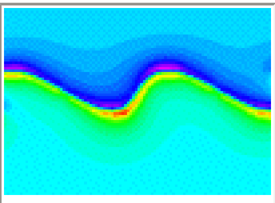
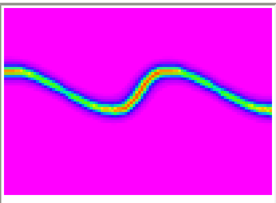
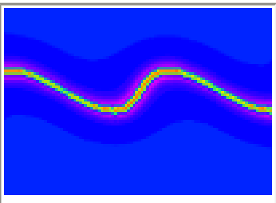
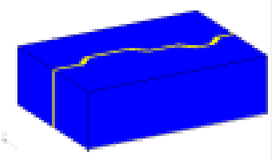
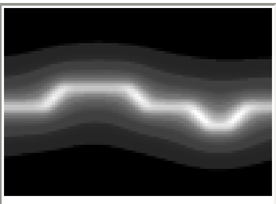
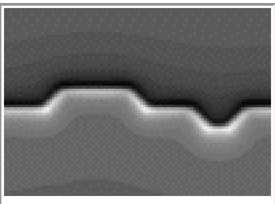
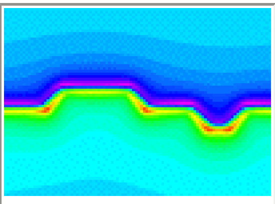
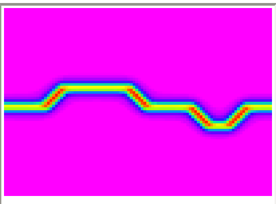
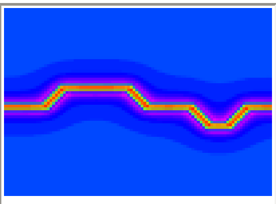
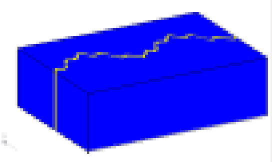
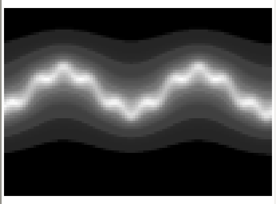
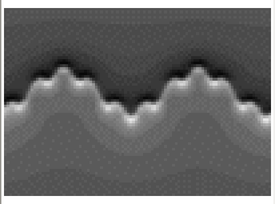
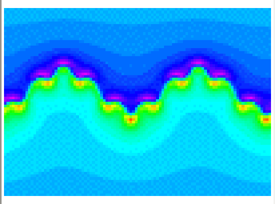
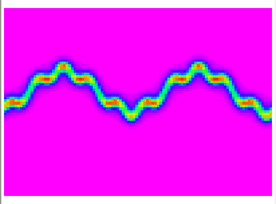
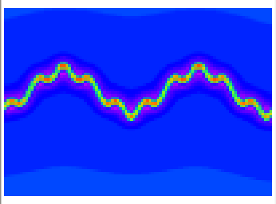
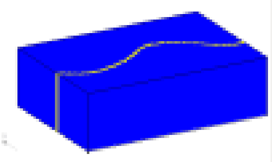
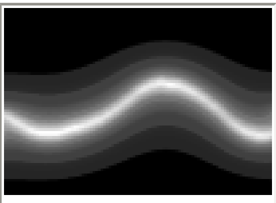
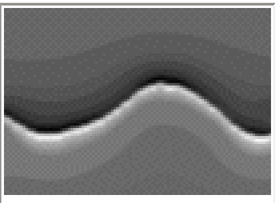
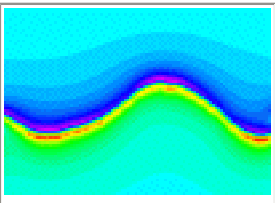
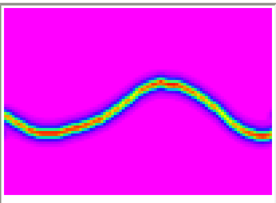
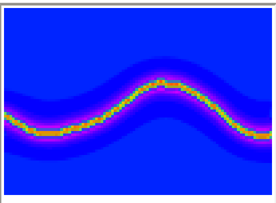
WWW conversion by Ian Brayshaw Thursday 30 April 1998

2.1.1 Variation in fold profile

This sequence shows the affect of varying the fold profile geometry for a 200 m thick layer.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Sinusoidal Folds	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This model was generated using a similar fold style, so there is some hinge thickening relative to the limbs.					
Chevron Folds	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Asymmetric Folds	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	The west limbs of this fold are structurally thickened.					
Box Folds	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	These folds are actually formed as a result of conjugate kink sets, and results in the thickening of the limbs relative to the hinges.					
Anticlinoriums & Synclinoriums	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Buckle Fold	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This fold has uniform limb and hinge thickness, but still shows anomaly peaks at the hinges.					

Key	Survey Parameters	Scales
layer $\kappa = 10^{-2}$ background $\kappa = 0$ image width 10,000 m	Inclination 50° or 90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max (greyscale) min max (colour) min

All models created using Noddy

WWW conversion by Ian Brayshaw

2.1.2 Variation in fold plunge direction of sinusoidal folds

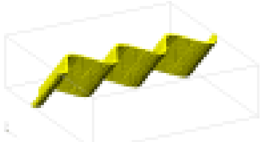
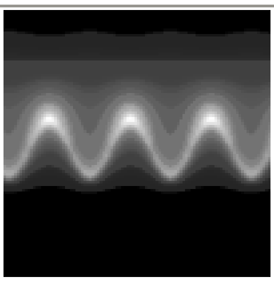
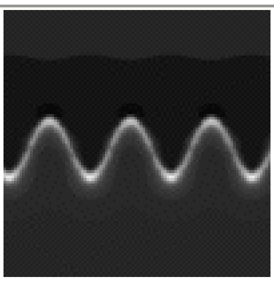
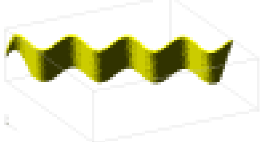
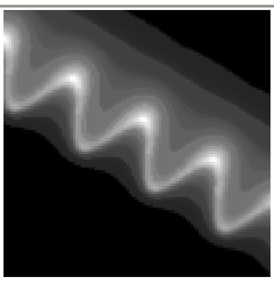
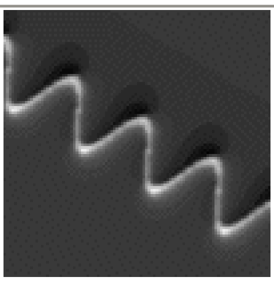
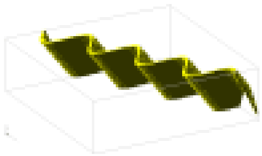
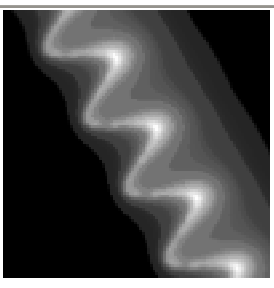
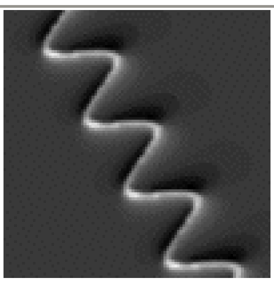
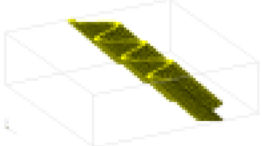
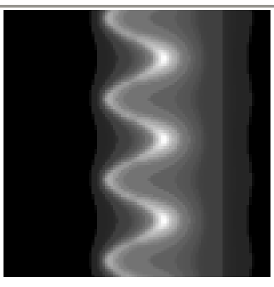
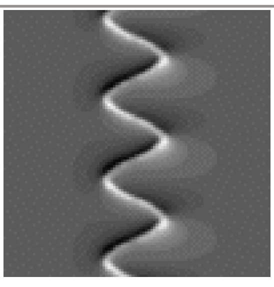
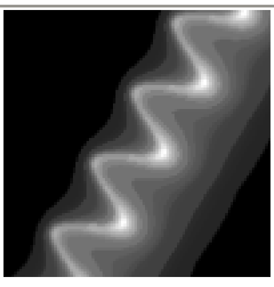
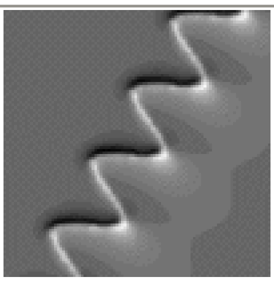
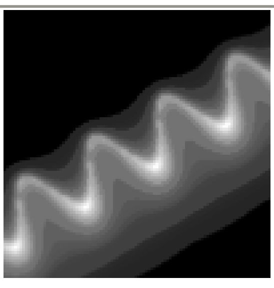
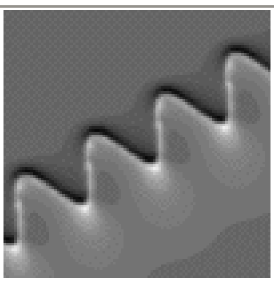
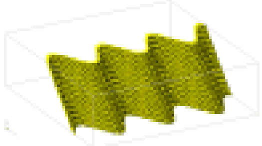
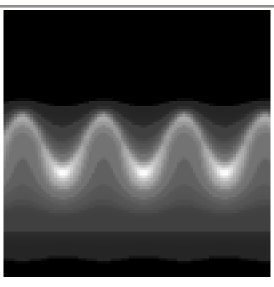
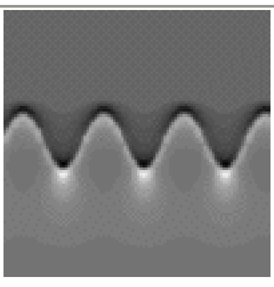
2.1.2bn

This sequence shows the affect of varying the fold plunges direction for a set of open sinusoidal folds in a 200 m thick layer, with fold axes plunging at 60°.

Notice the variations in field strength between hinges and limbs in both the gravity and magnetic images, the assymmetry between limbs in folds which are not plunging due north or south, and the marked differences between the north and south plunging magnetic images.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics
Folds plunging to 000 (North)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the strong asymmetry of the magnetic anomaly in north-south sections, and the asymmetry between the anticlines in the north and the synclines in the south.		
Folds plunging to 030	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the asymmetry of the magnetic anomaly between north-east and south-west facing limbs.		
Folds plunging to 060	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging to 090	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging to 120	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging to 150	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging to 180	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the symmetry of the magnetic anomaly in north-south sections, but the asymmetry between the anticlines in the north and the synclines in the south for the gravity but not magnetic images.		

Key		Survey Parameters		Scale
layer	$\rho = 1$ $\kappa = 10^{-2}$	Inclination	50°	max [gradient] min
background	$\rho = 0$ $\kappa = 0$	Intensity	50,000	
image width	10,000 m	Flight height	80 m	

All models created using Noddy

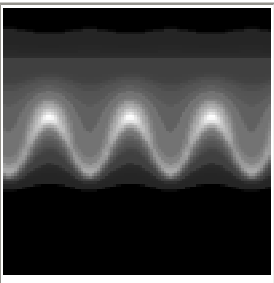
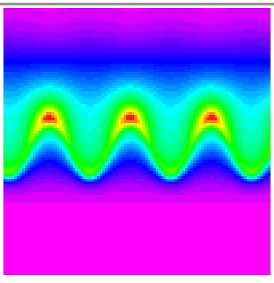
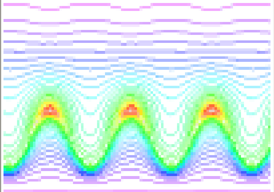
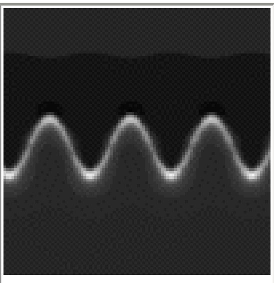
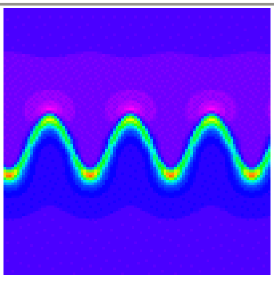
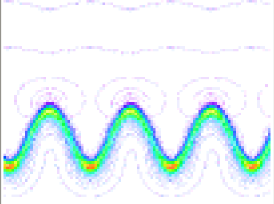
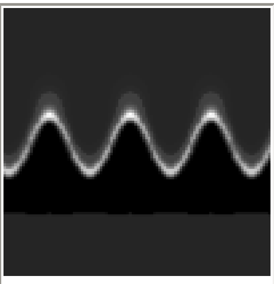
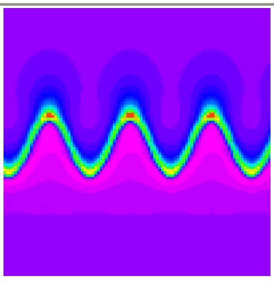
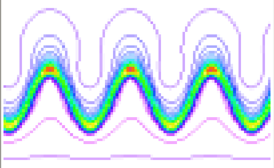
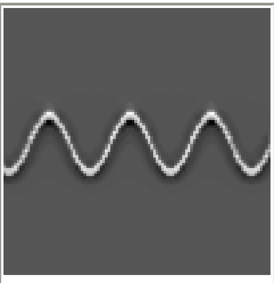
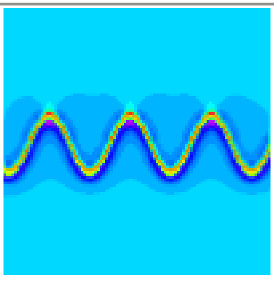
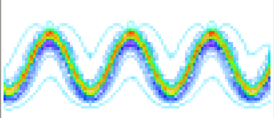
WWW conversion by Ian Brayshaw

2.1.2b Variation in fold plunge direction of sinusoidal folds (continued)

2.1.2n

This sequence shows the affect of a sinusoidal fold in a 200 m thick layer, plunging to the North. Other orientations are not shown as reduced to the pole images would simply vary by rotation. The images show the variation in display formats between grey scale and pseudo-colour look up tables, and colour contours, and the differences between folds at inclinations of 50° and 90°, together with first vertical derivative images at the pole.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Grey Scale	Pseudo Colour	Contours
Folds plunging to 000 (North) -- Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the strong asymmetry of the anomaly in north-south sections, and the asymmetry between the anticlines and synclines in the south.		
Folds plunging to 000 (North) -- Magnetics at 50°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the asymmetry of the anomaly in north-south sections, and the asymmetry between the anticlines and synclines in the south.		
Folds plunging to 000 (North) -- Magnetics at 90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the weaker asymmetry of the anomaly in north-south sections, and the asymmetry between the anticlines and synclines in the south.		
Folds plunging to 000 (North) -- Magnetics at 90° First Vertical Derivative	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the weaker asymmetry of the anomaly in north-south sections.		

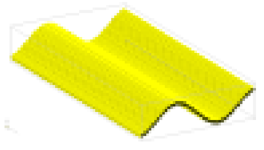
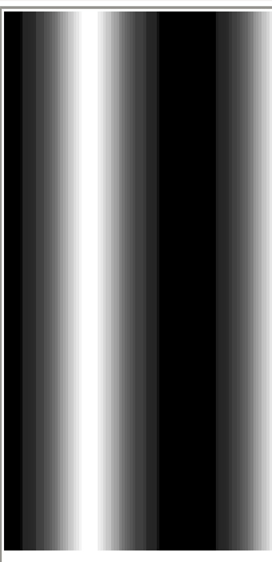
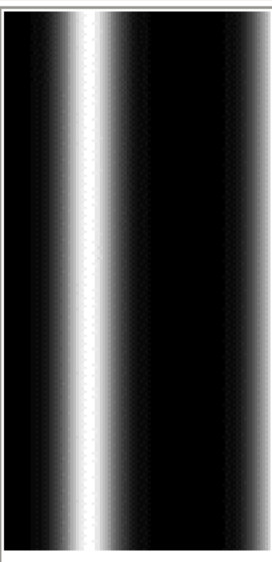
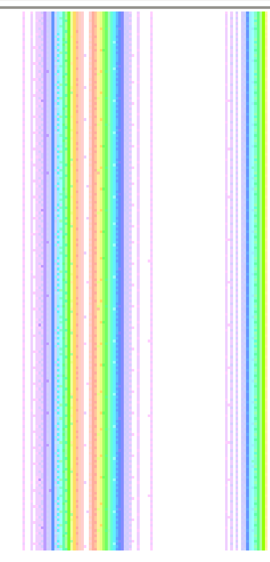
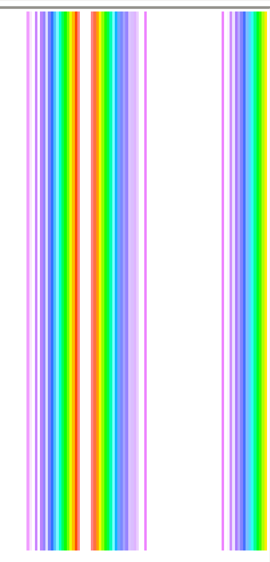
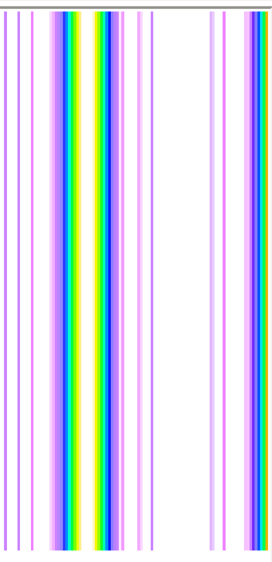
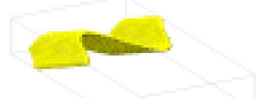
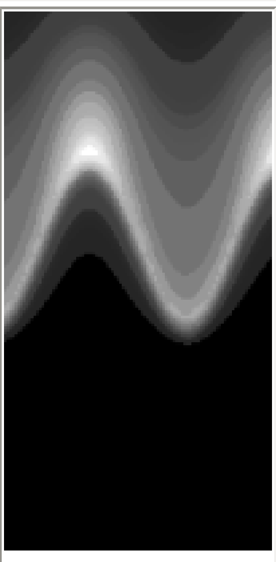
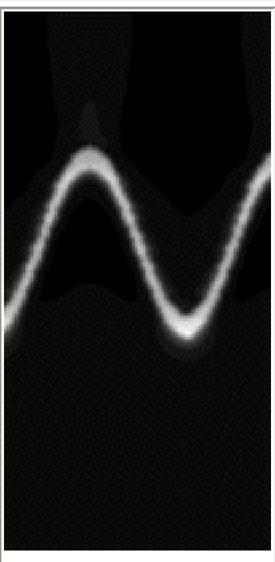
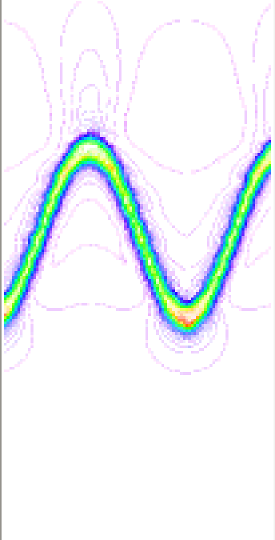
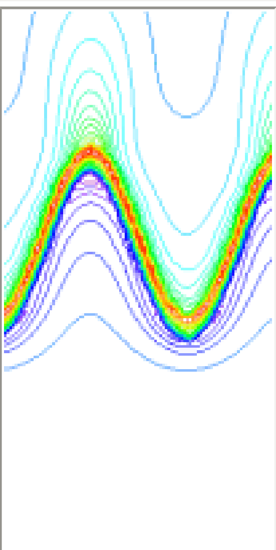
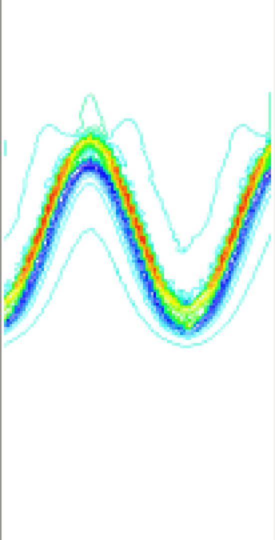
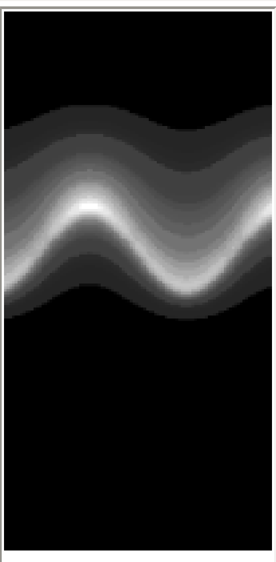
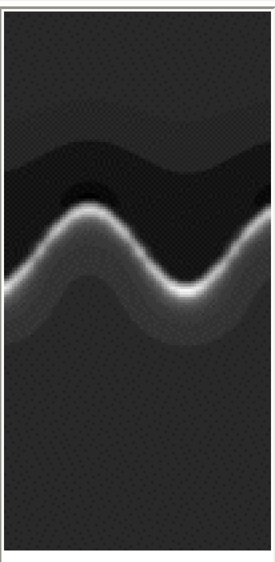
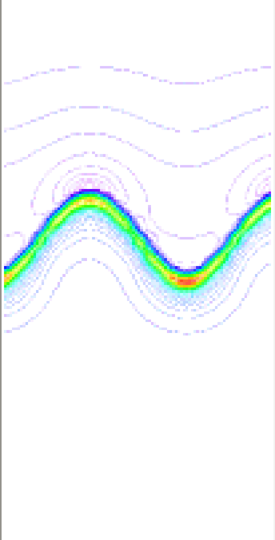
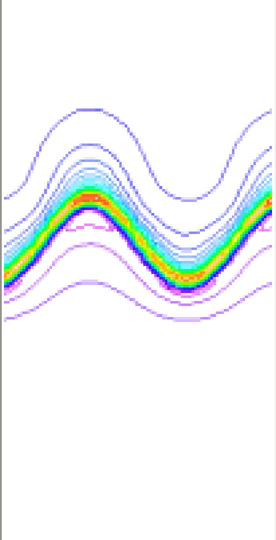
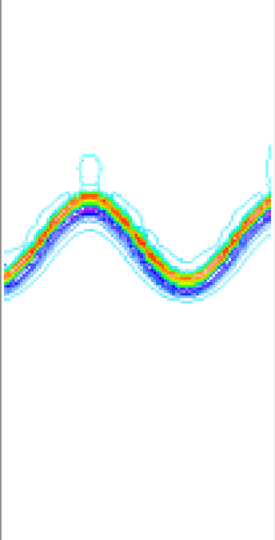
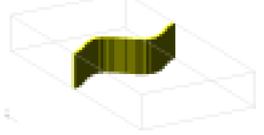
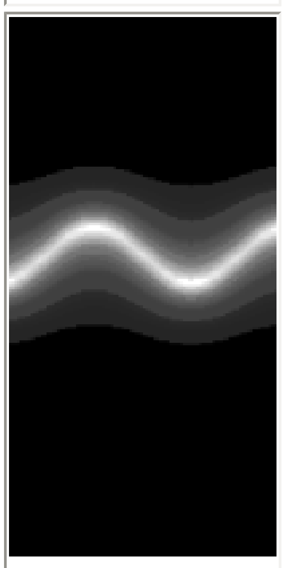
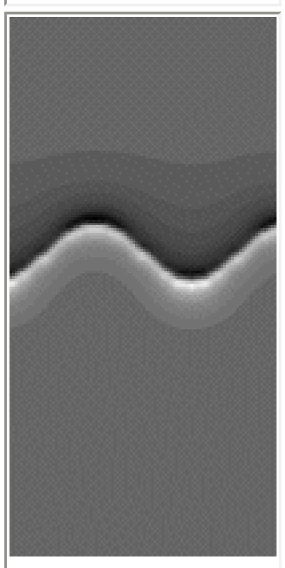
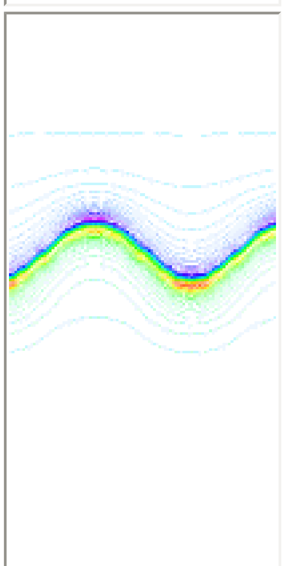
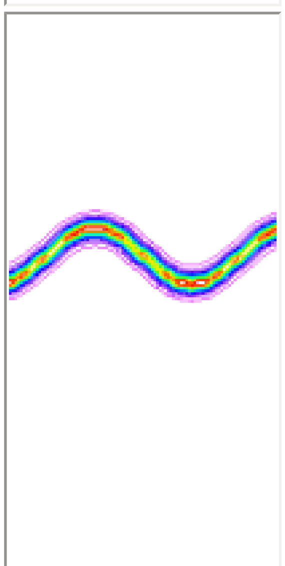
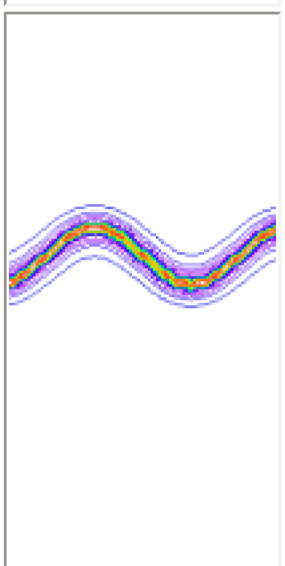
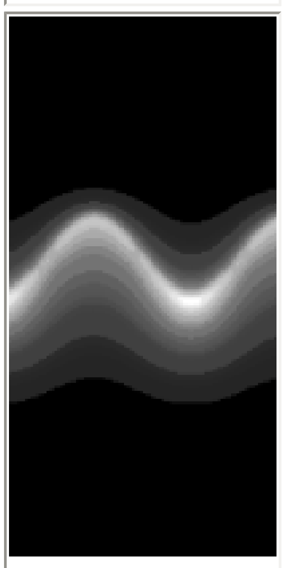
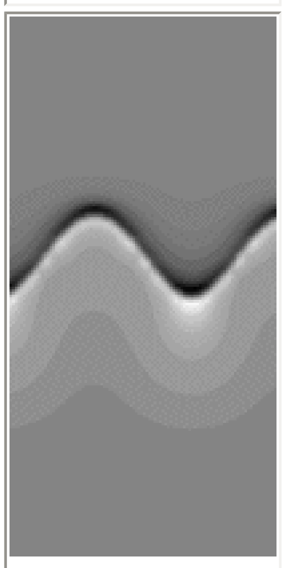
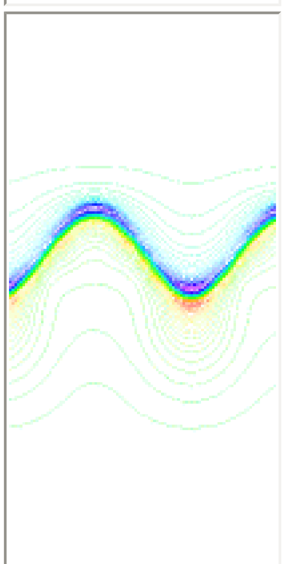
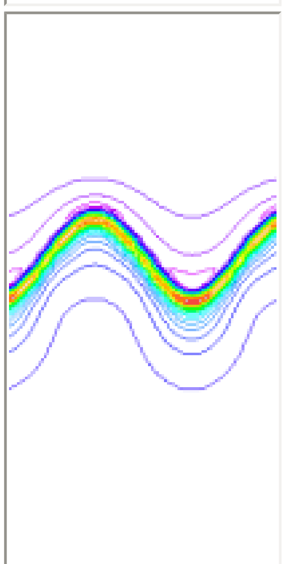
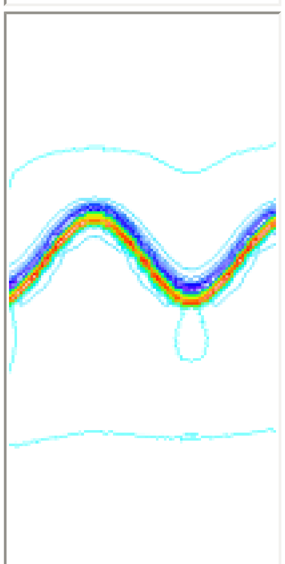
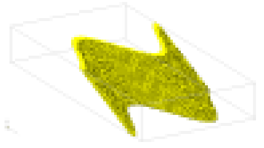
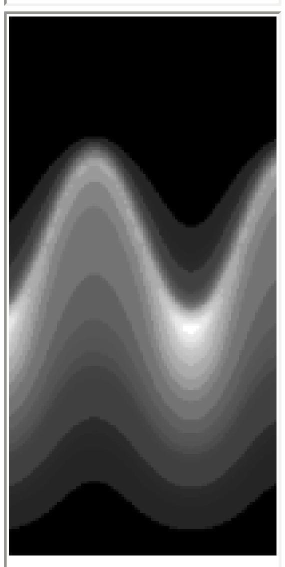
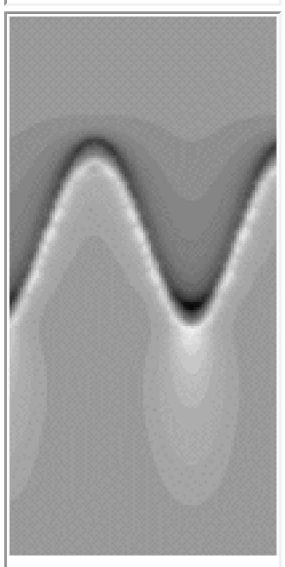
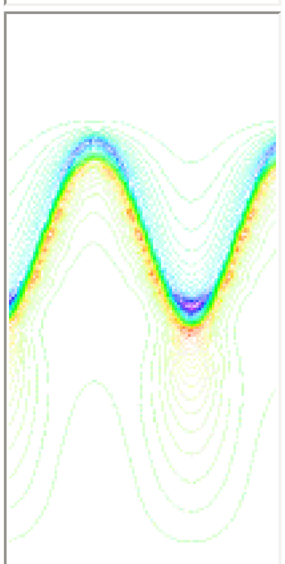
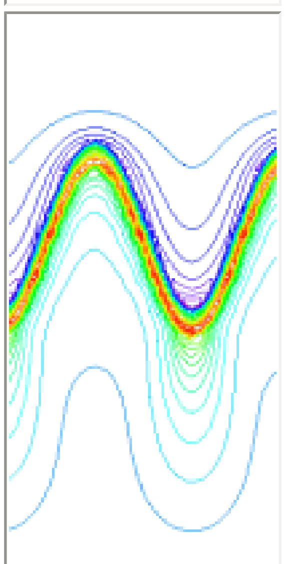
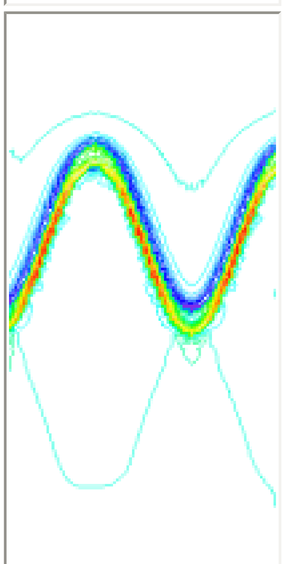
Key	Survey Parameters	Scales
layer $\rho = 1$ $\kappa = 10^{-2}$ background $\rho = 0$ $\kappa = 0$ image width 10,000 m	Inclination 50° or 90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max (grey) min max (colour) min

2.1.3 Variation in fold plunge of sinusoidal folds

This sequence shows the affect of varying the fold plunge for a set of open sinusoidal folds in a 200 m thick layer.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Folds plunging 0° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging 20° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging 45° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging 90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging 45° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging 20° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key		Survey Parameters		Scales
layer	$\rho = 1$ $\kappa = 10^{-2}$	Inclination	50°	max min
background	$\rho = 0$ $\kappa = 0$	Intensity	50,000 gamma	max min
image width	7,000 m	Flight height	80 m	

All models created using Noddy

WWW conversion by Ian Brayshaw

Atlas of
Structural Geophysics II

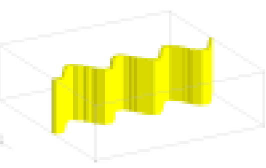
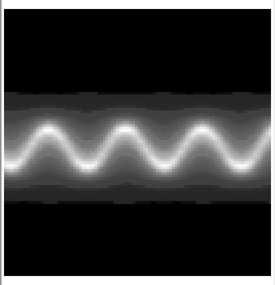
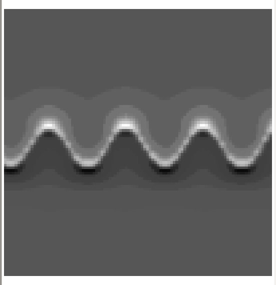
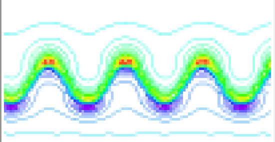
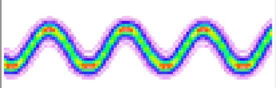
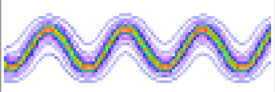
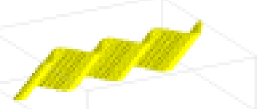
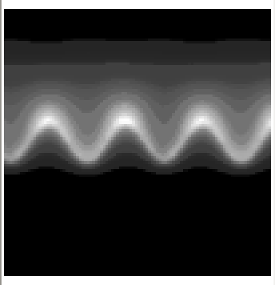
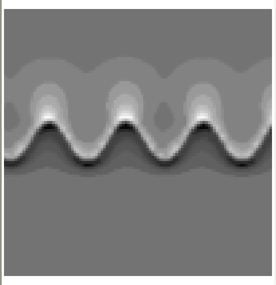
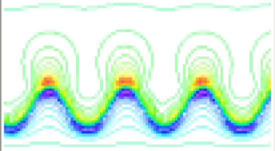
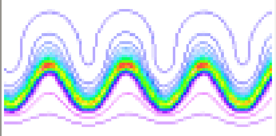
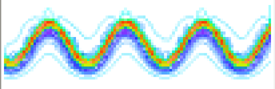
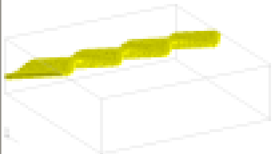
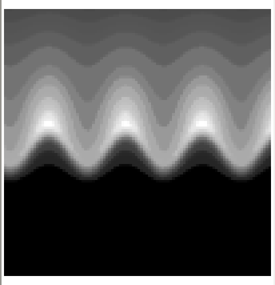
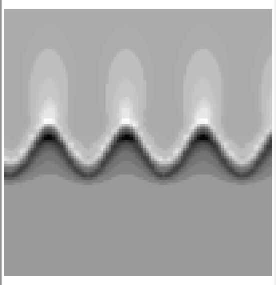
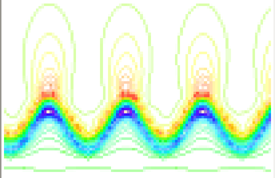
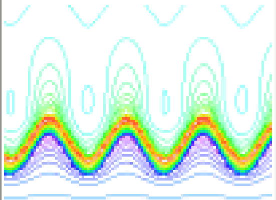
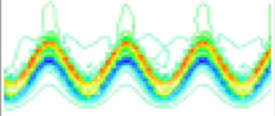
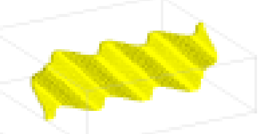
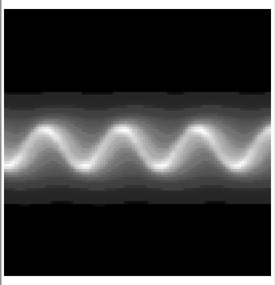
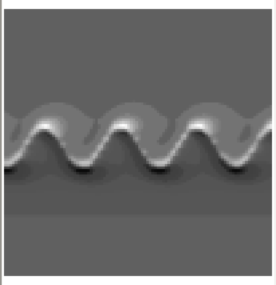
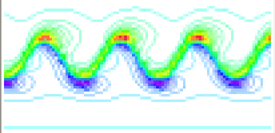
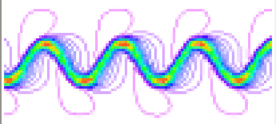
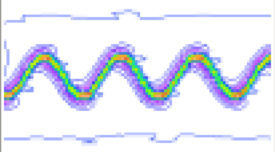
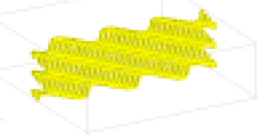
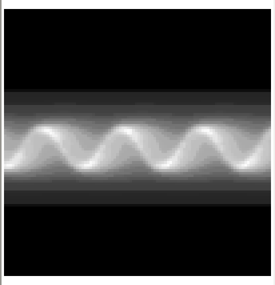
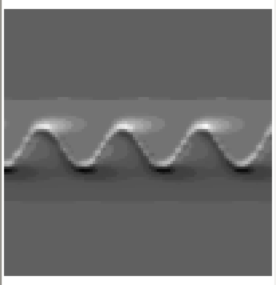
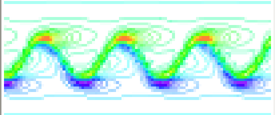
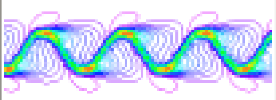
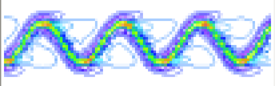
2.1.4 Ambiguities in the interpretation of sinusoidal folds

This sequence of images shows the effect of varying the orientation, amplitude and wave-length of sinusoidally folded 200 m thick layer in such a way that the outcrop pattens remain the same.

All block diagrams are viewed from SW.

Summary wavelet transform animation comparing 3 different orientations

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Sinusoidal folds plunging vertically	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the full EW and NS symmetry of gravity and EW symmetry of the magnetic images.					
Sinusoidal folds plunging 45° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Both gravity and magnetic images now only show EW symmetry.					
Sinusoidal folds plunging 20° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Both gravity and magnetic images now only show EW symmetry, with exaggerated differences between North and South hinges.					
Sinusoidal folds reclined 45° to East	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	The EW symmetry has now broken down in the gravity and magnetic images, and the magnetic images show neither EW or NS symmetries.					
Sinusoidal folds reclined 20° to East	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the EW trending high background band in the gravity and oblique tails off the North hinges of the folds in the magnetic image.					

Key		Survey Parameters		Scales
layer	$\rho = 1\ \kappa = 10^{-2}$	Inclination	50°	max (greyscale) min
background	$\rho = 0\ \kappa = 0$	Intensity	50,000 or 70,000 gamma	max (colour) min
image width	10,000 m	Flight height	80 m	

All models created using Noddy

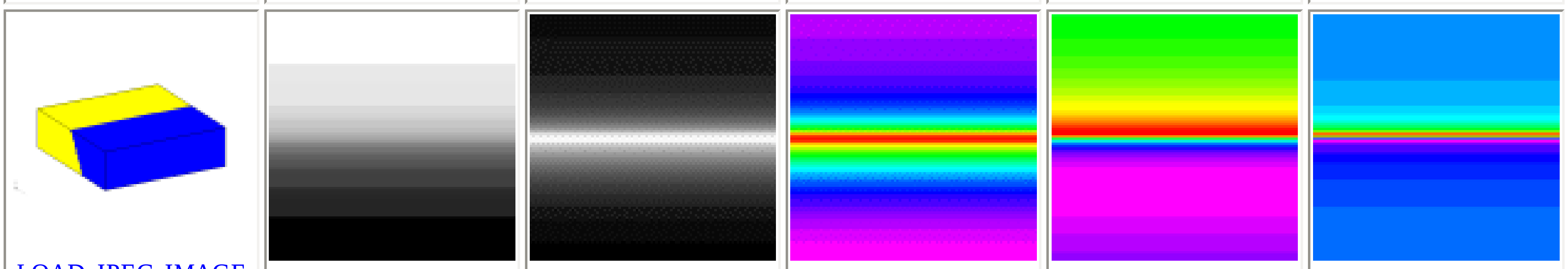
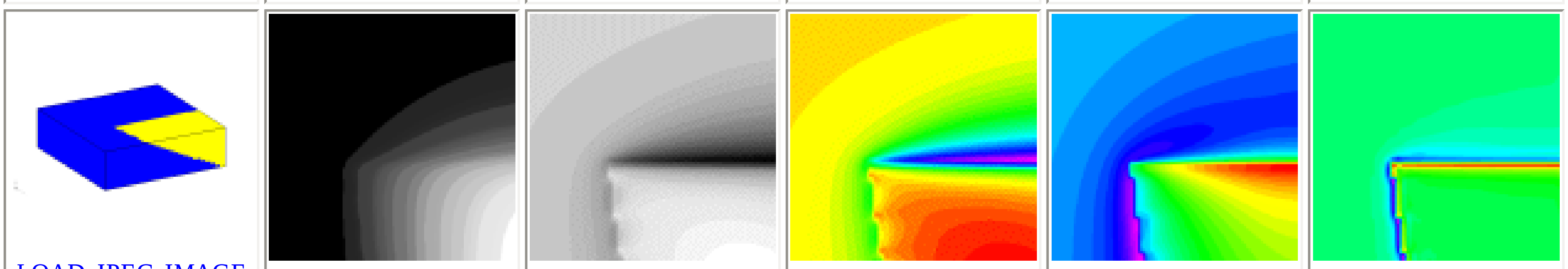
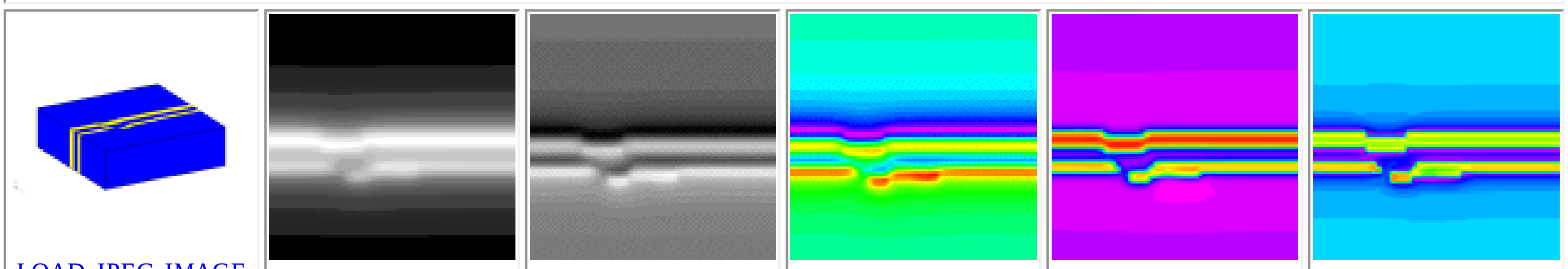
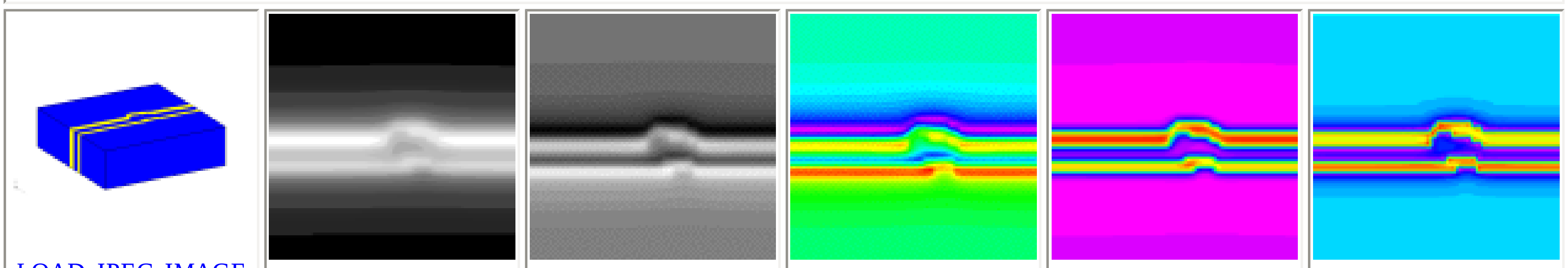
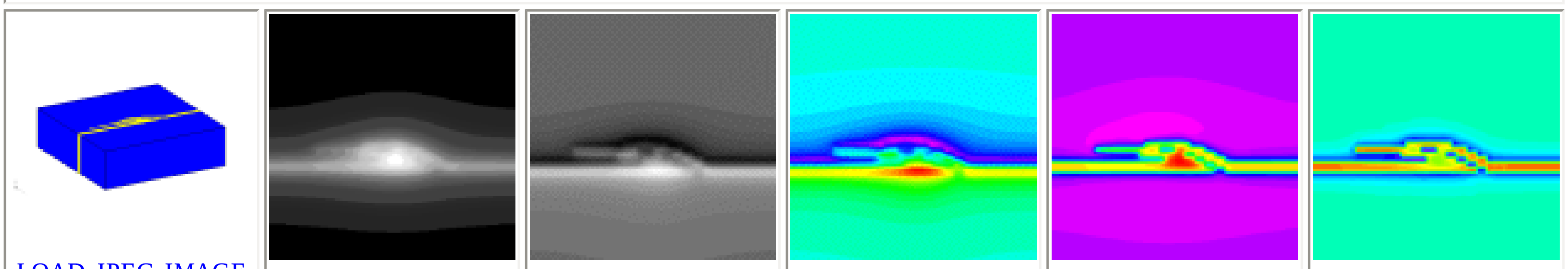
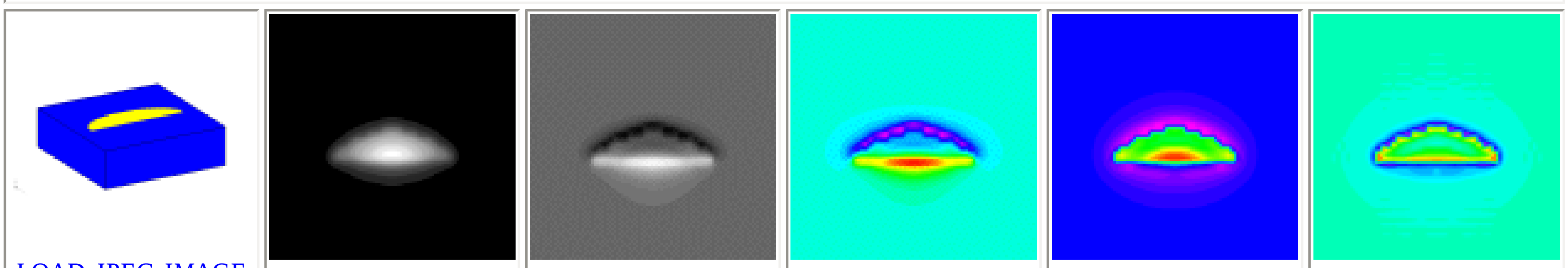
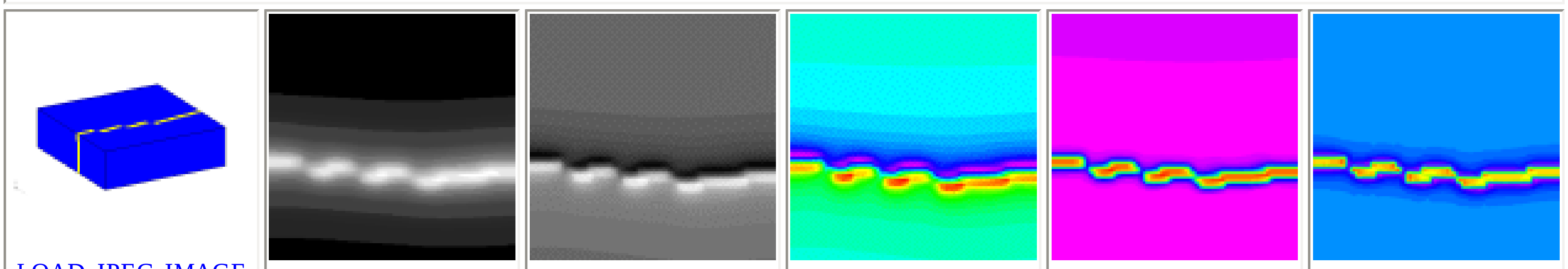
WWW conversion by Ian Brayshaw

2.2.1 Variation in fault geometry

This sequence shows a number of different fault styles.

All block diagrams are viewed from SW

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Normal Fault	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
Rotational Fault	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	In this case the fault produces a wedge of high density and high susceptibility material sloping to the East, with an increasing gravity response as the thickness increases, but a very localised magnetic high associated with the sharp change in susceptibilities.					
Growth Fault	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	In this model the middle, low susceptibility unit is significantly thickened due to the fault being active during deposition.					
Fault Inversion	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This model shows the effect of late shortening on an early growth fault.					
Thrust Ramp Fault	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	In this model a pair of thrust ramps have produced an antiformal stack.					
Elliptical Normal Fault	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	The magnitude of the slip vector decays away from centre of elliptical fault surface.					
Normal Fault Set	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scales
layer $\rho = 3.5$ $\kappa = 10^{-2}$	Inclination 50° or 90°	max (grey scale) min
background $\rho = 2.5$ $\kappa = 10^{-4}$	Intensity 50,000 or 70,000 gamma	max (colour scale) min
width of image 10,000 m	Flying height 80 m	

All models created using Noddy

WWW conversion by Ian Brayshaw

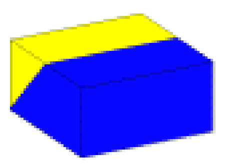
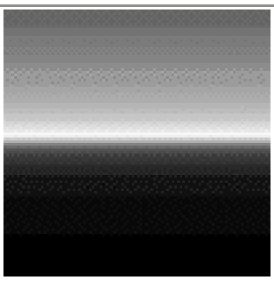
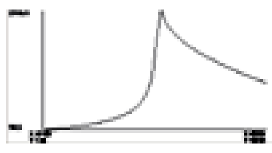
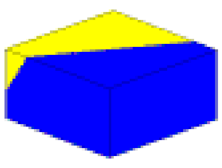
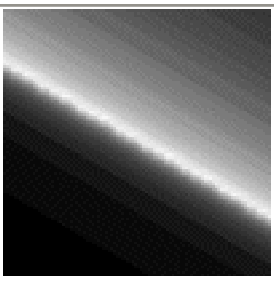
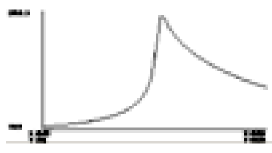
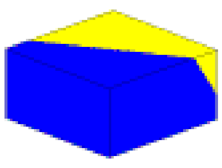
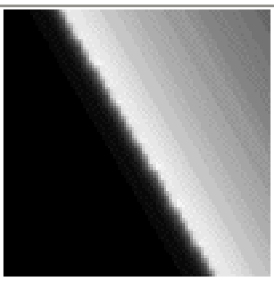
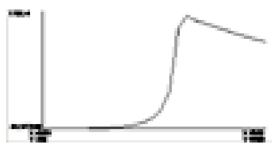
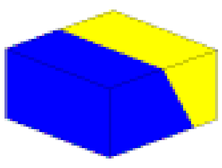
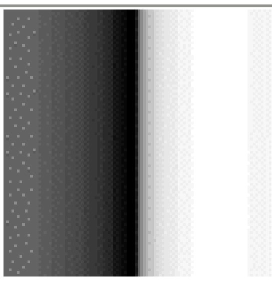
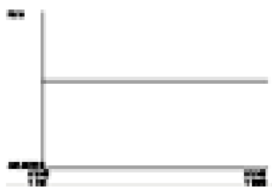
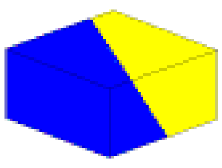
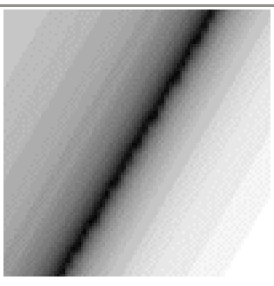
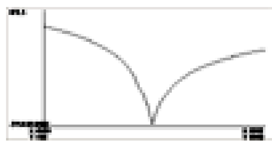
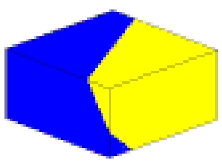
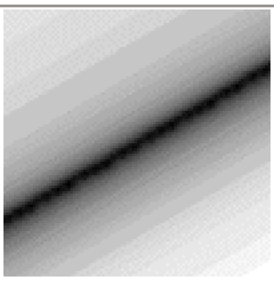
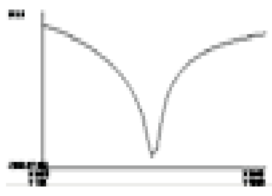
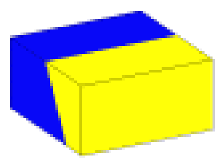
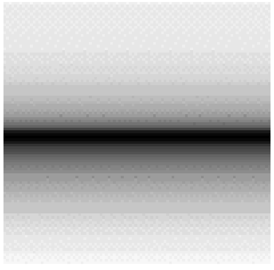
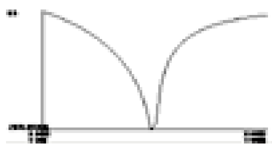
2.2.2 Variation in fault dip direction of low susceptibility footwall faults

2.2.2bn

This sequence shows the affect of varying the fault dip direction for faults which have a low susceptibility footwall block and a high susceptibility hangingwall block. Since these are essentially two-dimensional models, South to North profiles through the centre of the block are also provided.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Magnetics	South Intensity North
Faults dipping to 000 (North)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 030	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 060	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 090 (East)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 120	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 150	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 180 (South)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scale
foot wall κ = 0 hanging wall κ = 10^{-2} Image width 10,000 m	Inclination 50° Intensity 50,000 gamma Flying height 80 m	max min

All models created using Noddy

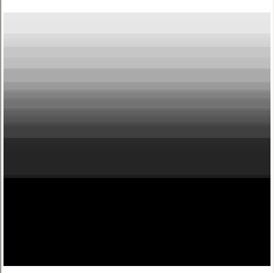
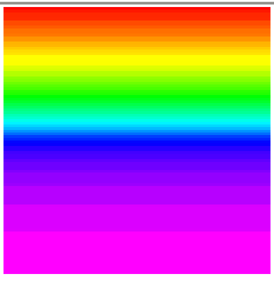
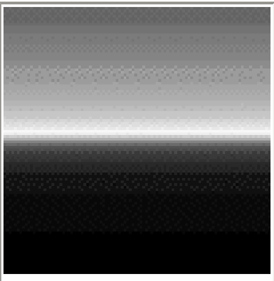
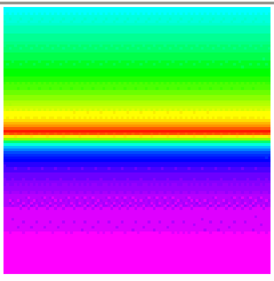
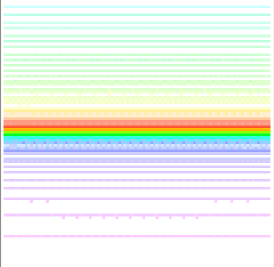
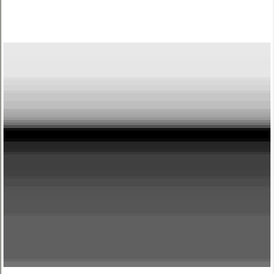
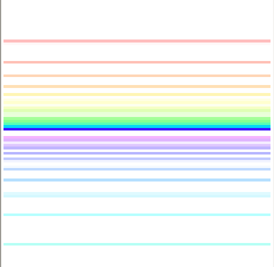
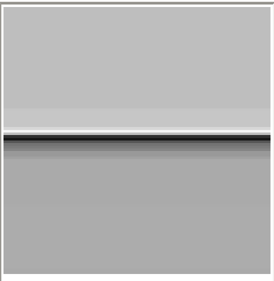
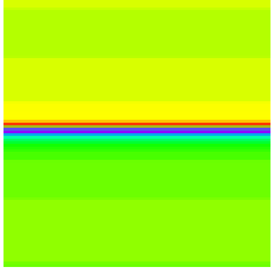
WWW conversion by Ian Brayshaw

2.2.2b Variation in fault dip direction of low susceptibility footwall faults (continued)

2.2.2n

This sequence shows the affect of a fault which has a low susceptibility footwall block and a high susceptibility hangingwall block. Other orientations are not shown as reduced to pole images would simply vary by rotation. The images show the variation in display formats between grey scale and pseudocolour look up tables, and colour contours, and the differences between folds at magnetic inclinations of 50° and 90°, together with first vertical derivative images at the pole.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Grey Scale	Pseudo Colour	Contours
Faults dipping to 000 (North) -- Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE
Faults dipping to 000 (North) -- Magnetics at an inclination of 50°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 000 (North) -- Magnetics at an inclination of 50°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 000 (North) -- First Vertical Derivative	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scales
foot wall ρ = 0 κ = 0 hanging wall ρ = 1 κ = 10^{-2} Image width 10,000 m	Inclination 50° or 90° Intensity 50,000 or 70,000 gamma Flying height 80 m	max min max min

All models created using Noddy

WWW conversion by Ian Brayshaw

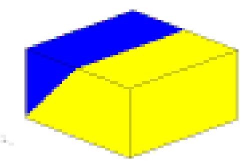
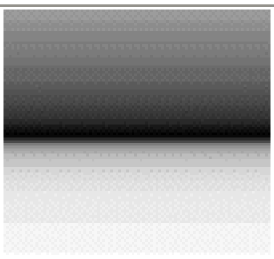
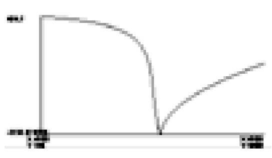
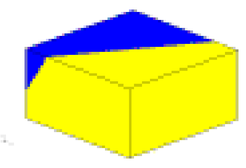
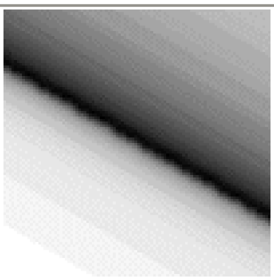
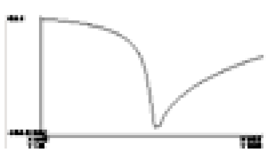
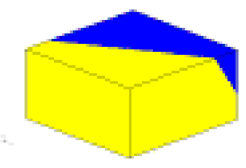
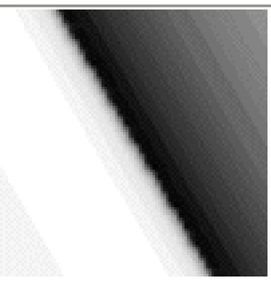
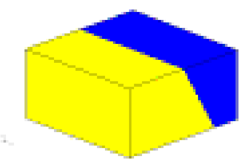
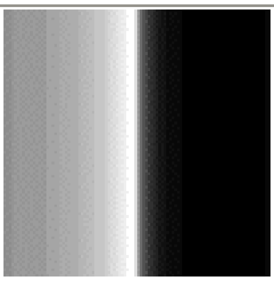
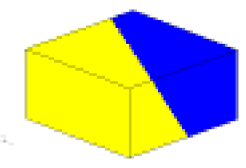
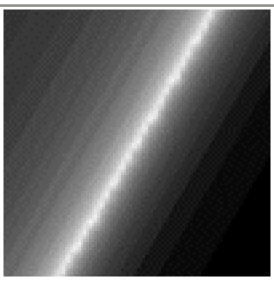
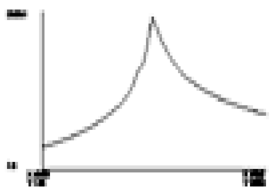
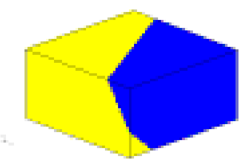
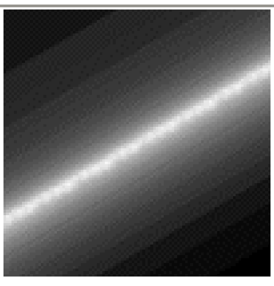
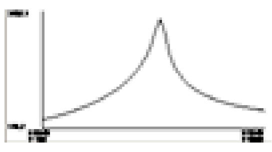
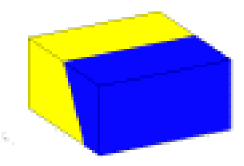
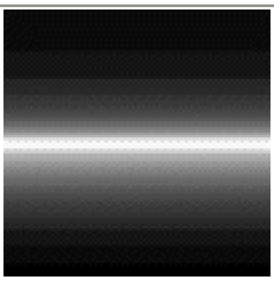
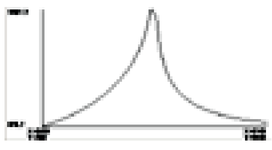
2.2.3 Variation in fault dip direction of high susceptibility footwall faults

2.2.3bn

This sequence shows the affect of varying the fault dip direction for faults which have a high susceptibility footwall block. Since these are essentially two-dimensional models, South to North profiles through the centre of the block are also provided.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Magnetics	South Intensity North
Faults dipping to 000 (North)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 030	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 060	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 090 (East)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 120	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 150	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 180 (South)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scale
foot wall κ = 10^{-2} hanging wall κ = 0 Image width 10,000 m	Inclination 50° Intensity 50,000 gamma Flying height 80 m	max [gradient] min

All models created using Noddy

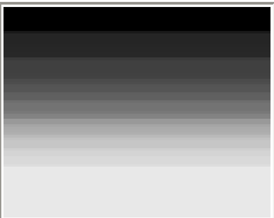
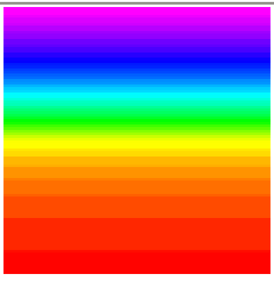
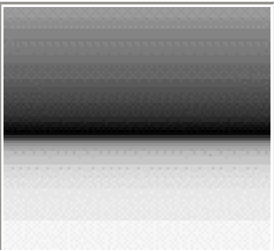
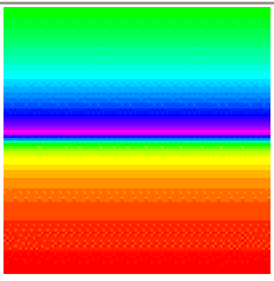
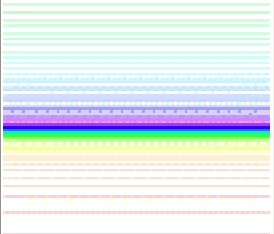
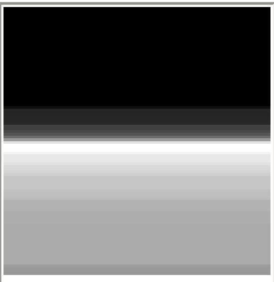
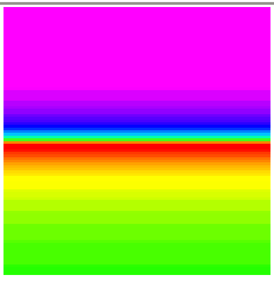
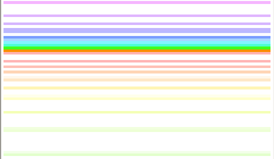
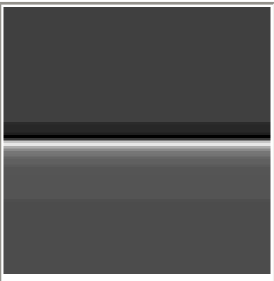
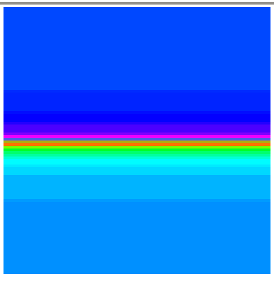
WWW conversion by Ian Brayshaw

2.2.3b Variation in fault dip direction of high susceptibility footwall faults (continued)

2.2.3n

This sequence shows the affect of a fault which has a high susceptibility footwall block. Other orientations are not shown as reduced to pole images would simply vary by rotation. The images show the variation in display formats between grey scale and pseudocolour look up tables, and colour contours, and the differences between folds at magnetic inclinations of 50° and 90°, together with first vertical derivative images at the pole.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Grey Scale	Pseudo Colour	Contours
Faults dipping to 000 (North) -- Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE
Faults dipping to 000 (North) -- Magnetics at an inclination of 50°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 000 (North) -- Magnetics at an inclination of 90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 000 (North) -- First Vertical Derivative	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scales
foot wall $\rho = 1$ $\kappa = 10^{-2}$ hanging wall $\rho = 0$ $\kappa = 0$ Image width 10,000 m	Inclination 50° or 90° Intensity 50,000 or 70,000 gamma Flying height 80 m	max min max min

All models created using Noddy

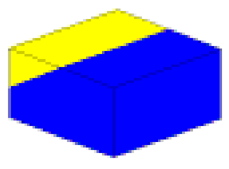
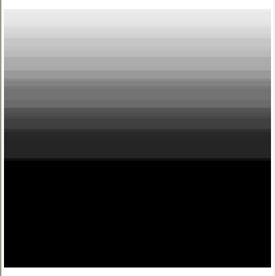
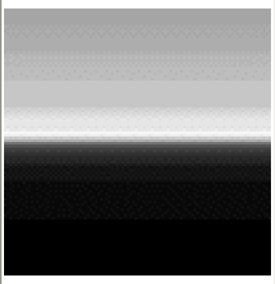
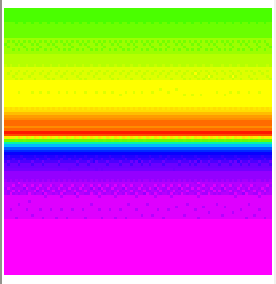
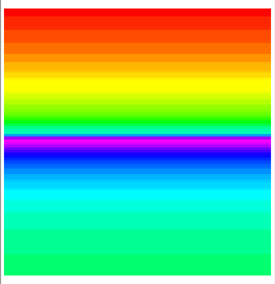
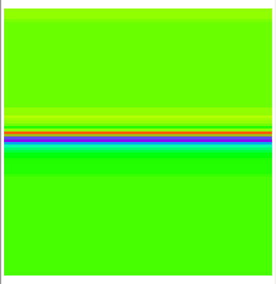
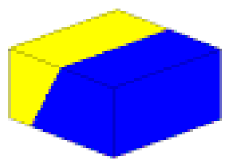
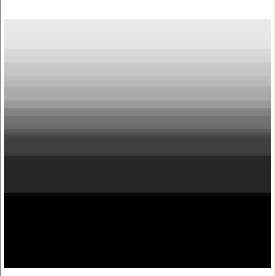
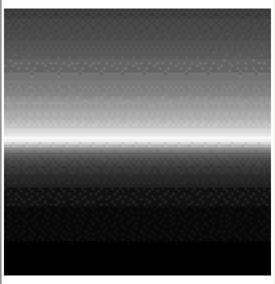
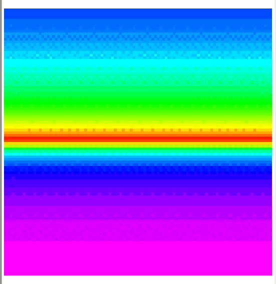
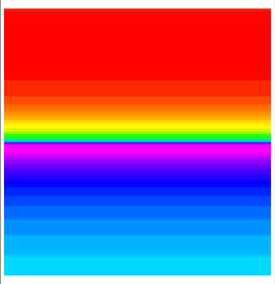
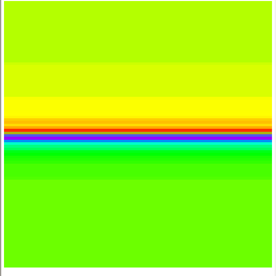
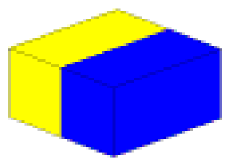
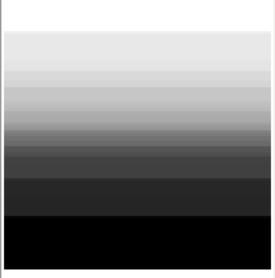
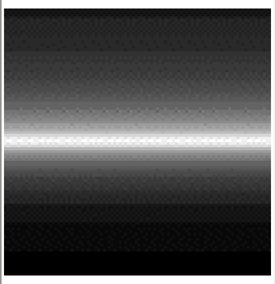
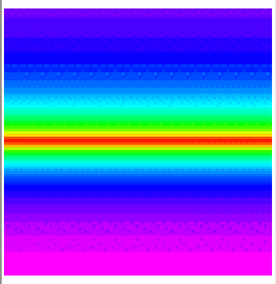
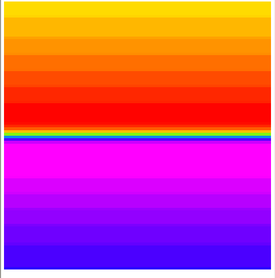
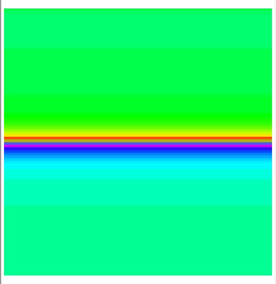
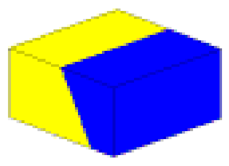
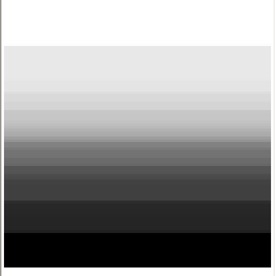
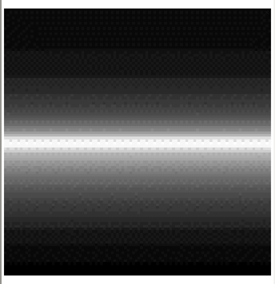
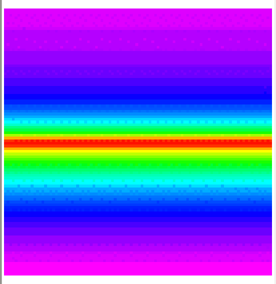
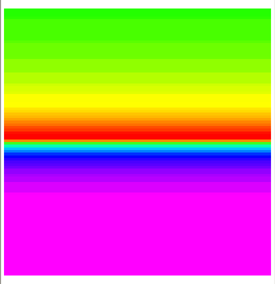
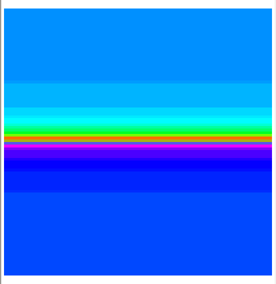
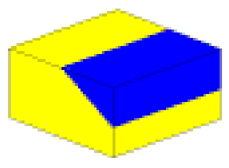
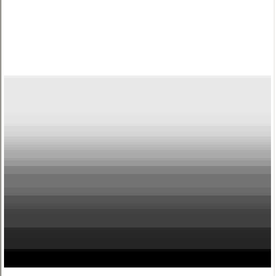
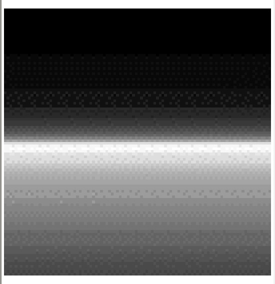
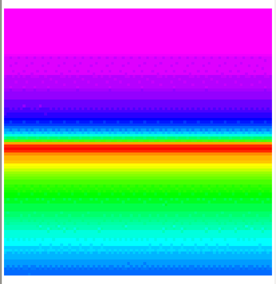
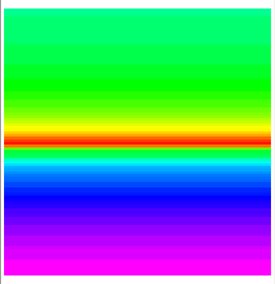
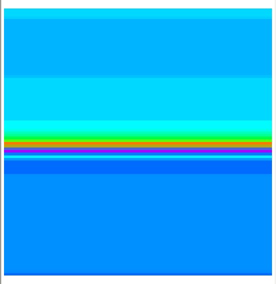
WWW conversion by Ian Brayshaw

2.2.4 Variation in fault dip

This sequence shows the affect of varying the fault dip direction for faults with a high susceptibility and density block to the North.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Faults dipping 30° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping 60° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping 90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping 60° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping 30° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scales
North Block ρ = 3.5 κ = 10^{-2} South Block ρ = 2.5 κ = 10^{-4} Image width 10,000 m	Inclination 50° or 90° Intensity 50,000 or 70,000 gamma Flying height 80 m	max — min max — min

All models created using Noddy

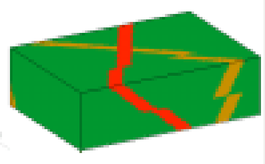
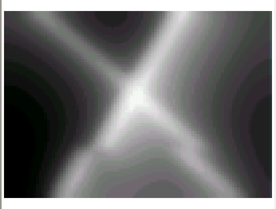
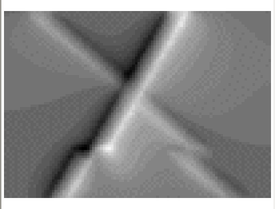
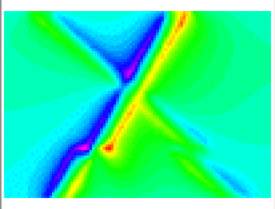
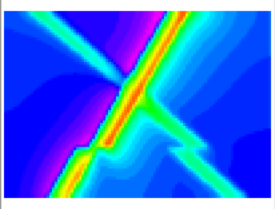
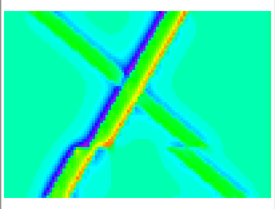
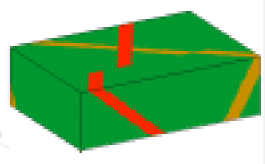
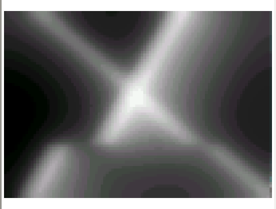
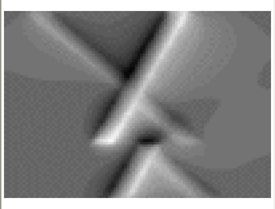
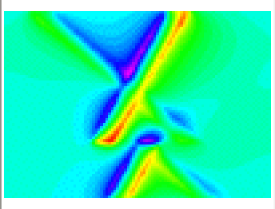
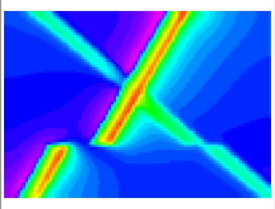
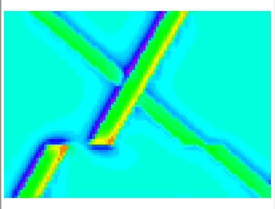
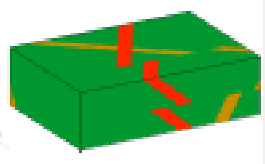
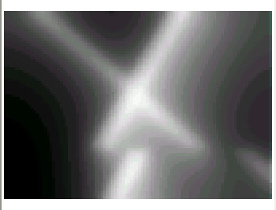
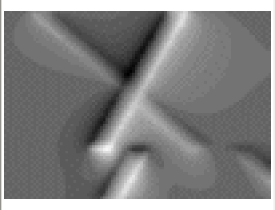
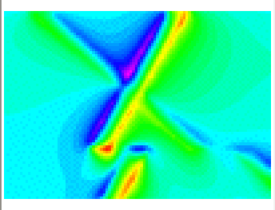
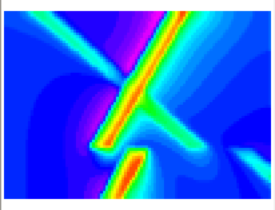
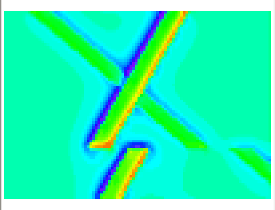
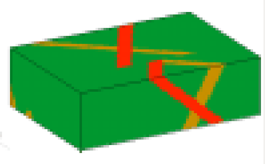
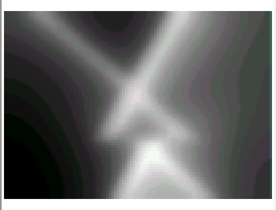
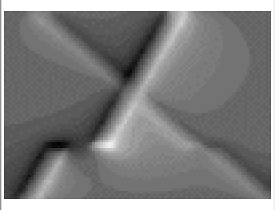
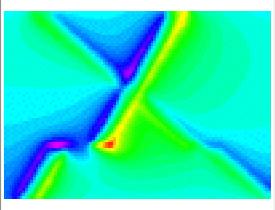
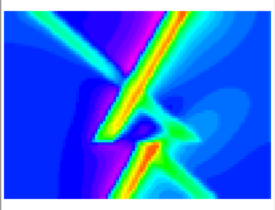
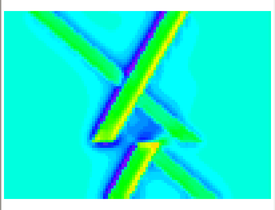
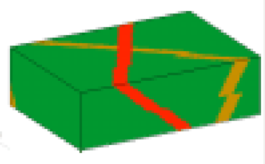
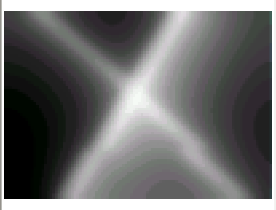
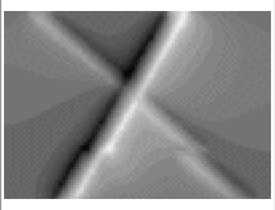
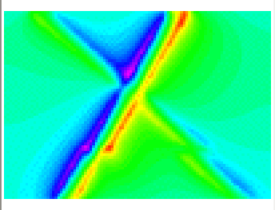
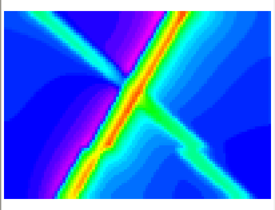
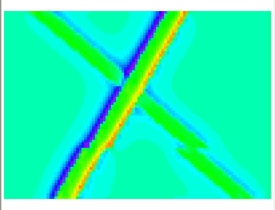
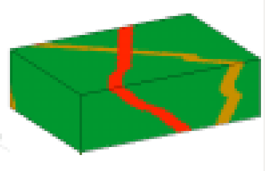
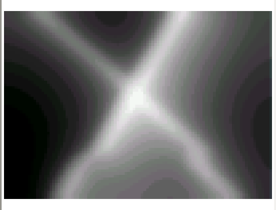
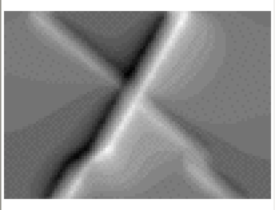
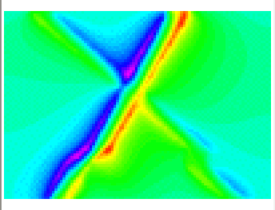
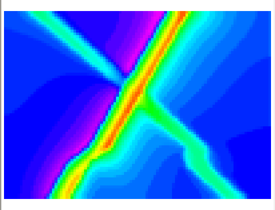
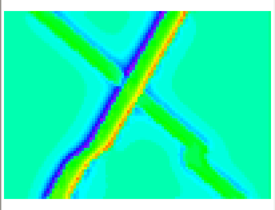
WWW conversion by Ian Brayshaw

2.2.5 Interpreting fault offsets

These images demonstrate the difficulties in determining true offsets (or even projected offsets), simply based on outcrop patterns. A model with 2 dipping dykes is faulted by an East-West striking translational fault with the same magnitude of slip, but variations in dip, dip direction, and the direction of slip movement.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Fault dipping 40° to South, down slip vector, normal fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the uniform apparent senses of movement of the two dykes.					
Fault dipping 40° to North, down slip vector, normal fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the apparent opposite senses of movement of the two dykes.					
Faults dipping 40° to South, horizontal slip vector, sinistral fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the uniform apparent senses of movement of the two dykes, and that the movement appears to be sinistral on the top surface, and dextral on the front surface of the block.					
Fault dipping 80° to South, down slip vector, normal fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the apparent opposite senses of movement of the two dykes.					
Faults dipping 40° to South, slip vector 10° off down dip to East	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the uniform apparent senses of movement of the two dykes. In this model the actual projected slip vector is sinistral, but the apparent offsets on the top surface are dextral.					
Shear zone dipping 40° to South, down slip vector, normal fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key		Earth's Magnetic Field		Scales
Dyke	ρ = 1 κ = 10^{-2}	Inclination	50° or 90°	max – min (grey scale)
Background	ρ = 0 κ = 1	Intensity	50,000 or 70,000 gamma	max – min (colour scale)
Image width 10,000 m		Flying height	80 m	

All models created using Noddy

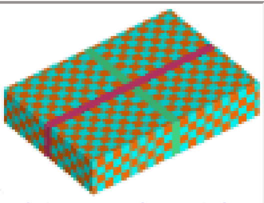
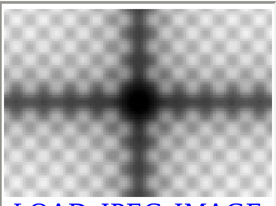
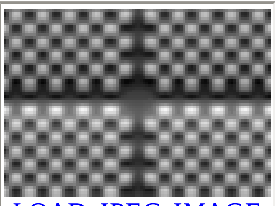
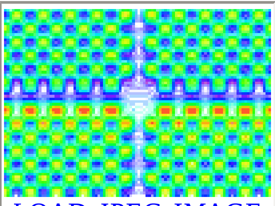
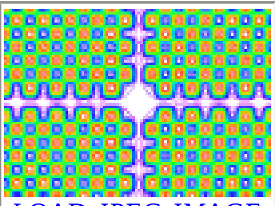
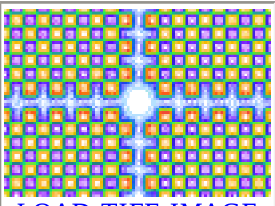
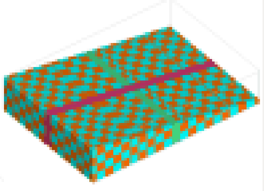
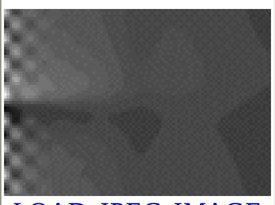
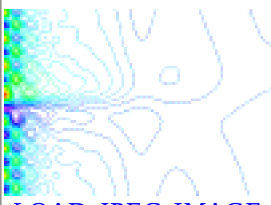
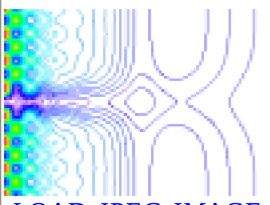
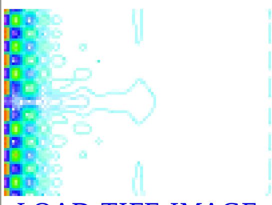
2.3 Unconformity Geometries

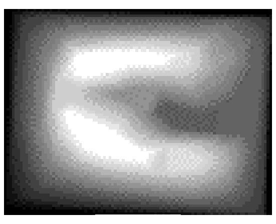
These models show the effect of low susceptibility/low density cover overlaying a regular chequerboard pattern or uniform high susceptibility structures in the basement.
The basement is taken from the models in Appendix A.

Block models viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

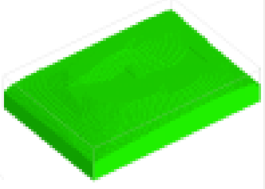
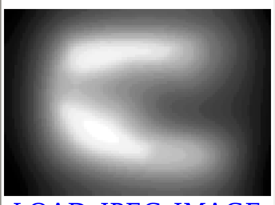
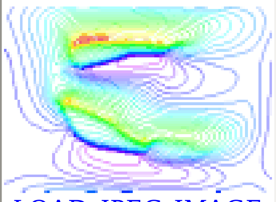
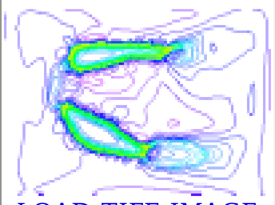
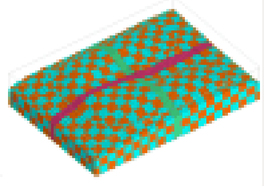
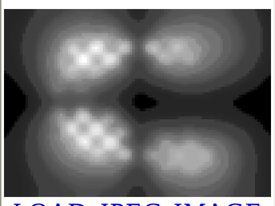
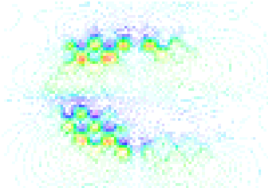
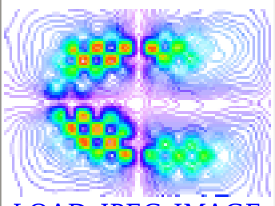
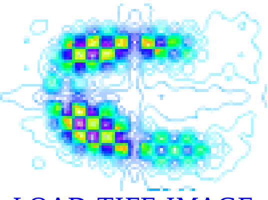
In order to use these history files you will also need to download the following three files!
uncon2.dxf chequer.g00 chequer.g12

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Chequerboard pattern with no overlying cover	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE
Chequerboard pattern with low susceptibility/density overlying cover, unconformity dipping at 10° to East.	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE



LOAD JPEG IMAGE

Image of the topography of unconformity surface used in next two models. Brighter areas have unconformity surface closer to land surface. Total range is 250 m.

Uniform high susceptibility/density rock with low susceptibility/density overlying cover, unconformity defined by buried land surface with 250 m topography.	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE
Chequerboard pattern with low susceptibility/density overlying cover, unconformity defined by buried land surface with 250 m topography.	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE

Key		Survey Parameters		Scales
cover	$\kappa = 10^{-4}$ $\rho = 2.5$	Inclination	50° or 90°	max (grey) min
basement layer	$\kappa = 10^{-3}$ $\rho = 2.5$ & 3.5	Intensity	50,000 or 70,000 gamma	max (colour) min
image width	10,000 m	Flight height	80 m	

All models created using Noddy

WWW conversion by Ian Brayshaw

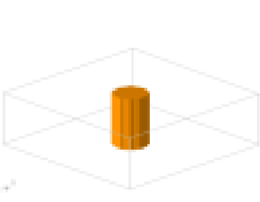
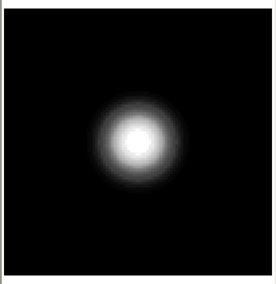
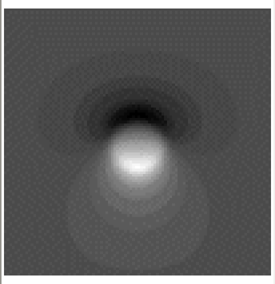
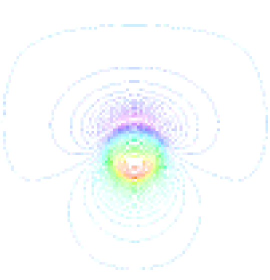
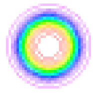
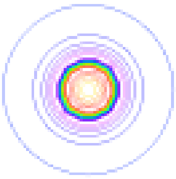
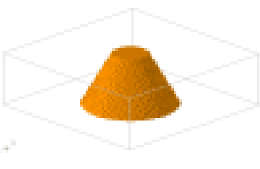
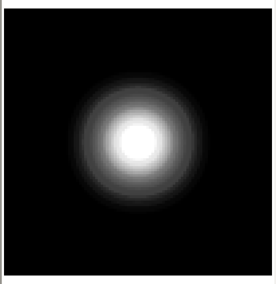
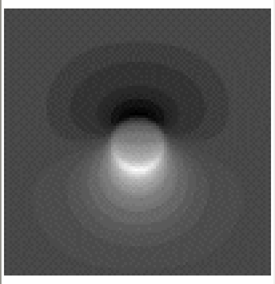
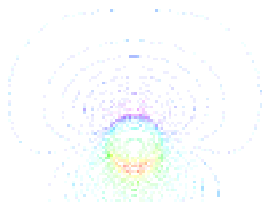
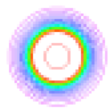
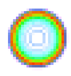
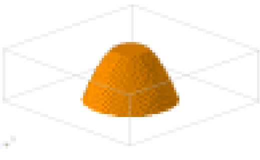
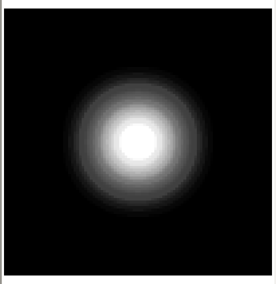
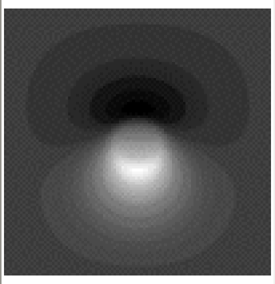
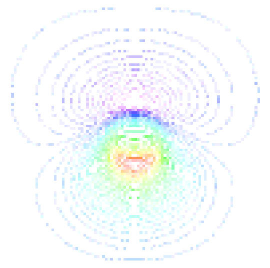
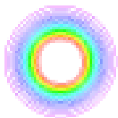
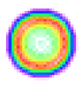
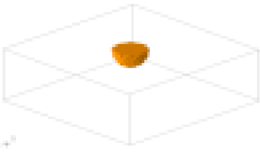
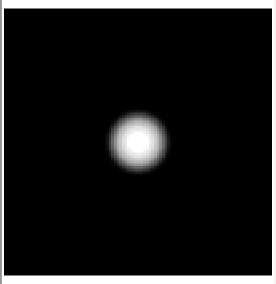
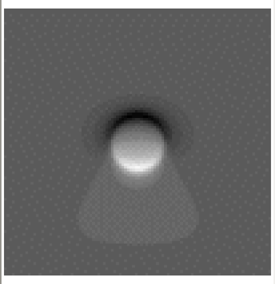
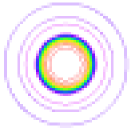
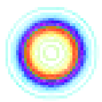
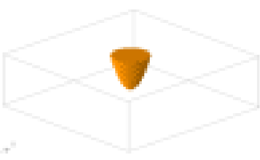
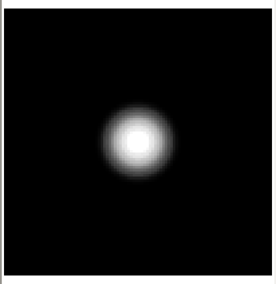
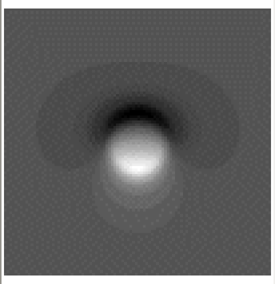
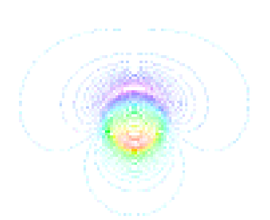
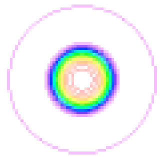
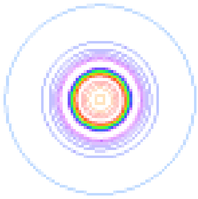
2.4.1 Simple Plug Geometries

These models all result in 1000 m radius circular outcrops, but have significantly different sub-surface geometries. The lack of obvious differences between the results suggest that careful modelling of the data would have to be carried out to distinguish between these cases.

Block models are viewed from SE.

Summary wavelet transform animation comparing 4 different geometries

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Upright Circular Cylinrical Plug	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Truncated Circular Conic Plug	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Truncated Parabolic Plug	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Truncated Spherical Plug	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Truncated Inverted Parabolic Plug	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Survey Parameters	Scales
plug $\rho = 1$ $\kappa = 10^{-2}$	Inclination 50°	max (greyscale) min
background $\rho = 0$ $\kappa = 0$	Intensity 50,000 or 70,000 gamma	max (colour) min
image width 10,000 m	Flight height 200 m	

All models created using Noddy

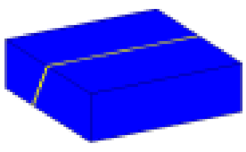
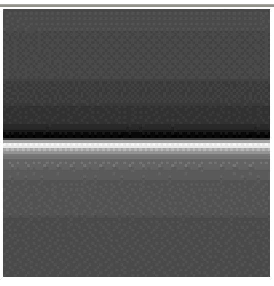
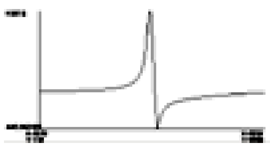
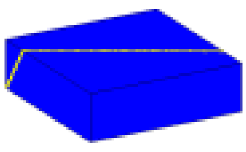
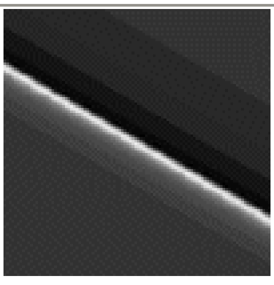
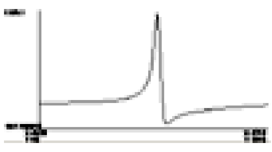
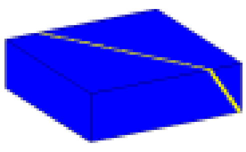
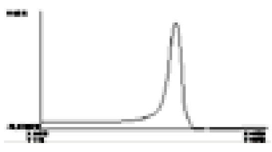
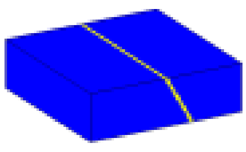
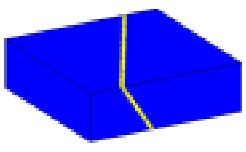
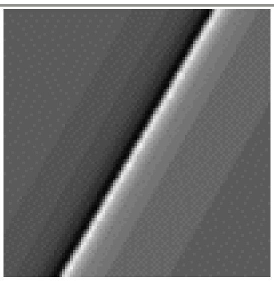
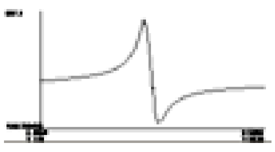
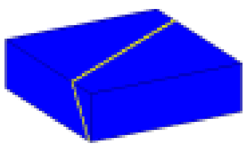
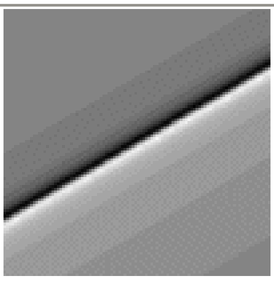
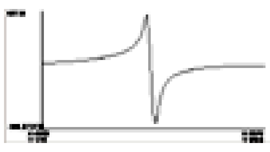
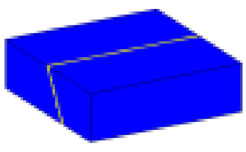
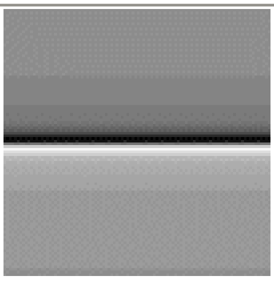
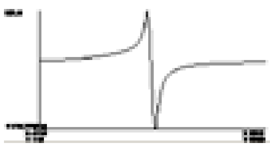
WWW conversion by Ian Brayshaw

2.4.2 Variation in Dip Direction for a Thin Dyke

2.4.2bn

This sequence shows the affect of varying the dip direction for a 200 m thick dyke. Since these are essentially two-dimensional models, South to North profiles are also provided. All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Magnetics	South Intensity North
Dyke dipping to 000 (North)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 030	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 060	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 090	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 120	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 150	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 180 (South)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Survey Parameters	Scale
dyke ρ = 1 κ = 10^{-2} background ρ = 0 κ = 0 image width 10,000 m	Inclination 50° Intensity 50,000 gamma Flight height 80 m	max — min

All models created using Noddy

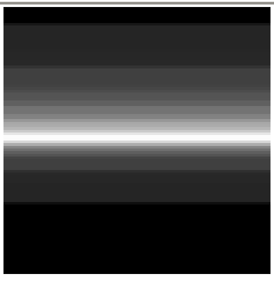
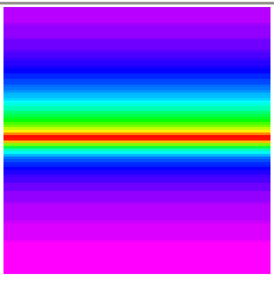
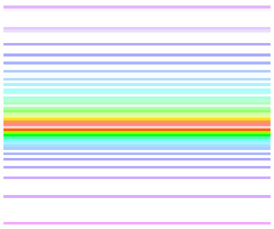
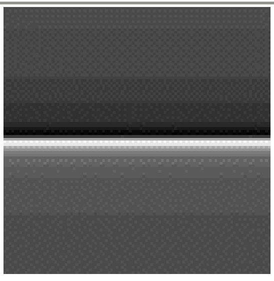
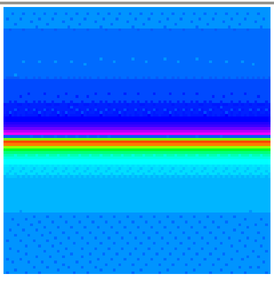
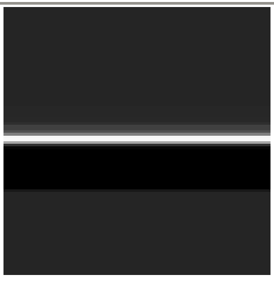
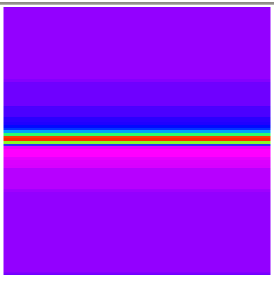
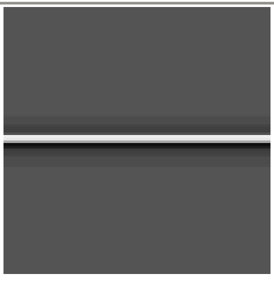
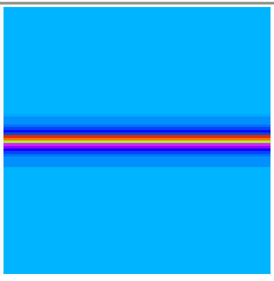
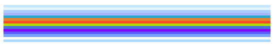
WWW conversion by Ian Brayshaw

2.4.2b Variation in Dip Direction for a Thin Dyke (continued)

2.4.2n

This sequence shows the affect of a 200 m dyke. Other images are not shown as reduced to the pole images would only vary by rotation. The images show the variation in display formats between grey scale and psuedocolour look up tables, and colour contours, and the differences between folds at an inclination of 50° and 90°, together with first vertical derivative images at the pole.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Grey Scale	Pseudo Colour	Contours
Dyke dipping to 000 (North) Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 000 (North) Magnetics at an inclination of 50°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 000 (North) Magnetics at an inclination of 90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 000 (North) First Vertical Derivative	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Survey Parameters	Scales
dyke $\rho = 1$ $\kappa = 10^{-2}$ background $\rho = 0$ $\kappa = 0$ image width 10,000 m	Inclination 50° or 90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max (grey scale) min max (colour scale) min

All models created using Noddy

WWW conversion by Ian Brayshaw

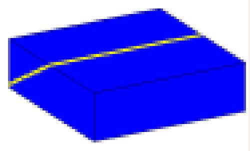
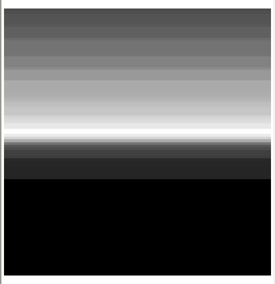
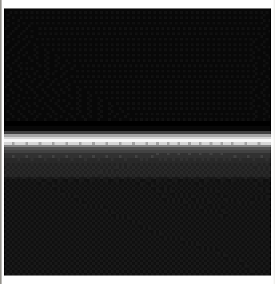
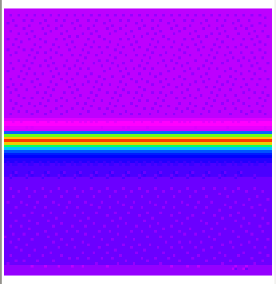
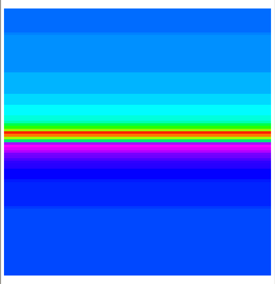
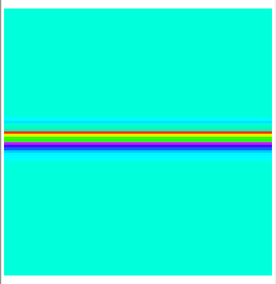
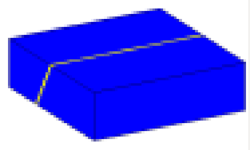
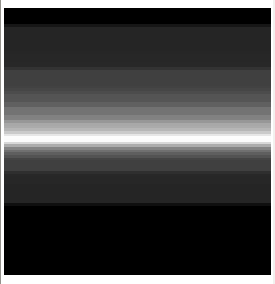
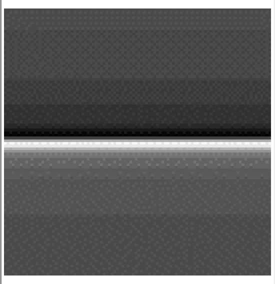
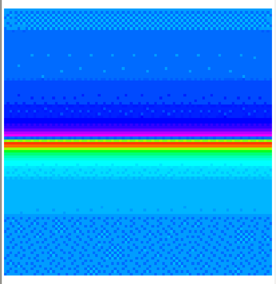
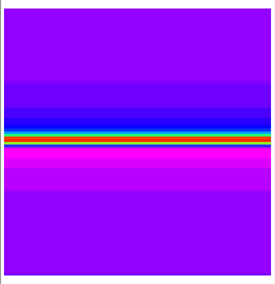
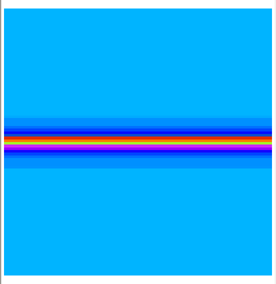
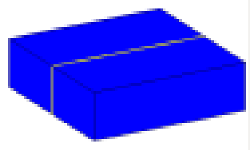
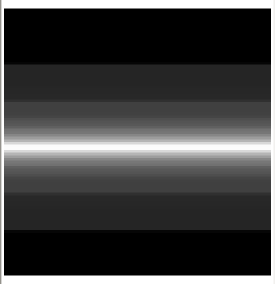
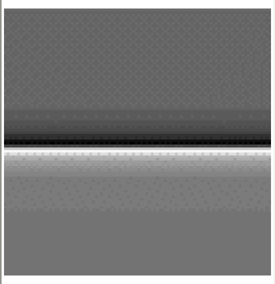
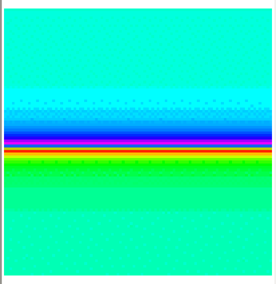
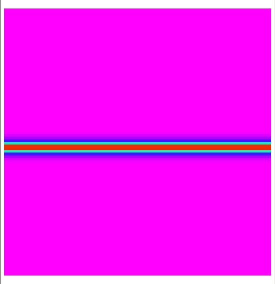
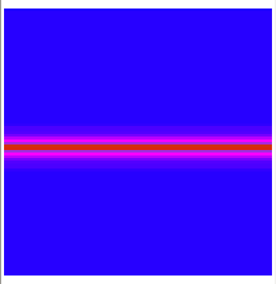
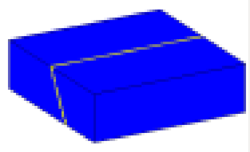
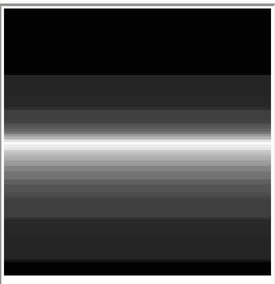
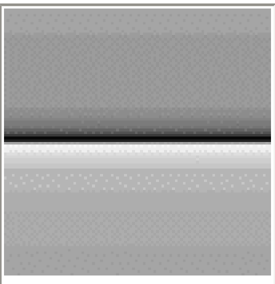
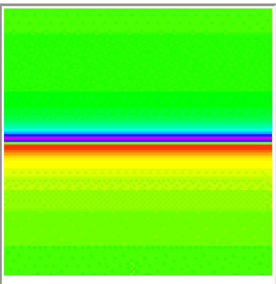
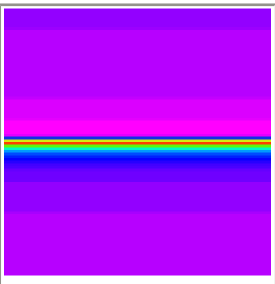
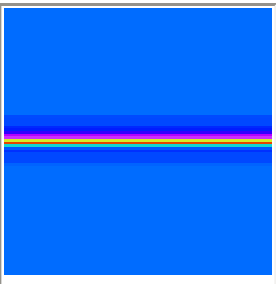
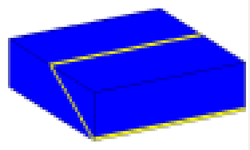
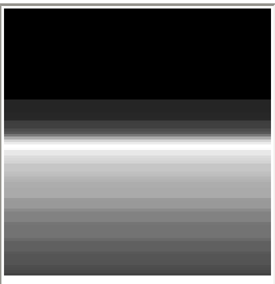
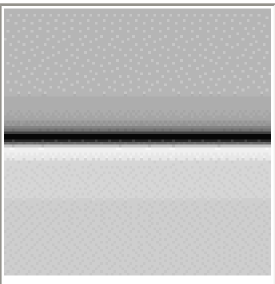
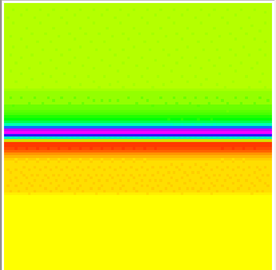
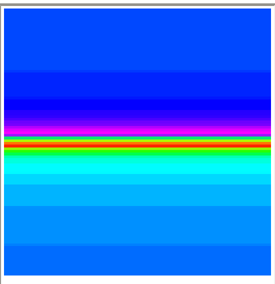
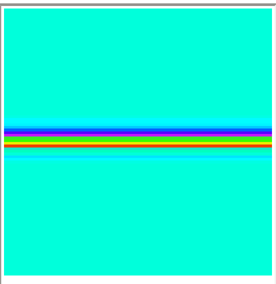
2.4.3 Variation in dyke dip

This sequence shows the affect of varying the dip of a 200 m thick EW striking dyke.

All block diagrams are viewed from SW.

Summary wavelet transform animation comparing 3 different dips

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Dyke dipping 30° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping 60° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping 90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping 60° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping 30° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Survey Parameters	Scales
dyke ρ = 1 κ = 10^{-2} background ρ = 0 κ = 0 image width 10,000 m	Inclination 50° or 90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max … min max … min

All models created using Noddy

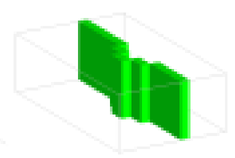
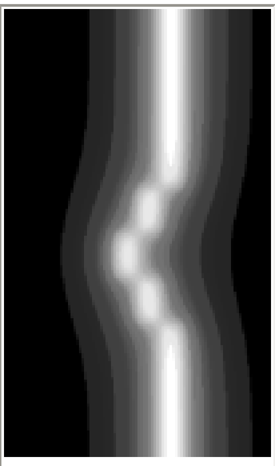
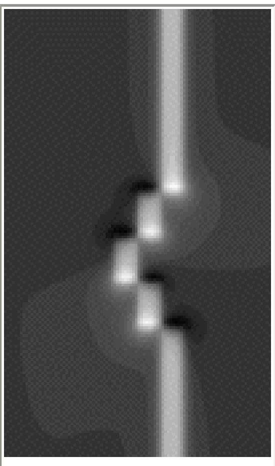
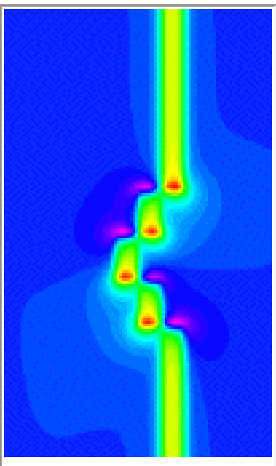
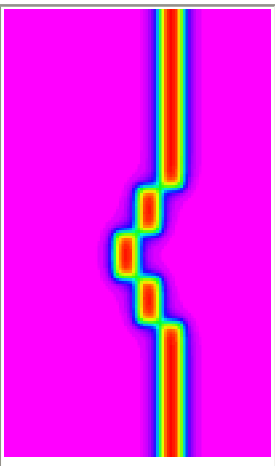
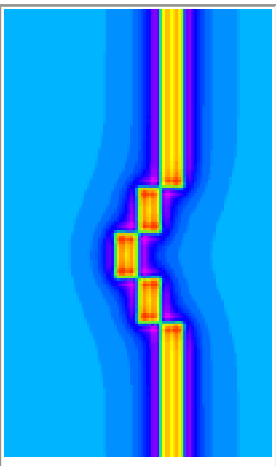
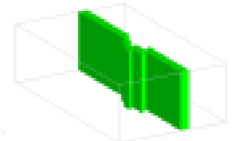
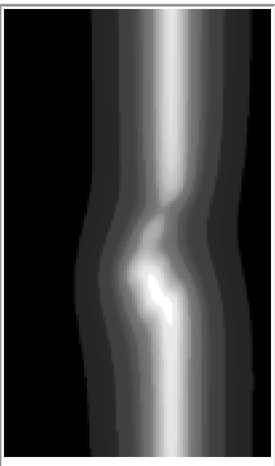
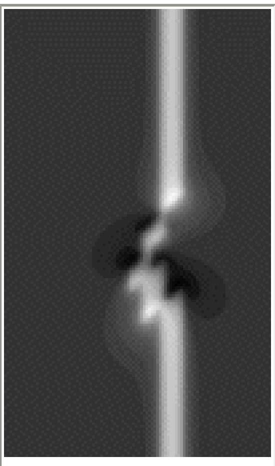
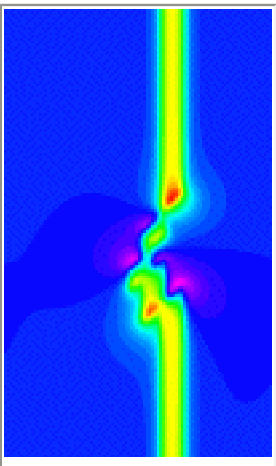
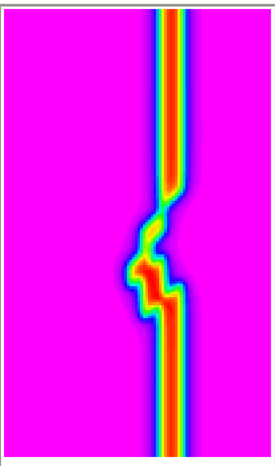
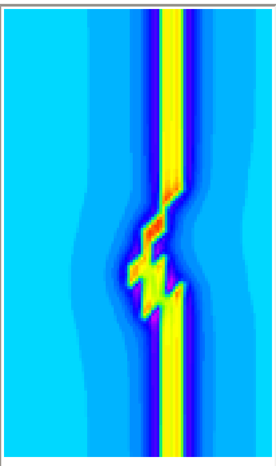
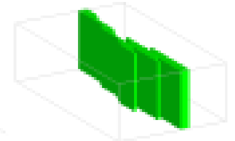
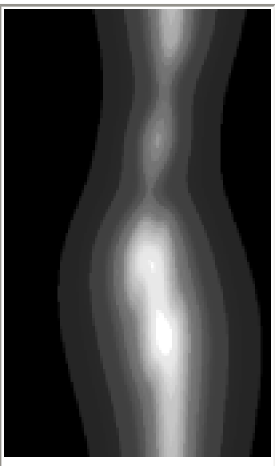
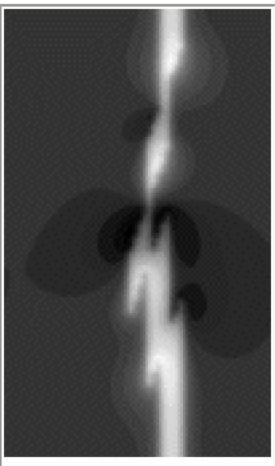
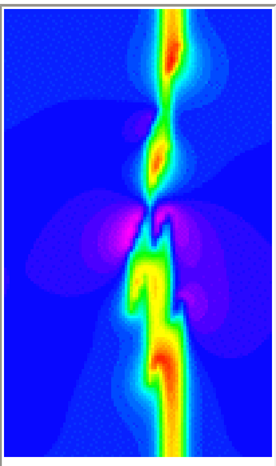
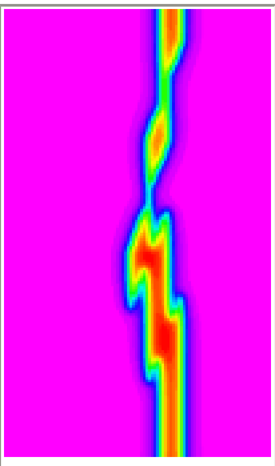
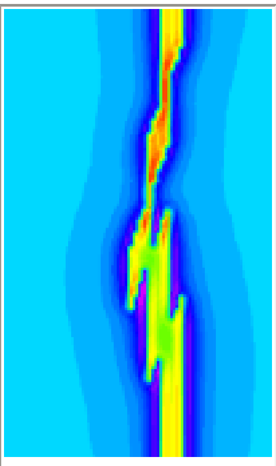
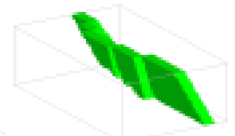
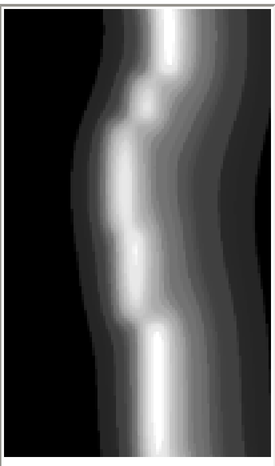
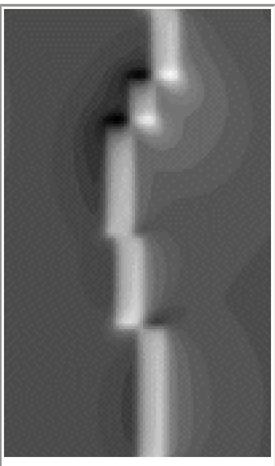
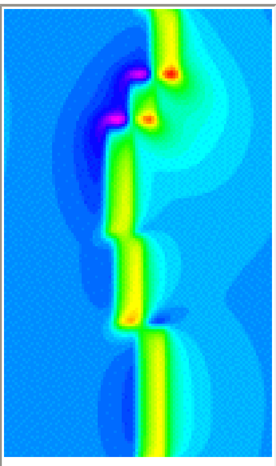
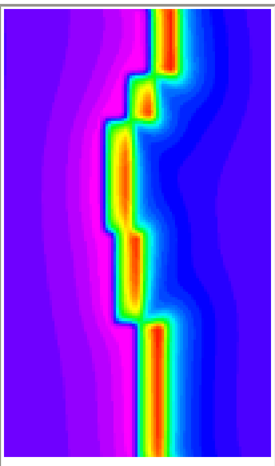
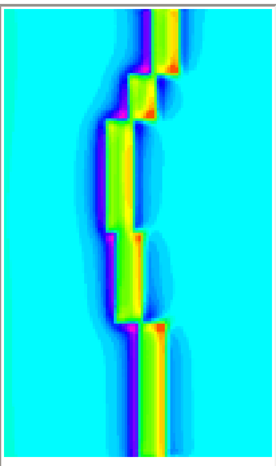
WWW conversion by Ian Brayshaw

3.1 Faulted dyke

These models demonstrate the effects of varying the fault orientation with respect to a vertical dyke, and the ease with which the fault orientations cand displacements can be recognised.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Faults at 90° to dyke	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this model the apparent offsets are quite clear, although the results of section 2.2.5 show that the true offsets cannot actually be determined from this data.					
Faults at 45° to dyke	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this case the fault positions are still quite clear in the magnetic data					
Faults at 20° to dyke	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In these images the fault positions and orientations start to become unclear, and the variations in dyke appearance along strike could be interpreted as thickness variations or rock property variations.					
Faults at 60° to dyke, dipping at 60°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This model re-emphasises the problem with reinterpreting true fault offsets from faults cutting a single marker horizon. (See section 2.2.5 for further examples.)					

Key	Survey Parameters	Scales
dyke ρ = 1 κ = 10^{-2} background ρ = 0 κ = 0 image width 10,000 m	Inclination 50° or 90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max min max min

All models created using Noddy

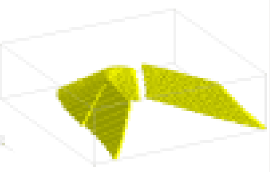
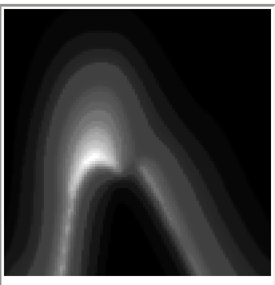
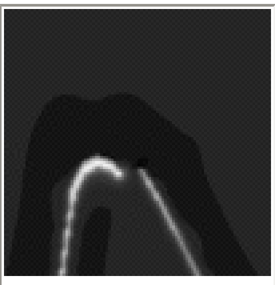
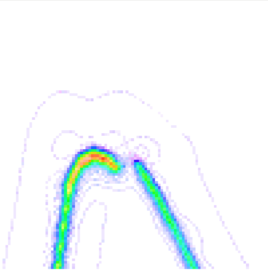
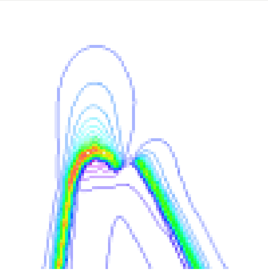
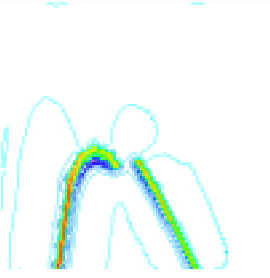
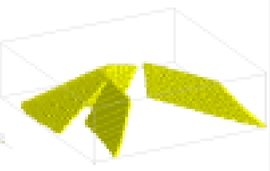
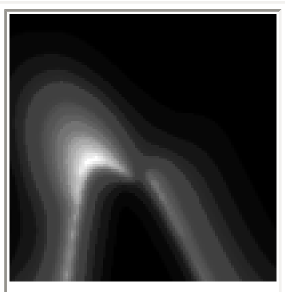
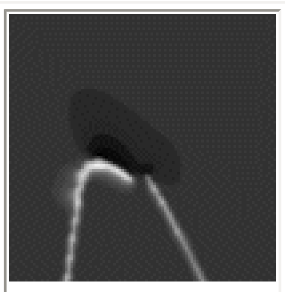
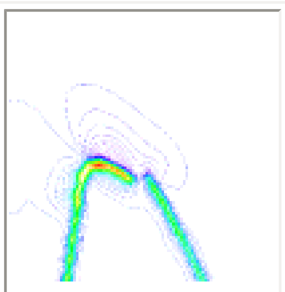
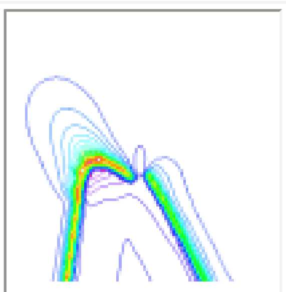
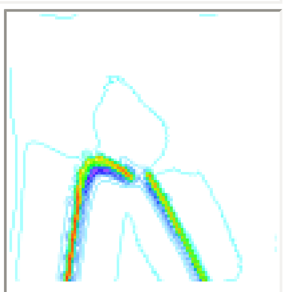
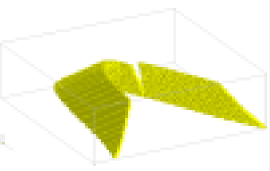
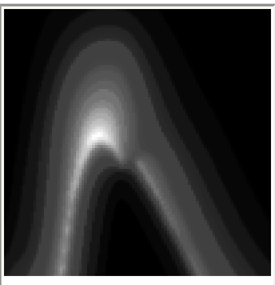
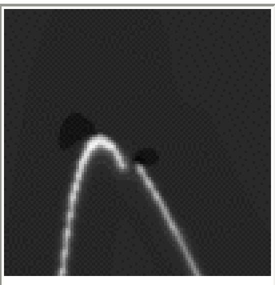
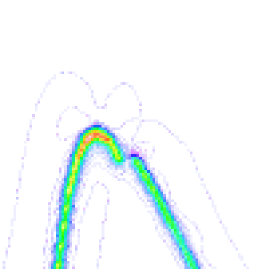
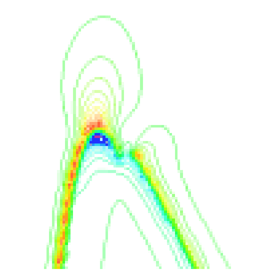
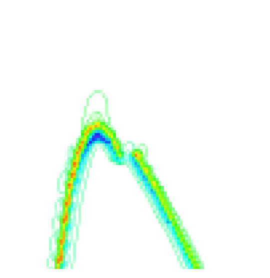
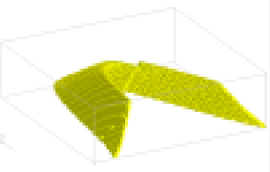
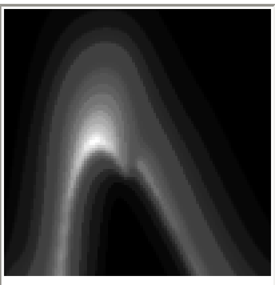
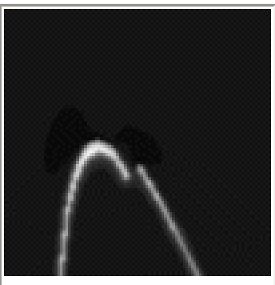
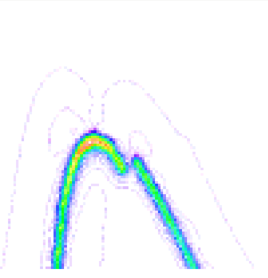
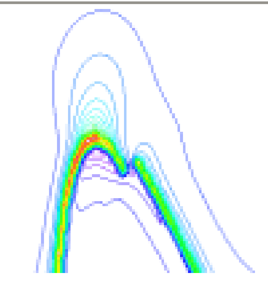
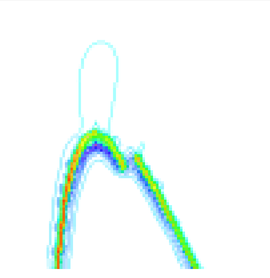
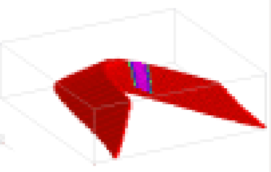
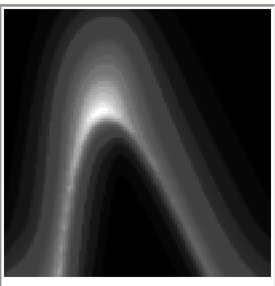
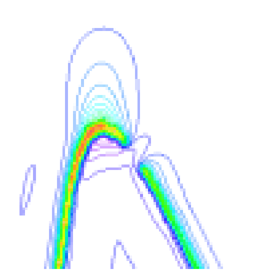
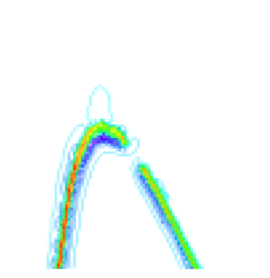
WWW conversion by Ian Brayshaw

3.2 Faulted Fold

These models demonstrate another aspect of the ambiguities that may arise when interpreting folds. In each model a single fault cuts through the nose of a plunging anticline, producing offset on one side of the fold but not on the other. A number of different fault geometries are shown which all result in similar outcrop geometries. It is likely that only mapping at the outcrop scale (of slickenside lineations of fault trace for example) would enable one to distinguish between these models.

All block diagrams viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Oblique Slip Translational fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this model we have a simple translational fault in which the slip vector is approximately parallel to the dip of the west limb of the fold, so that the offset is only apparent in the east limb.					
Scissor fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this model the north block is rotated clockwise around a point at the surface near where the fault cuts the west limb, so again the west limb appears to be un-displaced.					
Variable displacement fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Here the fault displacement decays towards the west, so that by the time the fault plane reaches the west limb, the amount of displacement is minimal.					
Curved fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Here the fault starts off cutting through the east limb of the fold and then swings around parallel to the layering as it reaches the west limb, so no offest occurs.					
Alteration zone around a fracture	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this case we have a fracture with no displacement, and instead an alteration zone around the fracture causes the disruption in the east limb (which could be misinterpreted as a fault offset).					

Key	Survey Parameters	Scales
plug ρ = 1 κ = 10^{-2}	Inclination 50° or 90°	max [grey scale] min
background ρ = 0 κ = 0	Intensity 50,000 or 70,000 gamma	max [colour scale] min
image width 10,000 m	Flight height 80 m	

All models created using Noddy

WWW conversion by Ian Brayshaw

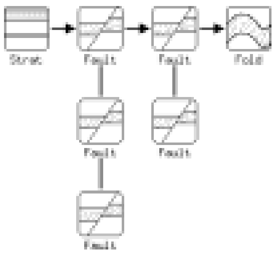
3.3 Basin Setting (Flat-lying sediments)

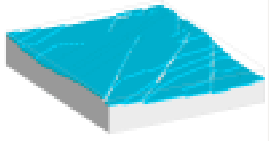
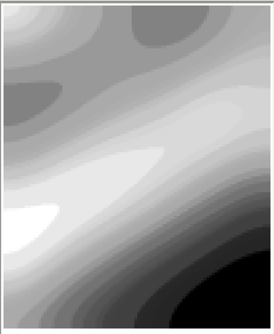
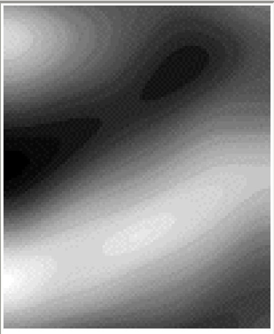
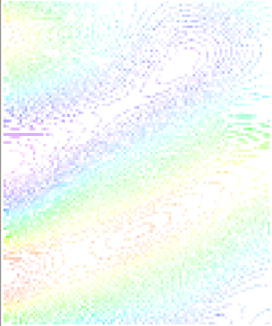
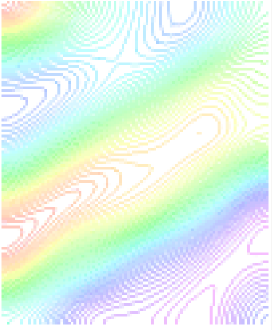
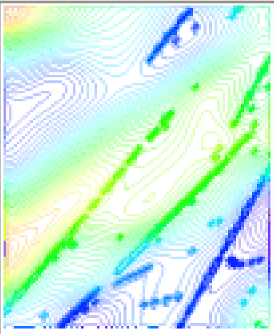
Very gently folded sediments cut by high angle normal and transfer faults. For example, North-West Shelf of Australia. The blue high susceptibility/high density layer is 100m thick.

Block is viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

The icon below shows the deformation history used for this model.



Link	Block	Gravity	Magnetics	Magnetics	Magnetics at pole	Magnetics at pole 1VD
	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key		Survey Specifications		Scales
layer	$\rho = 1$ $\kappa = 10^{-2}$	Inclination	50° or 90°	max — min
background	$\rho = 0$ $\kappa = 0$	Intensity	50,000 or 70,000 gamma	max — min
image width	10,000m	Flying height	80m	

All models created using Noddy

WWW conversion by Ian Brayshaw

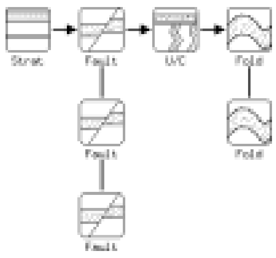
3.4 Block faulted, rifted and folded region

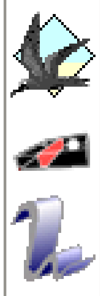
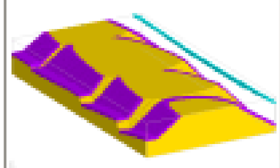
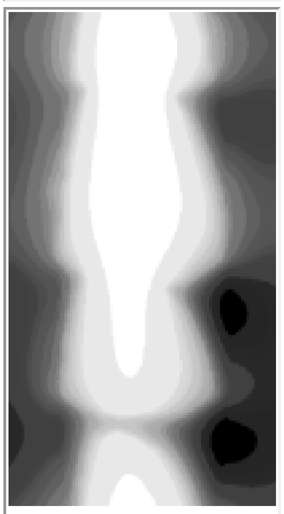
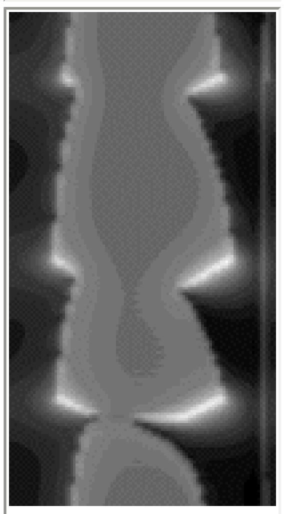
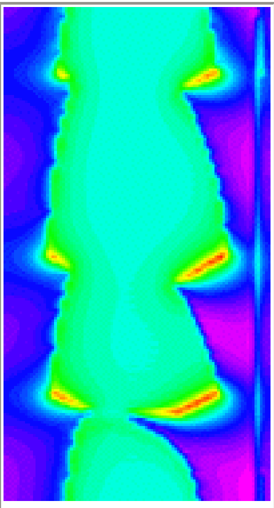
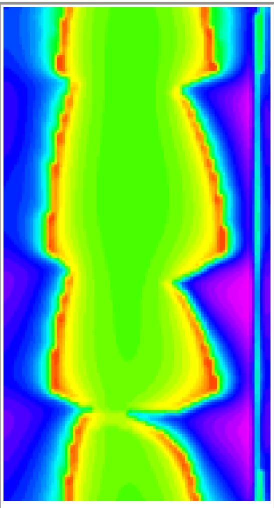
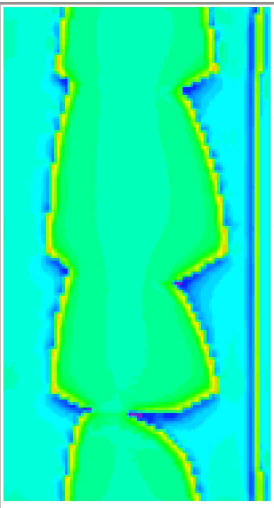
This model shows a set of East-West striking growth faults which have subsequently been overlain by a flat unconformity and then folded around a North-South trending anticline. For example, the Leichardt River Fault Trough, Mt Isa, Australia.

Block is viewed from SW.

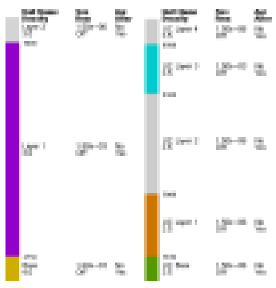
Click on the images to launch Noddy. A legend is provided at the end of this page.

The icon below shows the deformation history used for this model.



Link	Block	Gravity	Magnetics	Magnetics	Magnetics at pole	Magnetics at pole 1VD
	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

The following details the rock properties.



Key	Survey Specifications	Scales
image width 10,000m	Inclination 50o or 90o Intensity 50,000 or 70,000 gamma Flying height 80m	max (grey scale) min max (colour scale) min

All models created using Noddy

WWW conversion by Ian Brayshaw

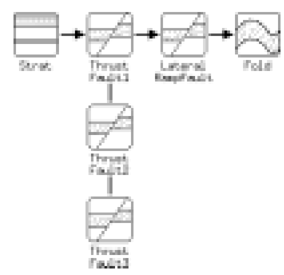
3.5 Fold & Thrust setting

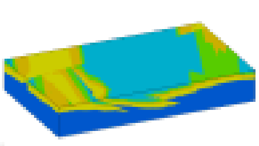
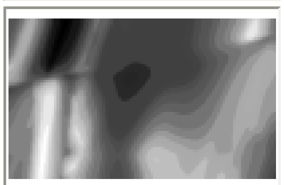
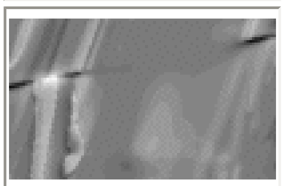
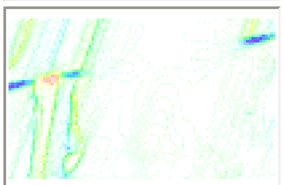
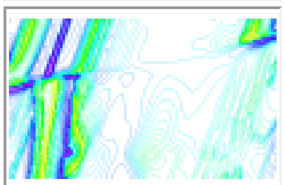
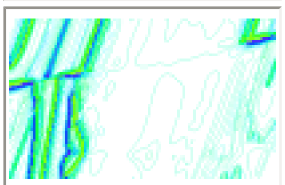
Thrusted sequence with ramp anticlines and late gentle folding. For example, the Rocky Mountains, Nth America.

Block diagram viewed from SW.

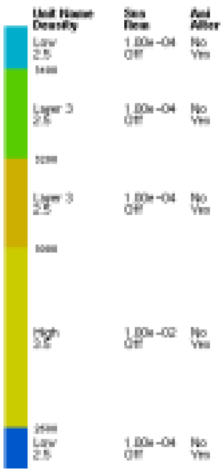
Click on the images to launch Noddy. A legend is provided at the end of this page.

The icon below shows the deformation history used for thie model.



Link	Block	Gravity	Magnetics	Magnetics	Magnetics at pole	Magnetics at pole 1VD
	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

The following details the rock properties.



Key	Survey Specifications	Scales
image width 20,000m	Inclination 50° or 90° Intensity 50,000 or 70,000 gamma Flying height 80m	max min max min

All models created using Noddy

WWW conversion by Ian Brayshaw

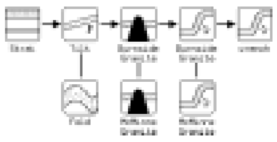
3.6 Dome and Basin setting

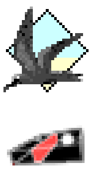
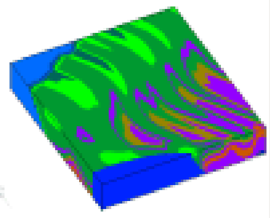
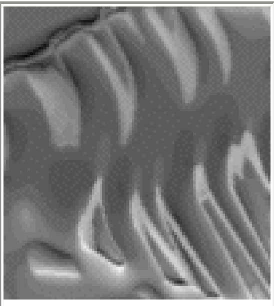
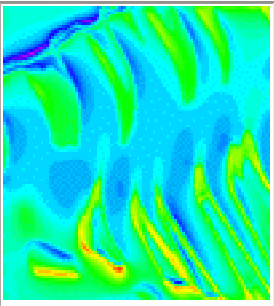
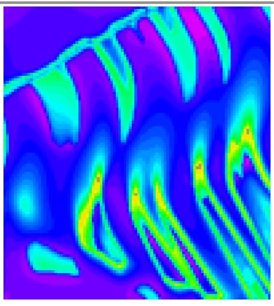
The dome and basin pattern is in this case produced by the interaction between early North-South trending folds with a later buttressing against a pair of granites. For example, Pine Creek Geosyncline, Northern Territory, Australia.

Block viewed from SW.

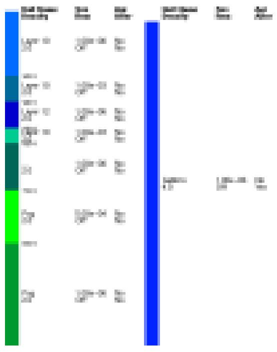
Click on the images to launch Noddy. A legend is provided at the end of this page.

The icon below shows the deformation history used for this model.



Link	Block	Magnetics	Magnetics	Magnetics at pole	Magnetics at pole 1VD
	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

The following details the rock properties.



Key	Survey Specifications	Scales
image width 14,000m	Inclination 50o or 90o Intensity 50,000 or 70,000 gamma Flying height 80m	max [greyscale bar] min max [colour bar] min

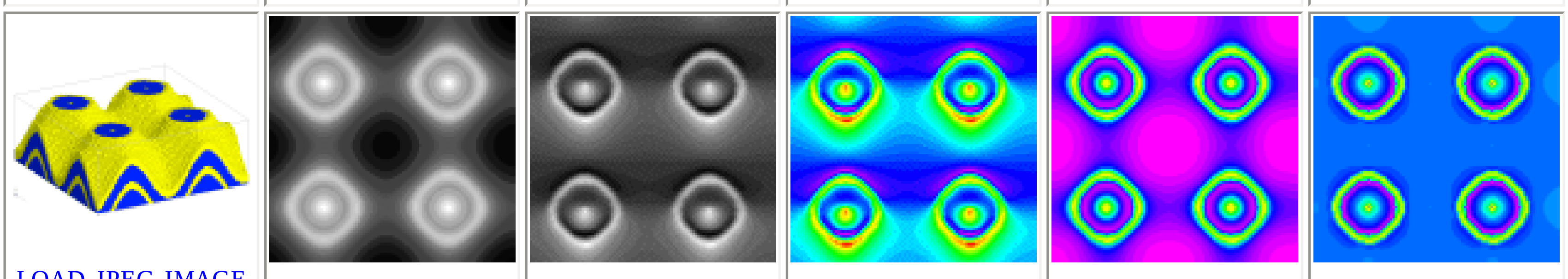
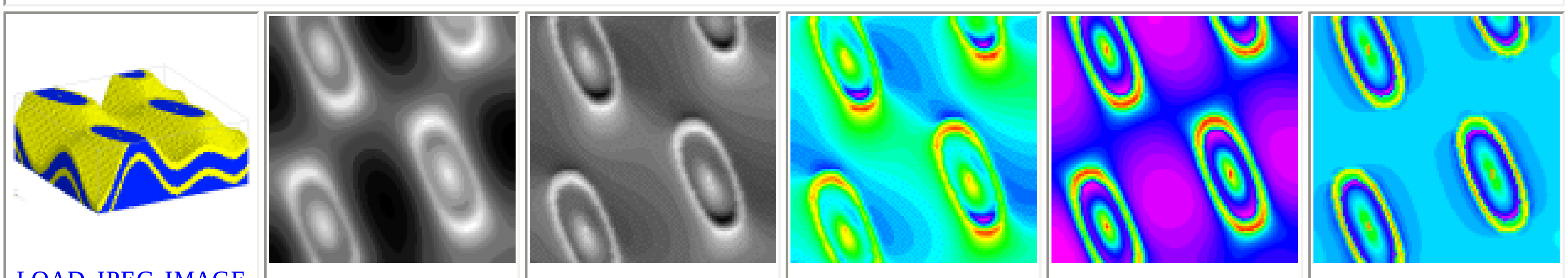
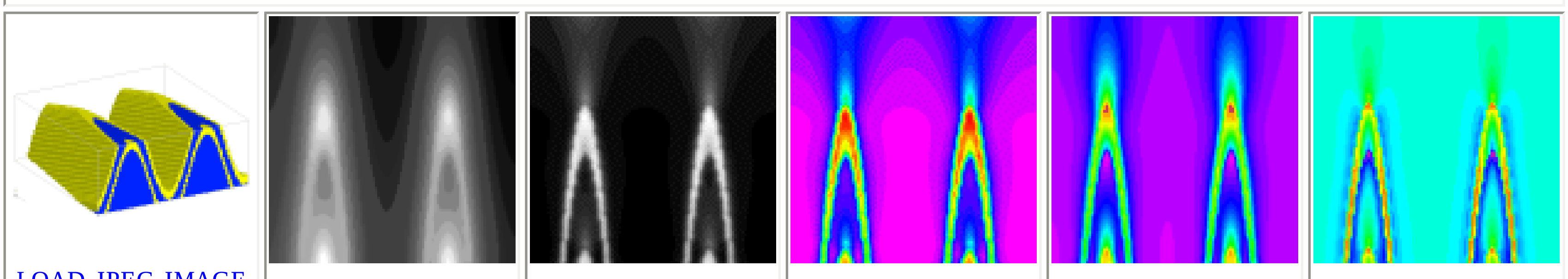
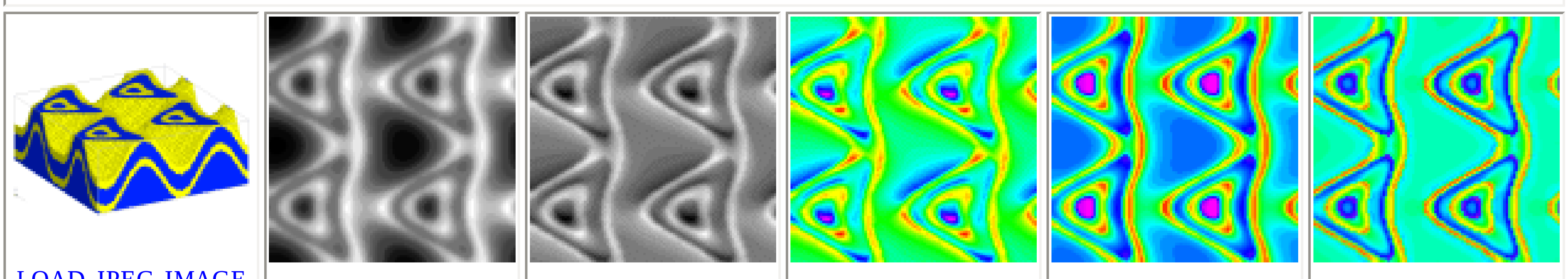
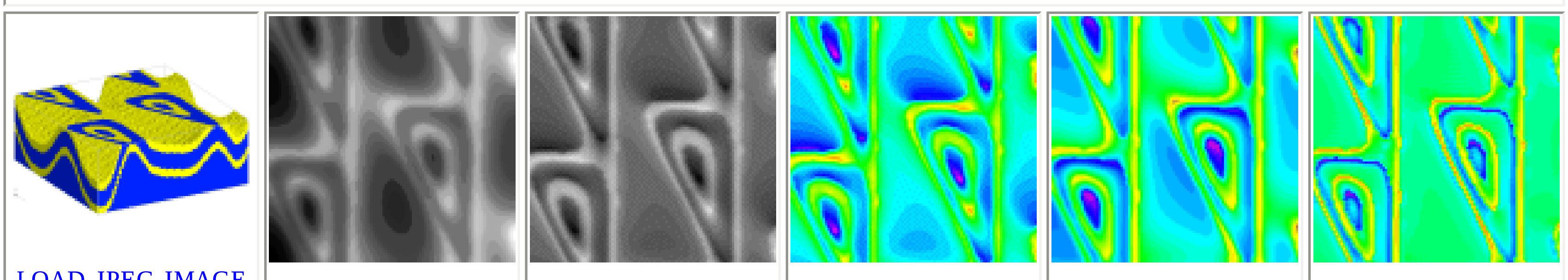
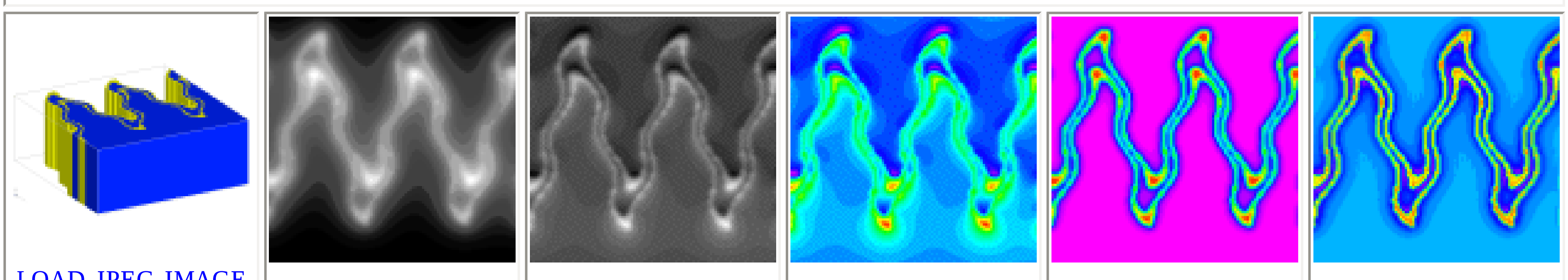
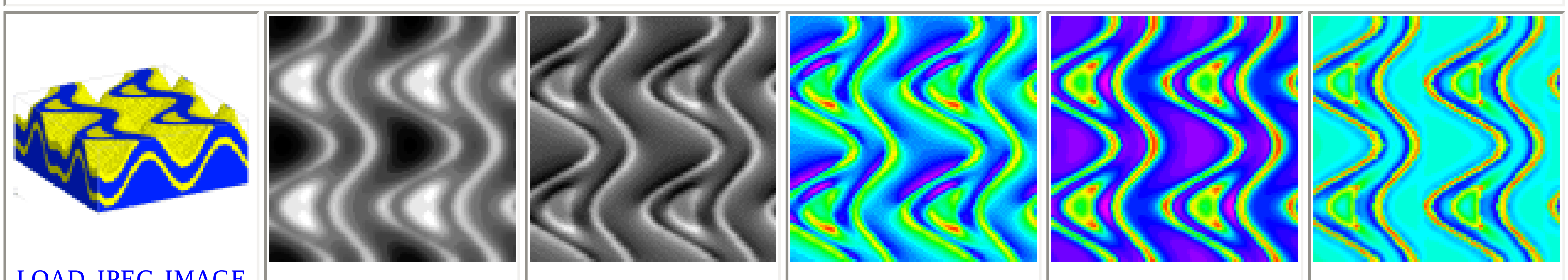
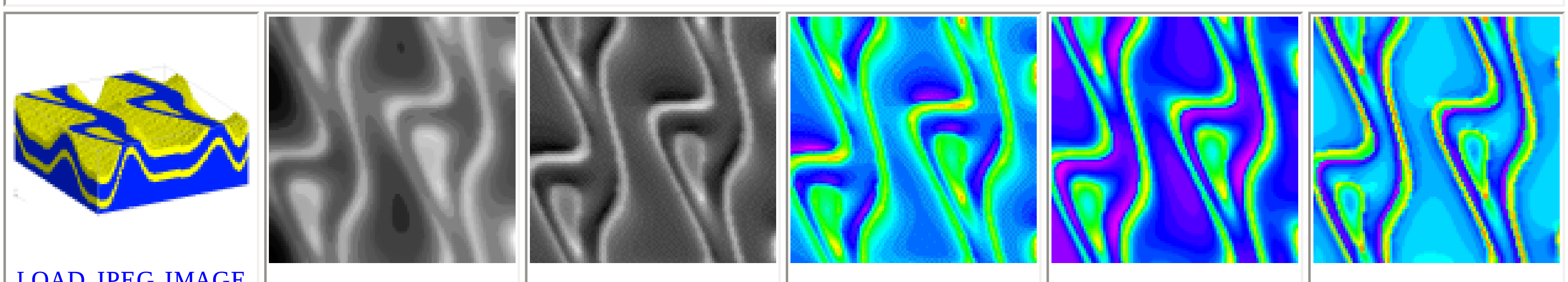
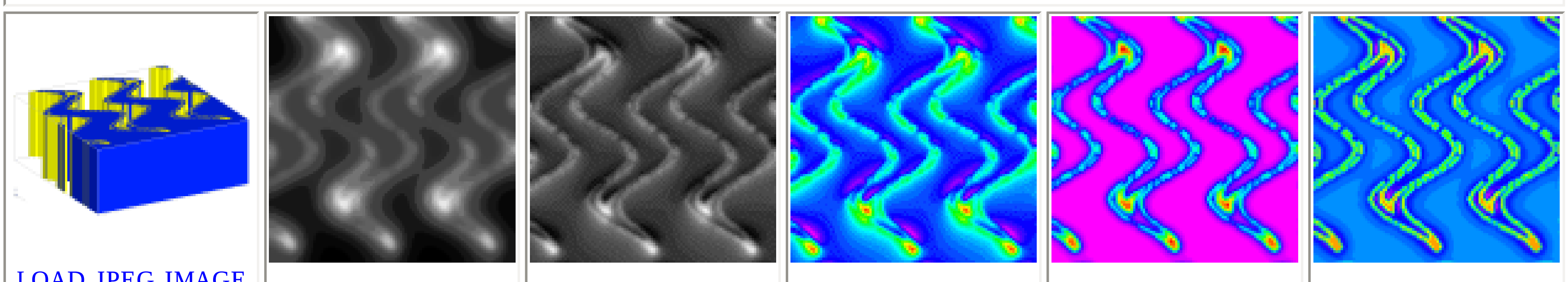
All models created using Noddy

WWW conversion by Ian Brayshaw

3.7 Fold Interference Patterns

This sequence duplicates the well known fold interference patterns of Ramsay, although see Theissen & Means and Theissen for a more complete scheme.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
A	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 1 pattern, also known as a dome and basin pattern.					
B	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 1 pattern, and is also a form of dome and basin pattern.					
C	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 0 pattern, where the two fold systems are completely parallel (and it is thus unlikely you would be able to distinguish the two phases of folding).					
D	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 1 (+2) pattern.					
E	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 1 (+2) pattern.					
F	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 3 pattern.					
G	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 2 pattern, also known as a mushroom pattern.					
H	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 2 pattern, also known as a mushroom pattern.					
I	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 3 pattern.					

Key	Survey Specifications	Scales
blue layer $\rho = 0$ $\kappa = 0$ yellow layer $\rho = 1$ $\kappa = 10^{-2}$ image width 10,000m	Inclination 50° or 90° Intensity 50,000 or 70,000 gamma Flying height 80m	max [greyscale] min max [colour scale] min

Ramsay, 1967, Folding and Fracturing of Rocks, MacGraw-Hill, p531.
Theissen & Means, Journal of Structural Geology, 2, pp311-316.
Theissen, 1986, Journal of Structural Geology, 8, pp563-573.

All models created using Noddy

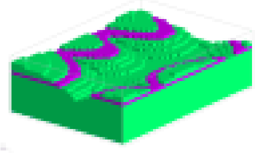
WWW conversion by Ian Brayshaw

4.1 Horizontal stratigraphy

In this model an East-West trending valley dissects a simple horizontal layered stratigraphy, so that the outcrop pattern follows the contours of the topography. The results are compared for a barometric survey, where the survey locations are at a constant height above sea level (in this case 400 m above the top of the block), and a draped survey, where the survey locations maintain a constant height above the local land surface (in this case 400 m above the land surface).

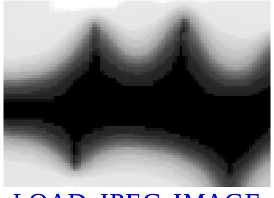
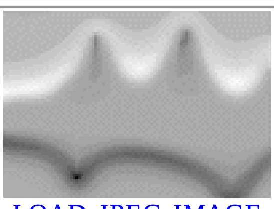
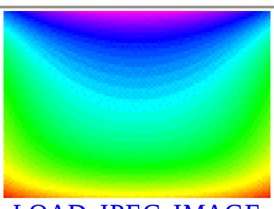
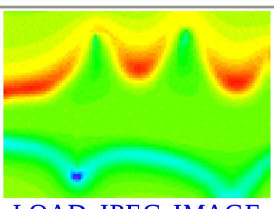
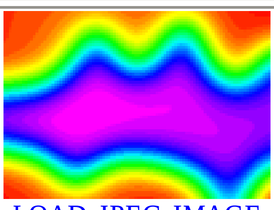
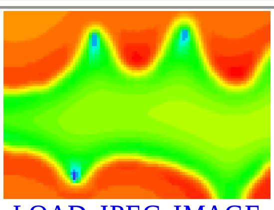
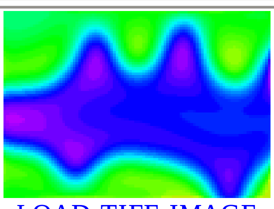
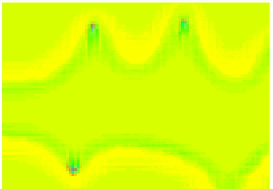
Click on the images to launch Noddy. A legend is provided at the end of this page.

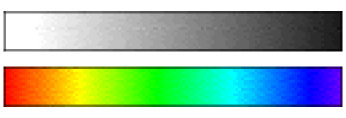
Block model showing topography dissecting a three layer stratigraphy.



LOAD JPEG IMAGE

In order to use these history files you will also need to download the following file! topofile.top

	Barometric Survey	Draped Survey
Link		
Gravity	 LOAD JPEG IMAGE In this image the gravity field only reflects the general shape of the topography, and the position of the high density layer is not immediately obvious.	 LOAD JPEG IMAGE In this image the gravity field reflects the shape of the topography, and the sharp gradient (which follows the contours) marks the position of the high-density layer.
Magnetics	 LOAD JPEG IMAGE In this image the magnetic field only reflects the general shape of the topography, although there is a strong asymmetry between the North and South facing slopes of the valley, and the exact position of the high susceptibility layer is unclear.	 LOAD JPEG IMAGE In this image the magnetic field reflects the shape of the topography, and the position of the high susceptibility layer is marked by a low contour-following low on the South-facing slope, and a contour-following high on the North-facing slope.
Magnetics	 LOAD JPEG IMAGE In this image the magnetic field only reflects the general shape of the topography, although there is a strong asymmetry between the North and South facing slopes of the valley, and the exact position of the high susceptibility layer is unclear.	 LOAD JPEG IMAGE In this image the magnetic field reflects the shape of the topography, and the position of the high susceptibility layer is marked by a low contour-following low on the South-facing slope, and a contour-following high on the North-facing slope.
Magnetics at Pole	 LOAD JPEG IMAGE In this image the magnetic field only reflects the general shape of the topography, and since this image is calculated at the South Pole, the North- and South-facing slopes behave in the same way. The exact position of the high susceptibility layer is unclear.	 LOAD JPEG IMAGE In this image the magnetic field reflects the shape of the topography, and the position of the high susceptibility layer is marked by a sharp transition in intensity values.
Magnetics at Pole 1VD	 LOAD TIFF IMAGE In this image the magnetic field only reflects the general shape of the topography, and since this image is calculated at the South Pole, the North- and South-facing slopes behave in the same way. The exact position of the high susceptibility layer is roughly marked by the sharp transition in intensity values.	 LOAD TIFF IMAGE In this image the magnetic field reflects the shape of the topography, and the position of the high susceptibility layer is marked by a contour-following dipole anomaly.

Key		Survey Specifications		Scales
green	κ = 0 ρ = 0	inclination	50° or 90°	 max min max min
green layer	$κ = 1.1×10^{-3}$	intensity	50,000 or 70,000 gamma	
purple	$κ = 10^{-2}$ ρ = 3	flying height	400 m	
purple layer	κ = 0			
image width	10,000 m			

All models created using Noddy

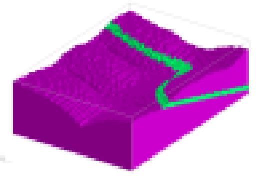
WWW conversion by Ian Brayshaw

4.2 Dipping stratigraphy

In this model an East-West trending valley dissects a simple tilted stratigraphy, so that the outcrop pattern curves around the topography (the model geometry is also that of a dipping dyke). The results are compared for a barometric survey, where the survey locations are at a constant height above sea level (in this case 400 m above the top of the block), and a draped survey where the locations maintain a constant height above the local land surface (in this case 400 m above the land surface).

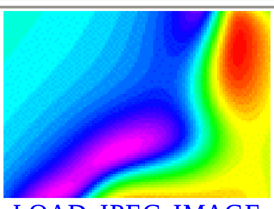
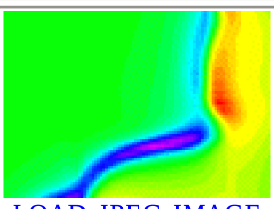
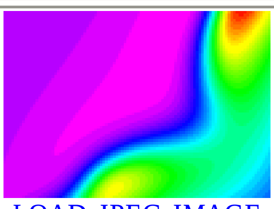
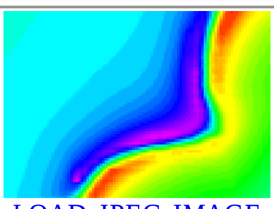
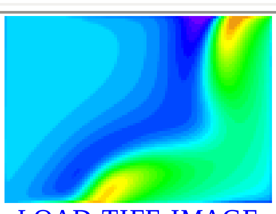
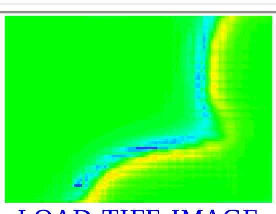
Click on the images to launch Noddy. A legend is provided at the end of this page.

Block model showing topography dissecting a dipping three layer stratigraphy



LOAD JPEG IMAGE

In order to use these history files you will also need to download the following file! topofile.top

	Barometric Survey	Draped Survey
Link		
Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this image the distance to the top of the body controls the local strength of the anomaly, with the hill outcrops dominating the survey.	With a draped survey the anomaly strength actually peaks at the base of the valley.
Magnetics	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	As with the gravity image, the magnetic survey mainly reflects the variable distance between the outcrop and sensor.	In this model the geometry of the body is more clearly defined, however there is a distinct asymmetry between North- and South-facing slopes, with the high susceptibility layer significantly weaker on the South-facing slope.
Magnetics	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	As with the gravity image, the magnetic survey mainly reflects the variable distance between the outcrop and sensor.	In this model the geometry of the body is more clearly defined, however there is a distinct asymmetry between North- and South-facing slopes, with the high susceptibility layer significantly weaker on the South-facing slope.
Magnetics at Pole	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	As with the 50° inclination model, the magnetic survey mainly reflects the variable distance between the outcrop and sensor.	In this model the geometry of the body is still more clearly defined, and the anomaly strength is more uniform along strike. The local fluctuations in anomaly strength along the length of the body reflect the discretisation of the land surface into cubes.
Magnetics at Pole 1VD	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	As with the pole image, the magnetic survey mainly reflects the variable distance between the outcrop and sensor.	In this model the geometry of the body is more clearly defined as a linear dipole anomaly. The local fluctuations in anomaly strength along the length of the body reflect the discretisation of the land surface into cubes. (The look up table of this image has been clipped to show more detail.)

Key		Survey Specifications		Scales
green	$\kappa = 0$ $\rho = 3$	inclination	50° or 90°	max (greyscale) min
green layer	$\kappa = 10^{-2}$	intensity	50,000 or 70,000 gamma	max (colour) min
purple	$\kappa = 10^{-2}$ $\rho = 0$	flying height	400 m	
purple layer	$\kappa = 0$			
image width	10,000 m			

All models created using Noddy

WWW conversion by Ian Brayshaw

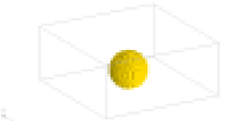
5.1 A remanently magnetised sphere

In this model we compare a normally magnetised sphere in an inclined field with the same sphere with an added remanent component. The remanence vector has a fixed inclination, but is calculated using various declinations.

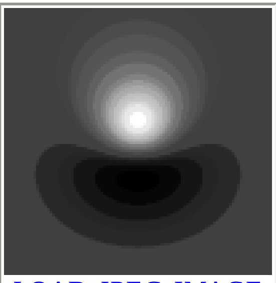
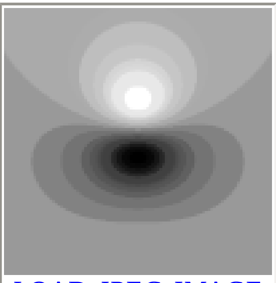
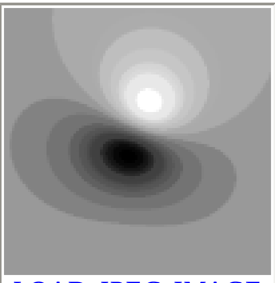
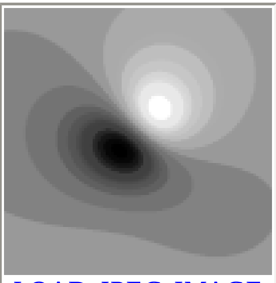
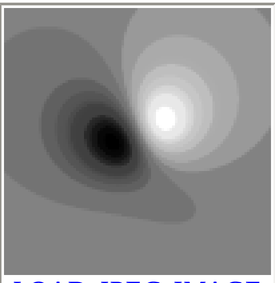
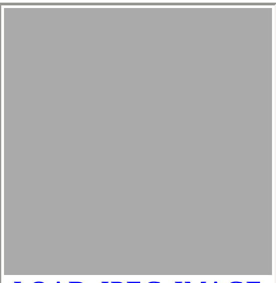
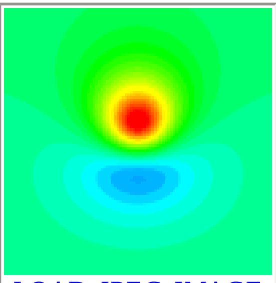
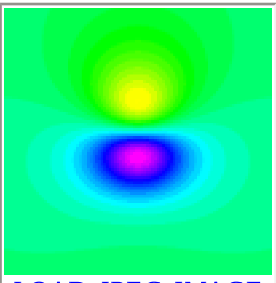
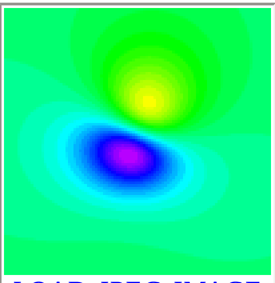
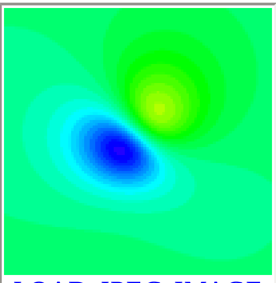
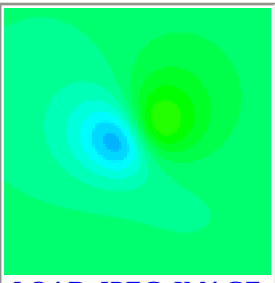
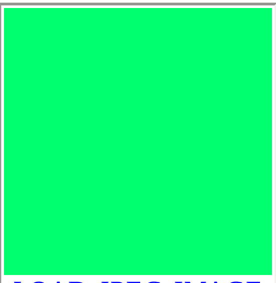
The grey scale images have look up tables clipped to maximum and minimum values so that the shapes of the anomalies are highlighted. The colour images have a single look up table for all anomalies, so that the intensity of the anomalies may be compared.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Block Diagram



LOAD JPEG IMAGE

	Normally magnetised sphere with remanent component declination					
Link	No remanent component	Declination of 000°	Declination of 045°	Declination of 090°	Declination of 135°	Declination of 180°
Grey Scale	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Pseudo Colour	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Comment						*In this model the remanent component exactly cancels out the induced component of the magnetisation.*

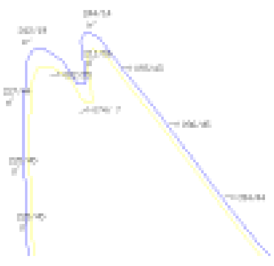
Key		Survey Specifications		Scales
sphere	$\kappa = 10^{-2}$	inclination	50°	max 35,000 – min -25,000
sphere remanence intensity	5×10^4	intensity	50,000 gamma	
sphere remanence declination	0° to 180°	flying height	200 m	
background	$\kappa = 0$			
image width	10,000 m			

5.2 Remanence and folding

This set of models shows three possible interactions of folding with a remanent component to magnetisation. The first row of models have no remanent component, the second row has a remanently magnetised layer with remanence imposed after folding, and the third row has a remanent layer with vectors deflected by the folding. While the overall fold geometry is apparent in all three models, because the total magnetic moment of the layer still in general contrasts strongly with the background, the folded remanence models show marked variation in field intensity for different fold limbs.

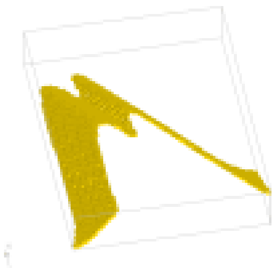
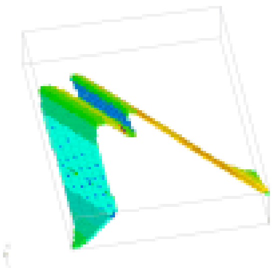
Click on the images to launch Noddy. A legend is provided at the end of this page.

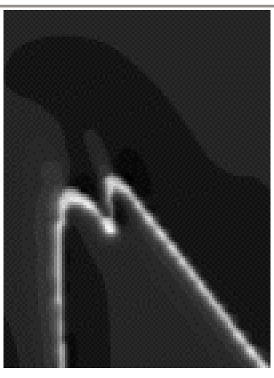
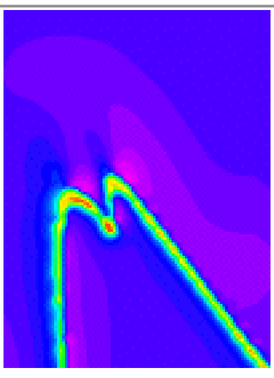
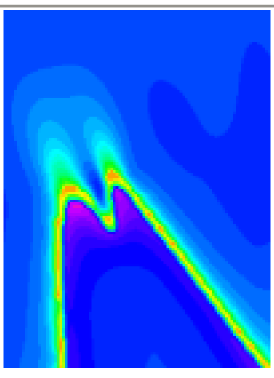
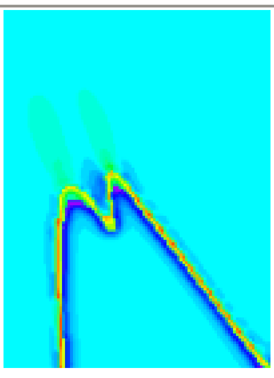
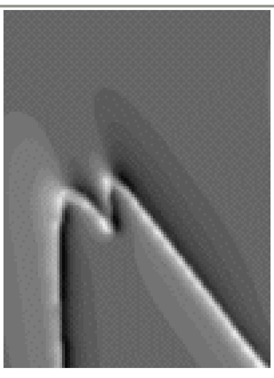
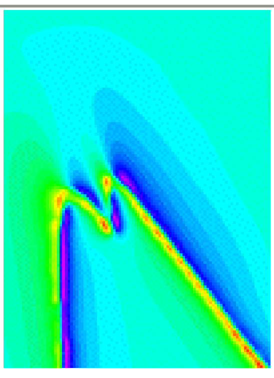
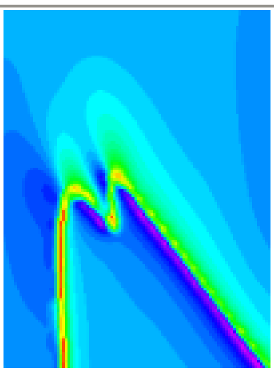
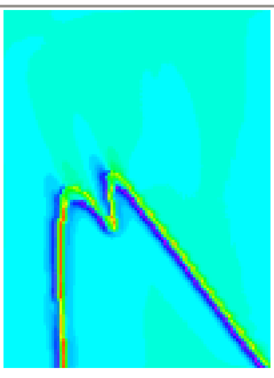
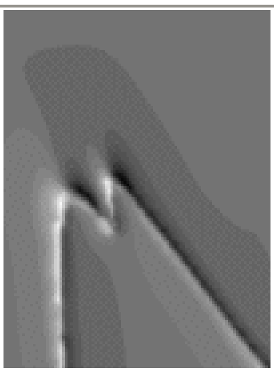
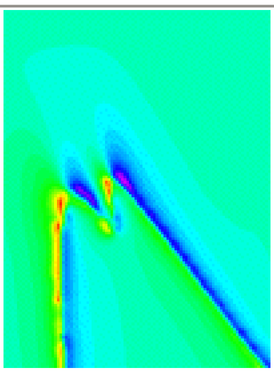
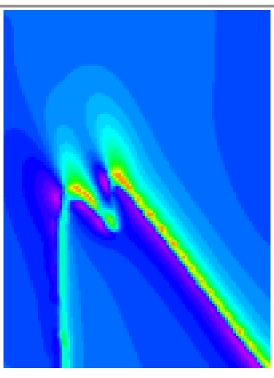
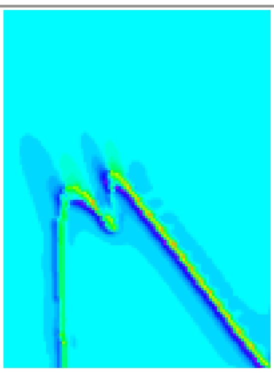
Map of remanence vectors



LOAD JPEG IMAGE

Map showing dip and dip direction values for remanence vector at selected positions.

Block diagram of folded layer	Block diagram of folded layer
 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
In this model the remanence is non-existant or uniform in orientation.	In this model the remanence orientation varies according to position on the fold. Colours vary with the declination of the remanence.

Link	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
No remanence	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Post-folding remanence	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Remanence uniformly set to: inclination 0 declination090 intensity 1000	Remanence uniformly set to: inclination 0 declination090 intensity 1000		
Pre-folding remanence	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Remanence set to: inclination variable declinationvariable intensity 1000	Remanence set to: inclination variable declinationvariable intensity 1000		

Key	Survey Specifications	Scales
layer κ = 10^{-2} background κ = 10^{-4} image width 10,000 m	inclination 50° or 90° intensity 50,000 or 70,000 gamma flying height 80 m	max (greyscale) min max (colour) min

All models created using Noddy

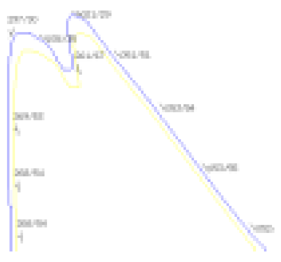
WWW conversion by Ian Brayshaw

5.3 Anisotropy and folding

This set of models shows three possible interactions of folding with a layer which possesses anisotropic susceptibility. The first row of models have isotropic susceptibility, the second row has uniform anisotropic susceptibility, and the third row has an anisotropy which is deflected by the folding. While the overall fold geometry is apparent in all three models, because the total magnetic moment of the layer still in general contrasts strongly with the background, the folded anisotropy models show marked variation in field intensity for different limbs.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Map of anisotropy orientations



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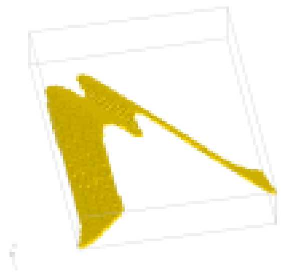
Map showing dip and dip direction values for planar anisotropy at selected positions.

Block diagram of folded layer



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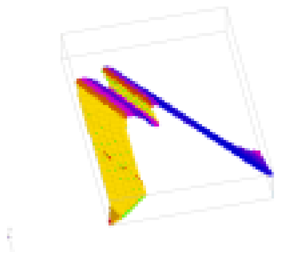
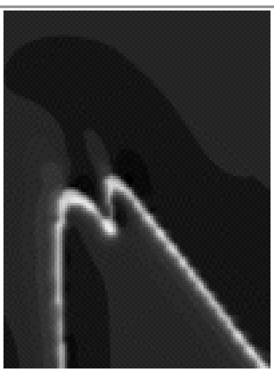
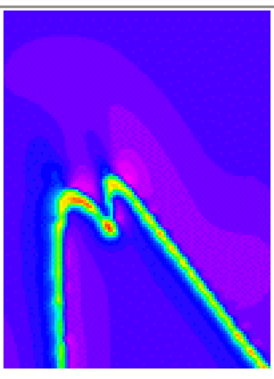
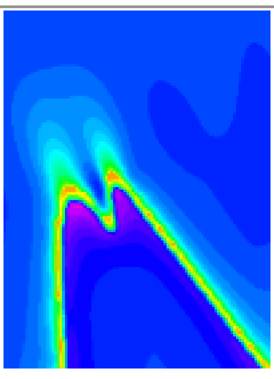
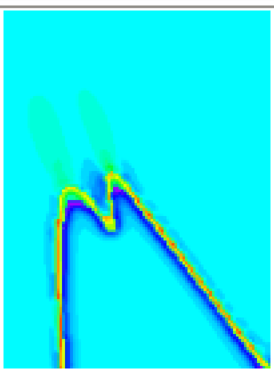
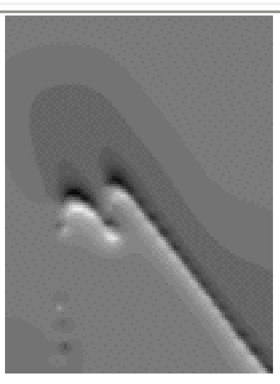
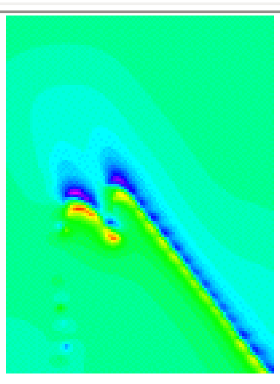
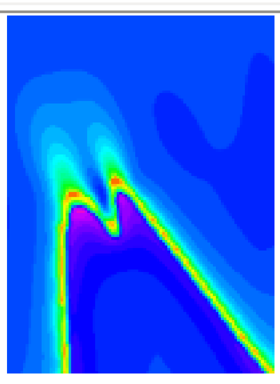
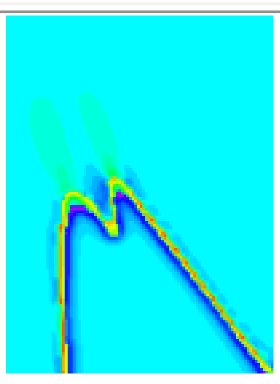
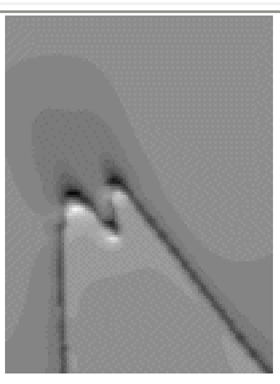
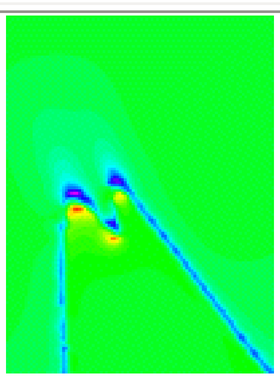
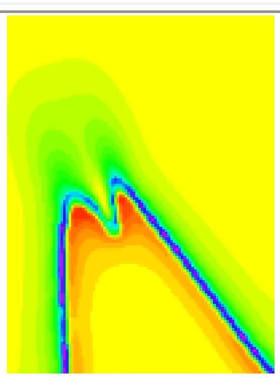
In this model the anisotropy is non-existant of uniform in orientation.

Block diagram of folded layer



LOAD JPEG IMAGE

In this model the orientation of the anisotropy varies according to position on the fold. Colours vary with the declination of the anisotropy.

Link	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
No anisotropy	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Post-folding anisotropy	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Susceptibility values uniformly set to: $\kappa X 10^{-2}$ $\kappa Y 10^{-2}$ $\kappa Z 10^{-6}$	Susceptibility values uniformly set to: $\kappa X 10^{-2}$ $\kappa Y 10^{-2}$ $\kappa Z 10^{-6}$ Notice how the west limb drops out in this image.	This image appears identical to the "no anisotropy" image at the pole since the anisotropy plane is normal to the direction of the Earth's field.	
Pre-folding anisotropy	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Anisotropy orientation variable, prior to deformation set to: $\kappa X 10^{-2}$ $\kappa Y 10^{-2}$ $\kappa Z 10^{-6}$	Anisotropy orientation variable, prior to deformation set to: $\kappa X 10^{-2}$ $\kappa Y 10^{-2}$ $\kappa Z 10^{-6}$		

Key	Survey Specifications	Scales
layer $\kappa = 10^{-2}$ background $\kappa = 0$ (isotropic) image width 10,000 m	inclination 50° or 90° intensity 50,000 or 70,000 gamma flying height 80 m	max [greyscale] min max [colour] min

All models created using Noddy

WWW conversion by Ian Brayshaw

5.4 Concentrically zoned plugs

These four models show the magnetic anomaly patterns that may develop in a igneous intrusion due either to the production of an alteration halo, or from a change in the orientation of the thermo-remanent component of the natural remanent magnetisation as the body cools.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Block Diagram

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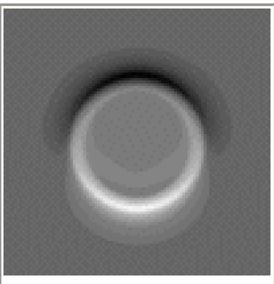
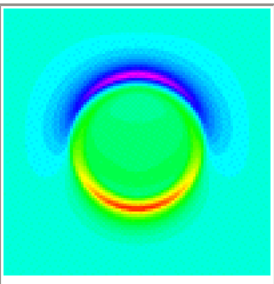
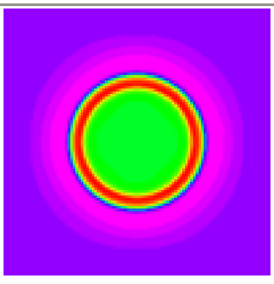
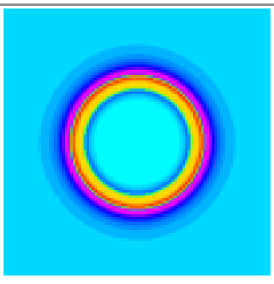
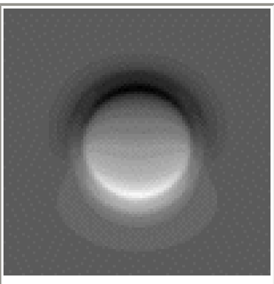
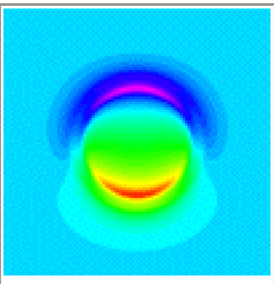
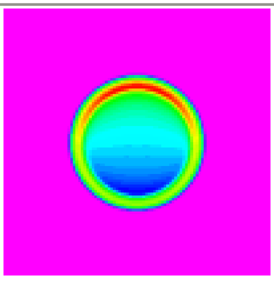
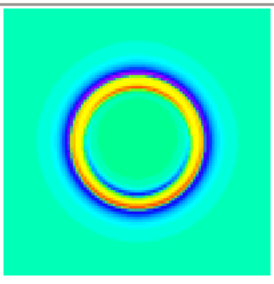
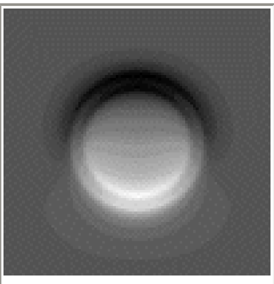
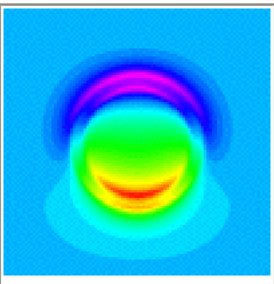
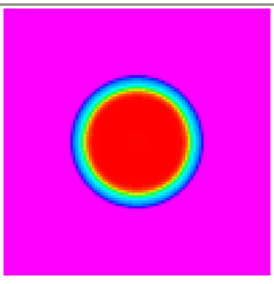
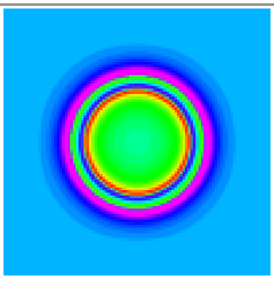
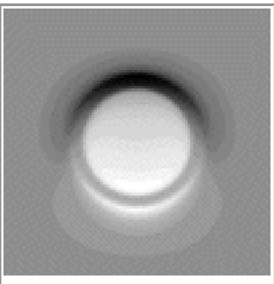
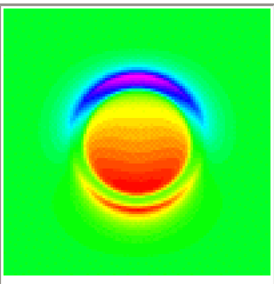
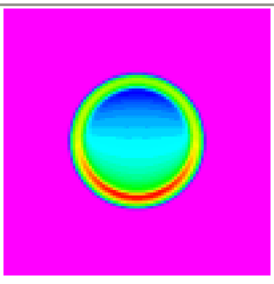
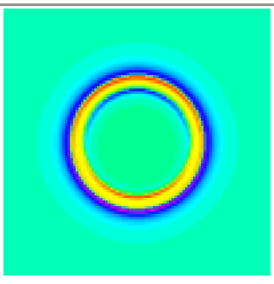
Concentric half-spheres with variable magnetic properties.

Link	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Alteration halo (magnetic susceptibility greater than igneous body)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Outer zone of plug defined by alteration zone enriched in high susceptibility minerals.			
Remanent zone (magnetisation vector same as current field)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Outer zone of plug defined by remanently magnetised minerals, perhaps due to change in grain size of magnetic minerals as body cooled. The remanent component has same orientation as current external field.			
Alteration halo (magentic susceptibility less than igneous body)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Outer zone of plug defined by alteration zone enriched in high susceptibility minerals, but has lower susceptibility than igneous body itself.			
Remanent zone (magnetisation vector opposite to current field)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Outer zone of plug defined by remanently magnetised minerals, perhaps due to change in grain size of magnetic minerals as body cooled. The remanent component has opposite orientation to current external field.			

Key	Survey Parameters	Scales
plug κ = 10^{-2}	Inclination 50°	max (grey scale) min
background m.s. = 0	Intensity 50,000 gamma	max (colour scale) min
image width 10,000 m	Flight height 80 m	

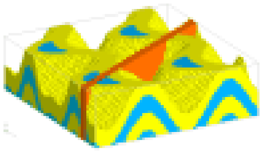
All models created using Noddy

WWW conversion by Ian Brayshaw

6.1 Depletion alteration halo around a dyke

This model shows the results of emplacing a dyke in an area of refolded folds. The refolded fold patterns are similar to those seen in the type D model of section 3.7. The density and susceptibility values are modelled as depletion haloes where the rock properties are varied as a function of distance from the dyke, before returning to normal as the distance away increases.

Click on the images to launch Noddy. A legend is provided at the end of this page.



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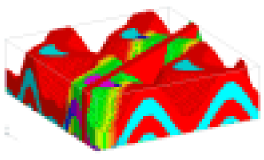
Block diagram of unaltered geology

Block diagram showing the geology of the model with dyke intrusion but no alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used simply to highlight the structures.



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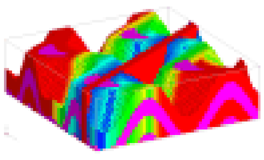
Block diagram showing density variations in altered geology

Block diagram showing the geology of the model with dyke intrusion and alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used to demonstrate density variations, using a rainbow look up table.



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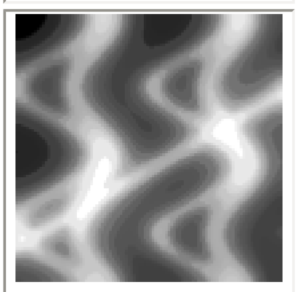
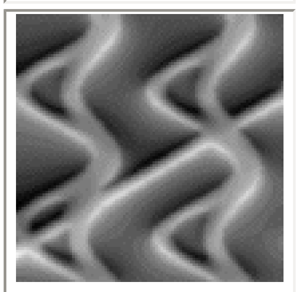
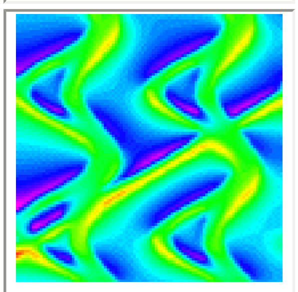
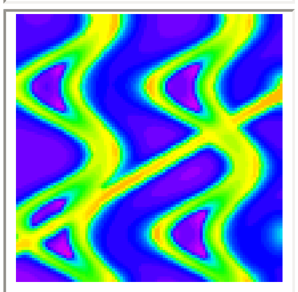
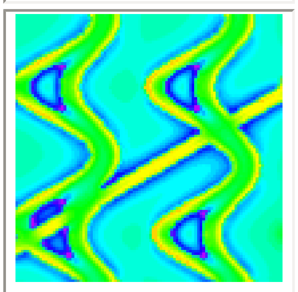
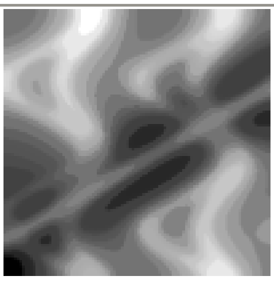
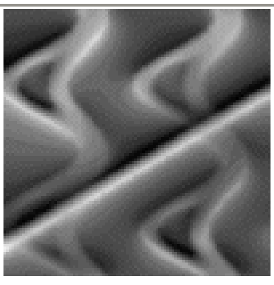
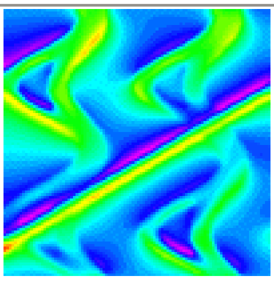
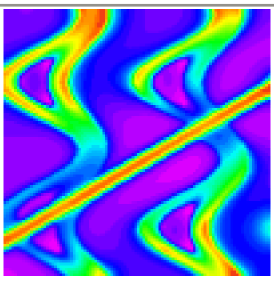
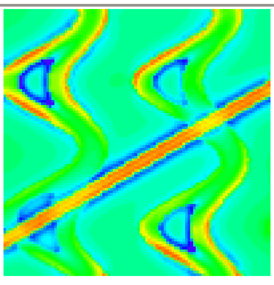
Block diagram showing magnetic susceptibility variations in altered geology

Block diagram showing the geology of the model with dyke intrusion but no alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used to demonstrate magnetic susceptibility variations, using a rainbow look up table.

Link	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
No alteration	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Note the constructive interference between the dyke and the background layers that produces a local high where the dyke cuts the layers.				Note the appearance of a variation in intensities along the dyke.
Alteration	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Note the destructive nature of the alteration halo.	Note the destructive nature of the alteration halo.	Note the destructive nature of the alteration halo.	Note the destructive nature of the alteration halo.	Note the appearance of a variation in intensities along the dyke.

Key		Survey Specifications		Scales
yellow	$\kappa = 10^{-2}$ $\rho = 3.5$	inclination	50° or 90°	max — min (greyscale)
blue	$\kappa = 10^{-2}$ $\rho = 2.5$	intensities	50,000 or 70,000 gamma	max — min (rainbow)
dyke	$\kappa = 10^{-2}$ $\rho = 3.5$	flying height	80 m	
image width	10,000 m			

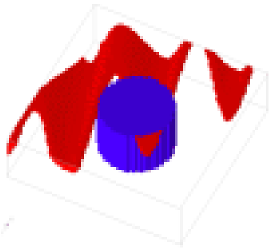
All models created using Noddy

WWW conversion by Ian Brayshaw

6.2 Enrichment alteration halo around a plug

This model shows the results of emplacing a plug in an area of tilted folds. The density and susceptibility values are modelled as enrichment haloes where the rock properties are varied as a function of distance from the plug, before returning to normal as the distance away increases.

Click on the images to launch Noddy. A legend is provided at the end of this page.



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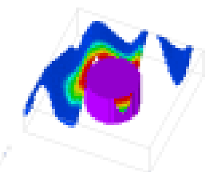
Block diagram of unaltered geology

Block diagram showing the geology of the model with plug intrusion but no alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used simply to highlight the structures.



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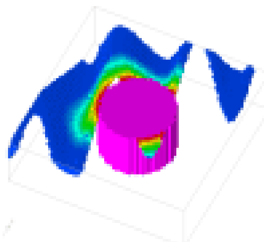
Block diagram showing density variations in altered geology

Block diagram showing the geology of the model with plug intrusion and alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used to demonstrate density variations, using a rainbow look up table.



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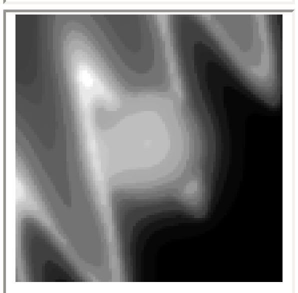
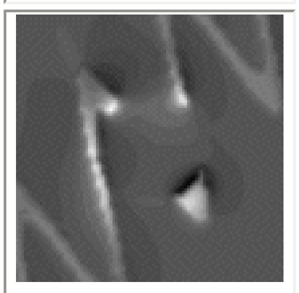
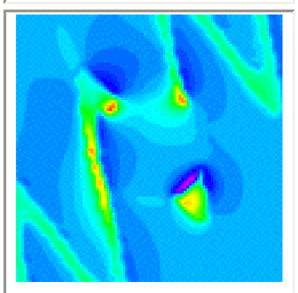
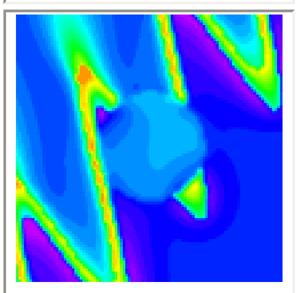
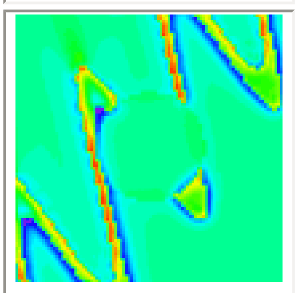
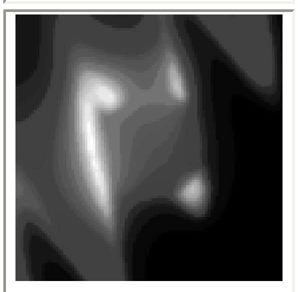
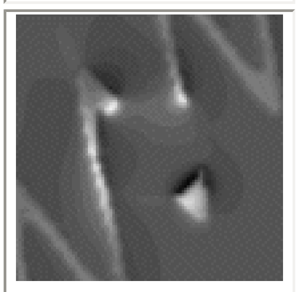
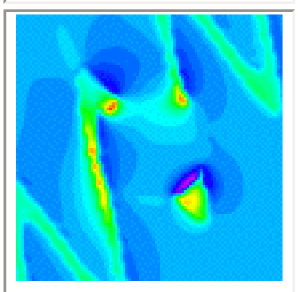
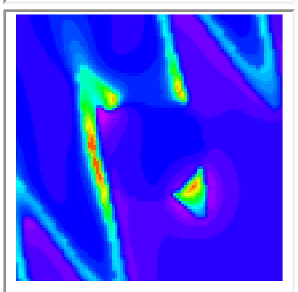
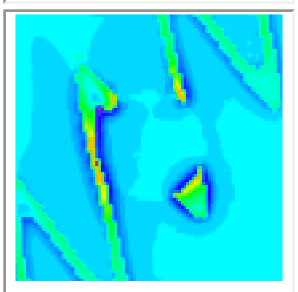
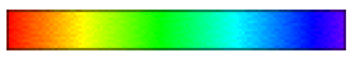
Block diagram showing magnetic susceptibility variations in altered geology

Block diagram showing the geology of the model with plug intrusion but no alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used to demonstrate magnetic susceptibility variations, using a rainbow look up table.

Link	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
No alteration	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Note the relatively uniform intensity values (except at the north plunging hinge) in the folded layer.	Note the relatively uniform intensity values (except at the north plunging hinge) in the folded layer.		Note the relatively uniform intensity values in the folded layer.	Note the relatively uniform intensity values (except at the north plunging hinge) in the folded layer.
Alteration	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Note the strong localisation of the high intensity field in the parts of the folded layer adjacent to the plug.	Note the strong localisation of the high intensity field in the parts of the folded layer adjacent to the plug.	Note the relatively uniform intensity values (except at the north plunging hinge) in the folded layer.	Note the strong localisation of the high intensity field in the parts of the folded layer adjacent to the plug.	Note the strong localisation of the high intensity field in the parts of the folded layer adjacent to the plug.

Key	Survey Specifications	Scales
red $\rho = 2.9$ $\kappa = 10^{-3}$ background $\rho = 2.4$ $\kappa = 5\times10^{-5}$ plug $\rho = 2.5$ $\kappa = 1.7\times10^{-4}$ image width 10,000 m	inclination: 50° or 90° intensities: 50,000 or 70,000 gamma flying height: 80 m	max  min max  min

All models created using Noddy

WWW conversion by Ian Brayshaw

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Table of Contents Southern Hemisphere Edition

The aim of this atlas is to provide examples of the relationship between three-dimensional structure and potential-field response. We have used the Noddy modelling system, which was developed as a result of an AGCRC/AMIRA/ARC project. This allowed us to create a variety of structural models which allow interpretive skills to be developed, through the specific comparison of structures and their responses. These models also provide a starting point for the interpretation of actual survey results. All of the history files used to create these models are provided in digital form, so that in combination with the *Noddy* software, variations to the models can be easily examined. In addition this addition of the atlas contains wavelet transforms of the data so that the interpretive skills needed for this new visualisation technique can be learned.

In order to reduce printing problems, a PDF version of this Atlas is also available.

This Table of Contents lists each page in text form, the Image Index (much slower to load) contains one example image from each page, and the Help page describes the meaning of each element in a page, and how to configure your browser to load the various file types. The atlas contains a complete set of images models calculated for both Southern and Northern Hemispheres, and each set can be accessed separately from the home page of the Atlas.

SECTION 1 BASIC INTERPRETATION PRINCIPLES In this section a number of basic intepretation principles are reviewed. The model geometries are kept very simple so that the effects of depth, latitude, and possible causes of potential-field anomaly asymmetries can be separated from the more complex issues of three-dimensional structures. Many of these principles can in fact be demonstrated in two-dimensions using profiles, and the reader is encouraged to draw profiles across the data sets in order to see these effects.

1.1 The effect of depth on anomaly dimensions in gravity data
1.2 The effect of depth on anomaly dimensions in magnetic data
1.3 A cross section through the gravity and magnetic fields
1.4 Vector components of a magnetic field
1.5 The effect of changing latitude on anomaly shapes in magnetic data
1.6 Asymmetries in magnetic and gravity data
1.7 Magnetic inclination and declination effects for complex structures

SECTION 2 SIMPLE STRUCTURAL TYPES In this section the potential-field response of simple structures is displayed. In some cases some earlier feature, such as a dyke, has been added to clarify the point being made. This chapter concentrates on contrasting different deformation geometries and demonstrating the effects of structurally controlled or field inclination controlled anomaly asymmetries.

2.1 FOLDS
2.1.1 Variation in fold profile
2.1.2 Variation in fold plunge direction of sinusoidal folds
2.1.2b Variation in fold plunge direction of sinusoidal folds (continued)
2.1.3 Variation in fold plunge of sinusoidal folds
2.1.4 Ambiguities in the interpretation of sinusoidal folds
2.2 FAULTS
2.2.1 Variation in fault geometry
2.2.2 Variation in fault dip direction of low susceptibility footwall faults
2.2.2b Variation in fault dip direction of low susceptibility footwall faults (continued)
2.2.3 Variation in fault dip direction of high susceptibility footwall faults
2.2.3b Variation in fault dip direction of high susceptibility footwall faults (continued)
2.2.4 Variation in fault dip
2.2.5 Interpretating fault offsets
2.3 UNCONFORMITIES
2.3 Unconformity Geometries
2.4 INTRUSIONS
2.4.1 Simple Plug Geometries
2.4.2 Variation in Dip Direction for a Thin Dyke
2.4.2b Variation in Dip Direction for a Thin Dyke (continued)
2.4.3 Variation in dyke dip

SECTION 3 COMPLEX STRUCTURES This section provides a number of examples of the interaction of two or more episodes of deformation, some derived from specific locations, others simply to demonstrate scenarios which may or may not be resolved by using the magnetic or gravity data sets.

3.1 Faulted dyke
3.2 Faulted Fold
3.3 Basin Setting (Flat-lying sediments)
3.4 Block faulted, rifted and folded region
3.5 Fold and Thrust setting
3.6 Dome and Basin setting
3.7 Fold Interference Patterns

SECTION 4 TOPOGRAPHIC EFFECTS This section provides two simple examples of the effects of topography on potential-field data. The two normal survey modes of draped and barometric flying are compared.

4.1 Horizontal stratigraphy
4.2 Dipping stratigraphy

SECTION 5 REMANENCE AND ANISOTROPY This section demonstrates the effects of a uniform or variable remanent magnetisation component, and a uniform or variably oriented magnetic anisotropy. A comparison of alteration haloes and remanent magnetisation haloes around igneous bodies is also made.

5.1 A remanently magnetised sphere
5.2 Remanence and folding
5.3 Anisotropy and folding
5.4 Concentrically zoned plugs

SECTION 6 ALTERATION ZONES In this section two examples are given which compare the effects results of having alteration haloes associated with igneous intrusion, for regions with pre-existing structure.

6.1 Depletion alteration halo around a dyke
6.2 Enrichment alteration halo around a plug

APPENDIX A: GEOLOGICAL MODELLING In this appendix the geometries resulting form each type of structural event are displayed for a chequerboard model.

Appendix A: Geological Modelling Events

APPENDIX B: Wavelet Transforms This appendix includes two papers describing the basis for the wavelet transforms models are given. In addition, a number of VRML models of 3D structures are provided which can be viewed interactively..

Appendix B: Wavelet Transforms

Appendix B: Wavelet Transforms

This page contains links to a series of VRML format files showing 3D structures and their corresponding wavelet transforms. The transforms are lower resolution that the animations in the bulk of the Atlas, so that they can be loaded easily into a VRML viewer.

The wavelet transforms display the position of the local maxima in the horizontal gradient in gravity field at various heights above the Earth's surface (as calculated by upward continuation). The colours for each position reflect the intensity of the local maximum. Additional information on wavelet transforms of potential field data can be found in the following Exploration Geophysics articles:

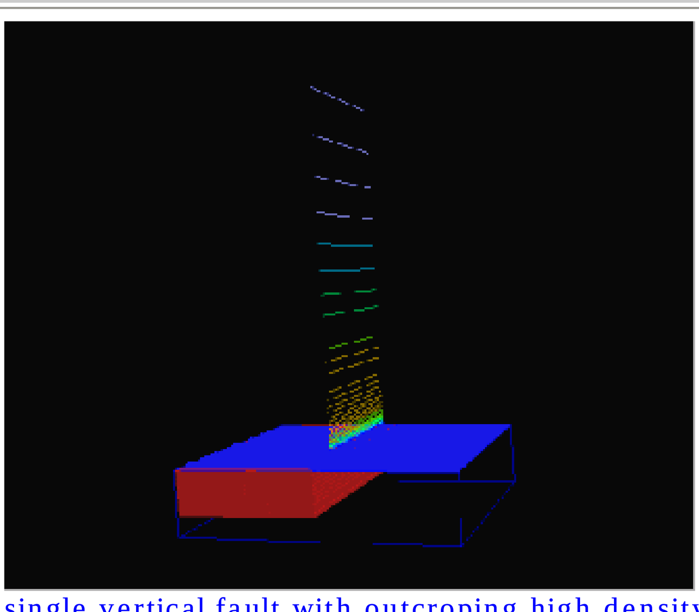
Archibald, N.J., P. Gow, and F. Boschetti, "Multiscale edge analysis of potential field data", Exploration Geophysics, 1999, 30, 38-44.

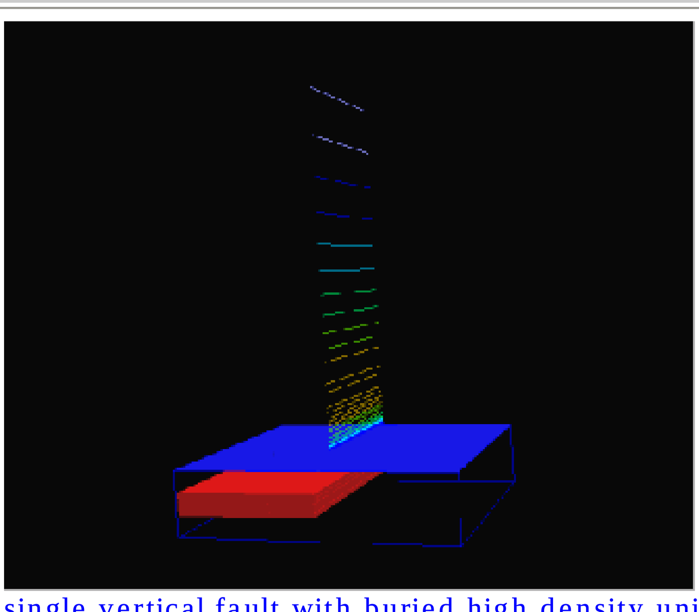
D. Holden, N. Archibald, F. Boschetti, M. Jessell "Inferring Geological Structures Using Wavelet-Based Multiscale Edge Analysis and Forward Models", Exploration Geophysics, 2000, 31, 617-621.

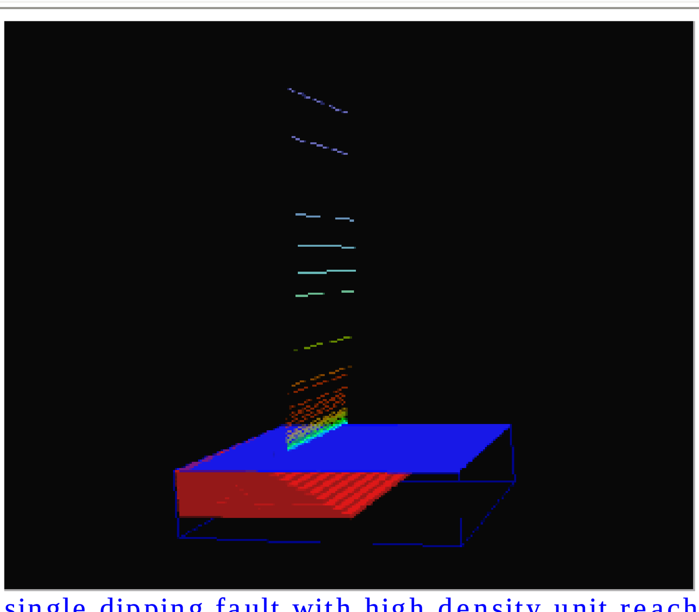
Click on the images to launch a VRML viewer. There are many different VRML Viewers available, and the availability of any one piece of software is not very stable, however *at the time of production of this site* 3D Exploration is a good one.

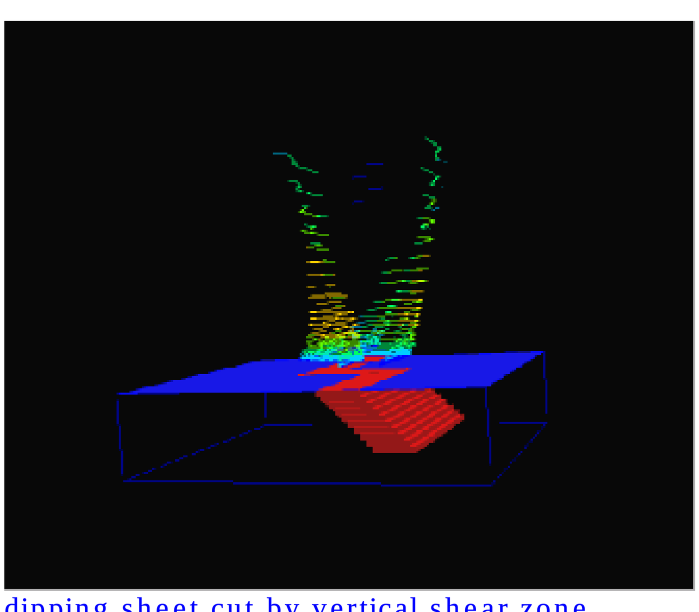
A legend is provided at the end of this page.

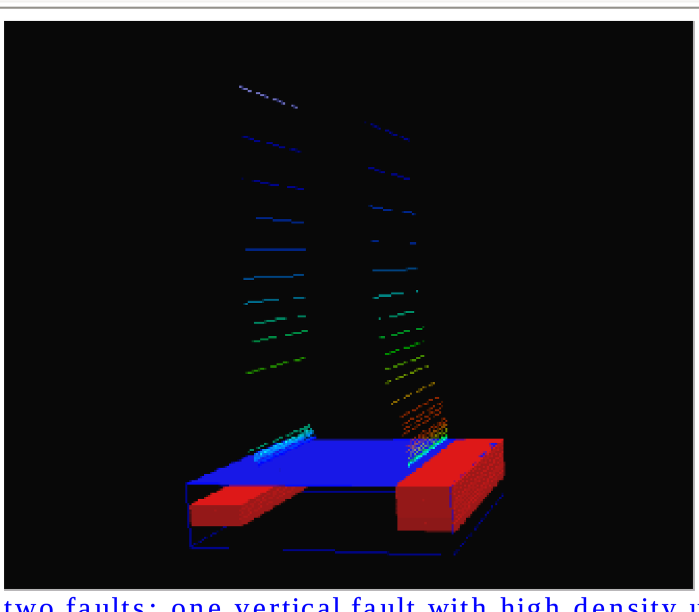
Faults and Shear zones


single vertical fault with outcroping high density unit

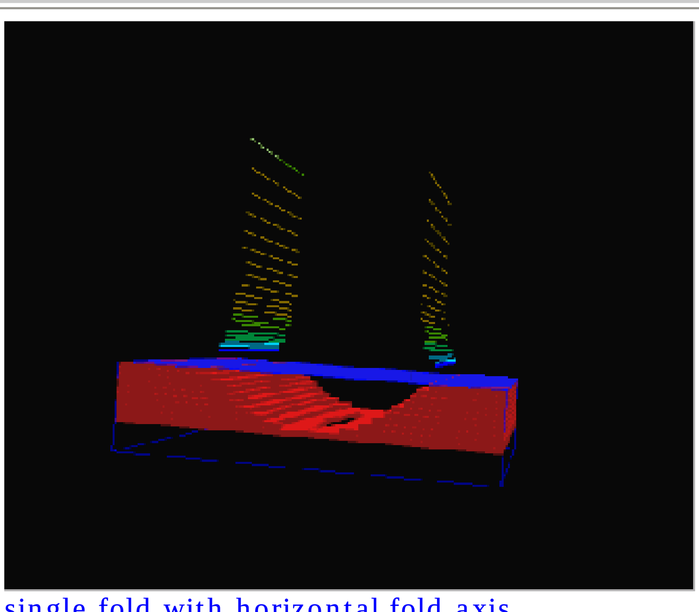

single vertical fault with buried high density unit

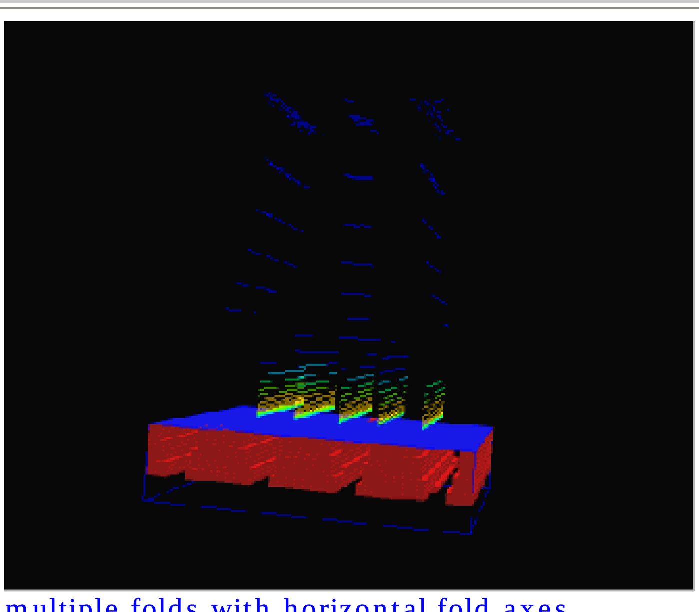

single dipping fault with high density unit reaching surface

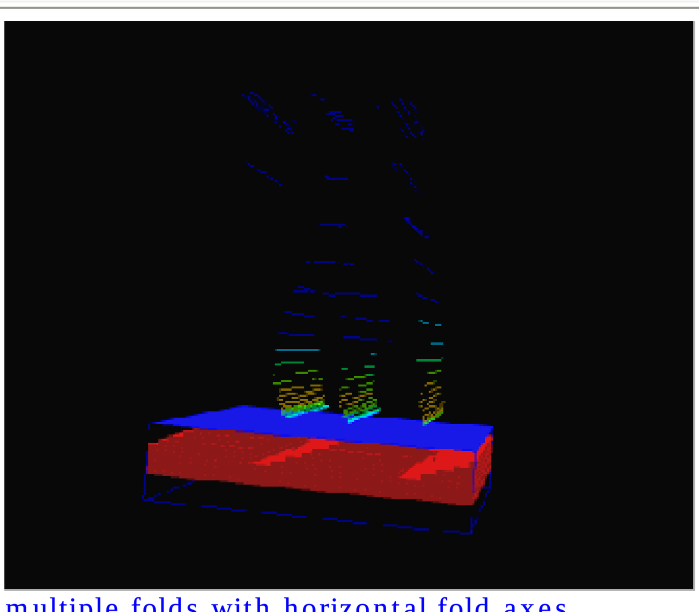

dipping sheet cut by vertical shear zone

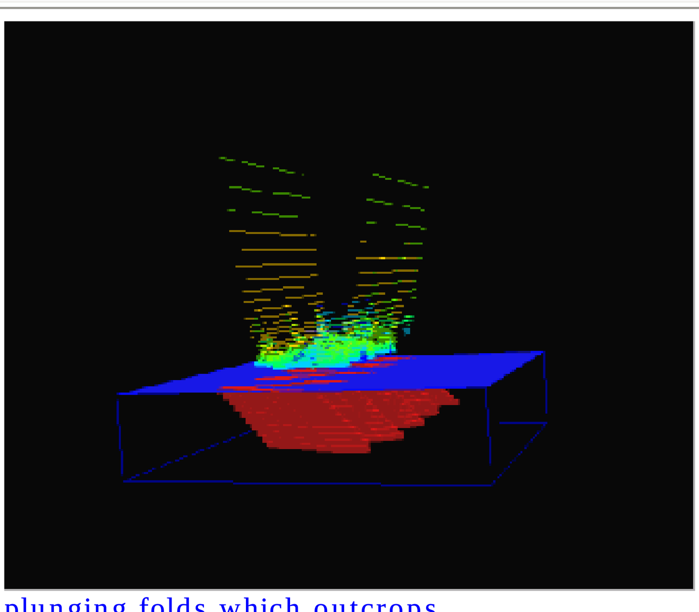

two faults: one vertical fault with high density unit that outcrops and one vertical fault which does not outcrop

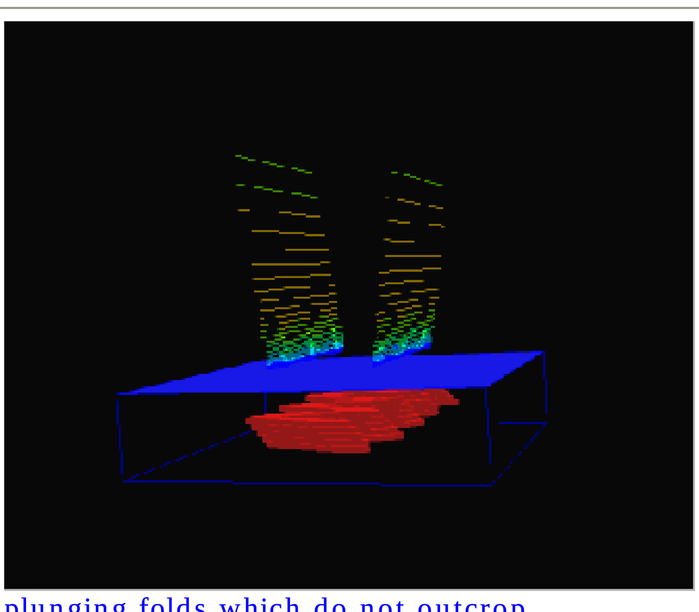
Folds


single fold with horizontal fold axis

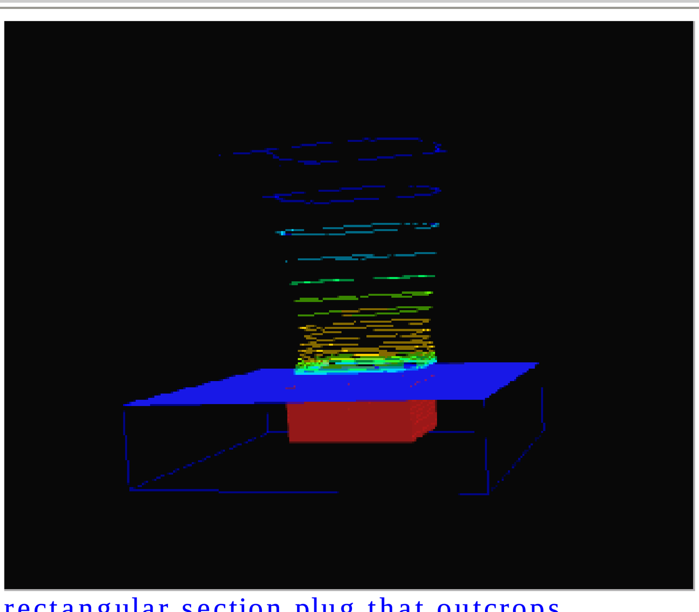

multiple folds with horizontal fold axes

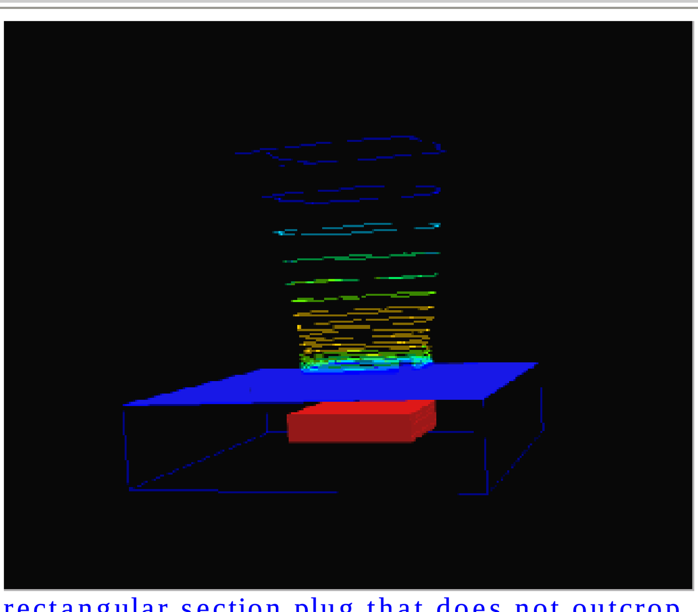

multiple folds with horizontal fold axes

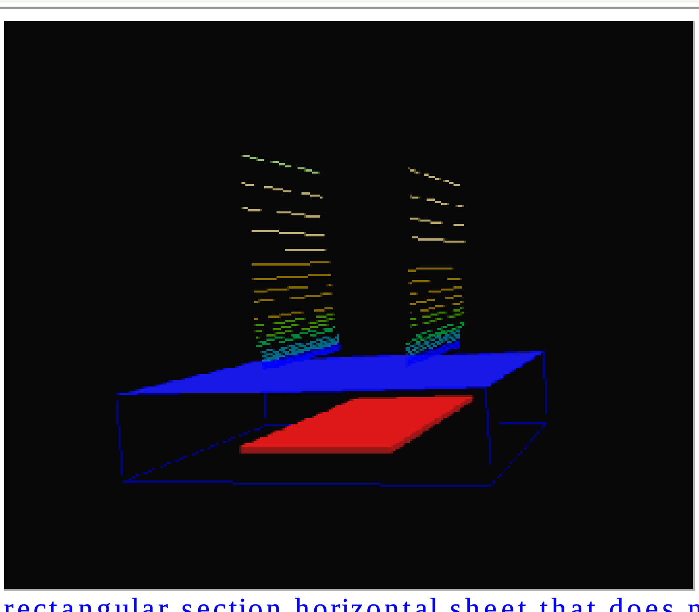

plunging folds which outcrops

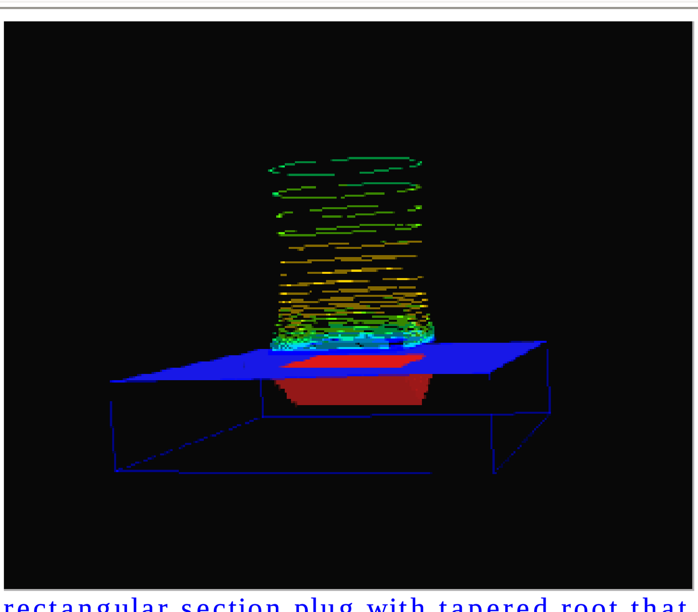

plunging folds which do not outcrop

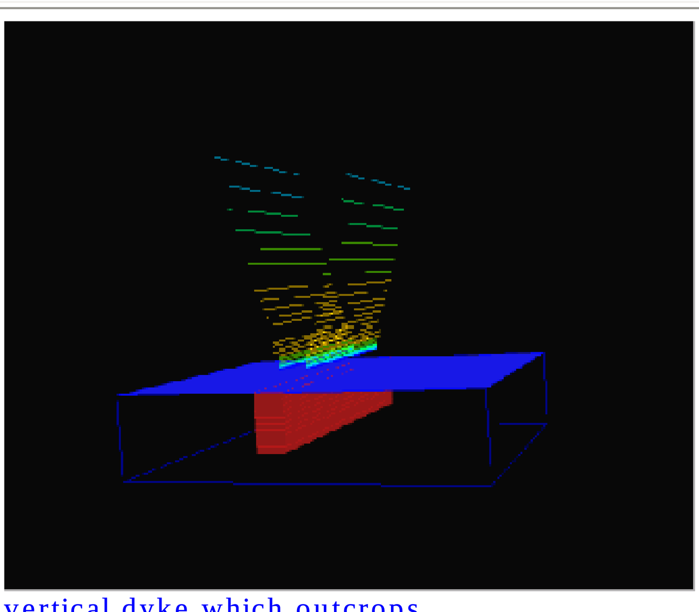
Intrusions

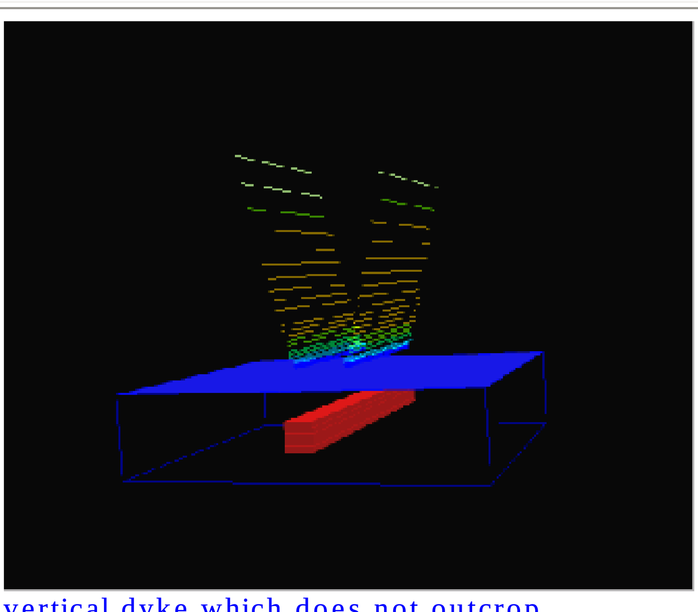

rectangular section plug that outcrops

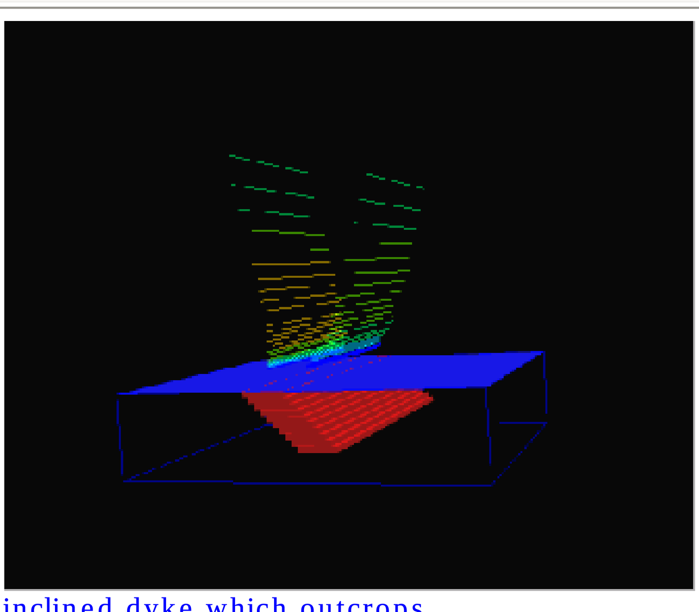

rectangular section plug that does not outcrop

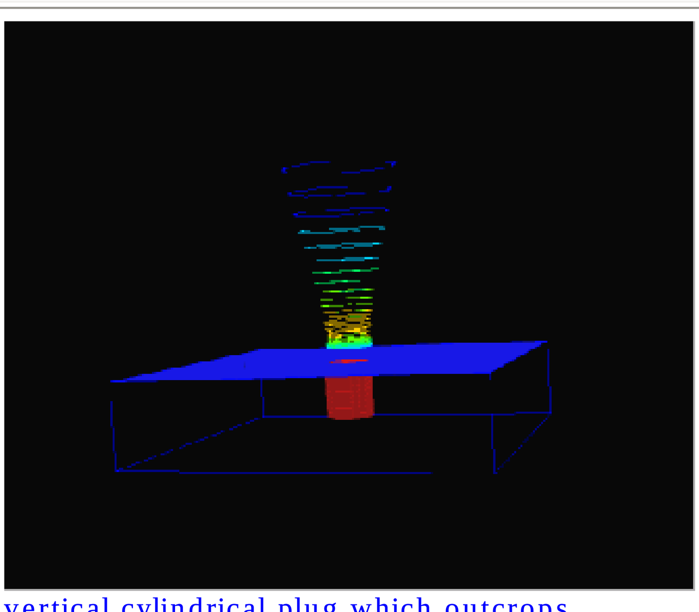

rectangular section horizontal sheet that does not outcrop

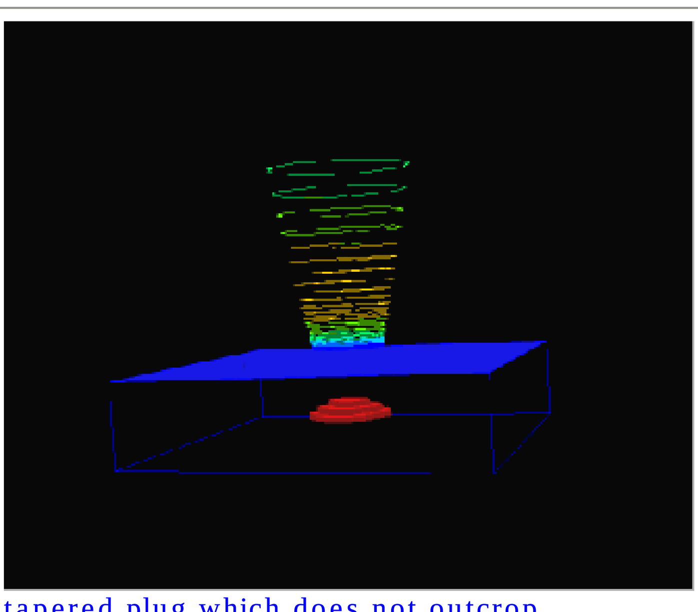

rectangular section plug with tapered root that outcrops

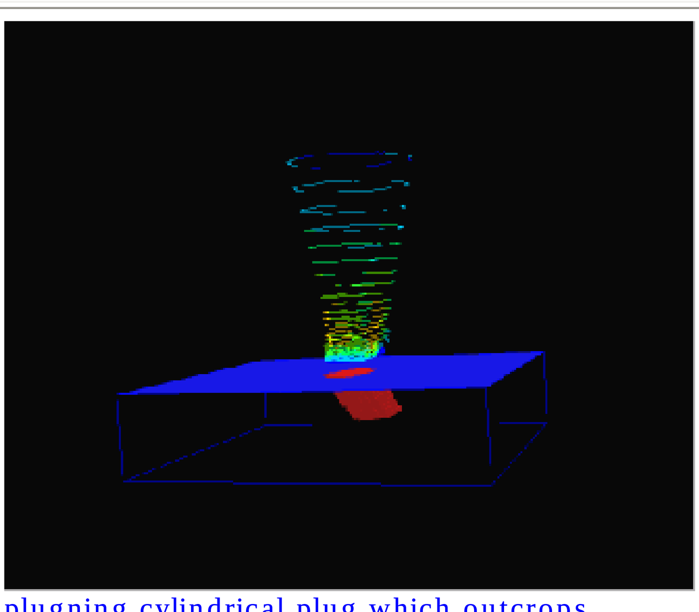

vertical dyke which outcrops

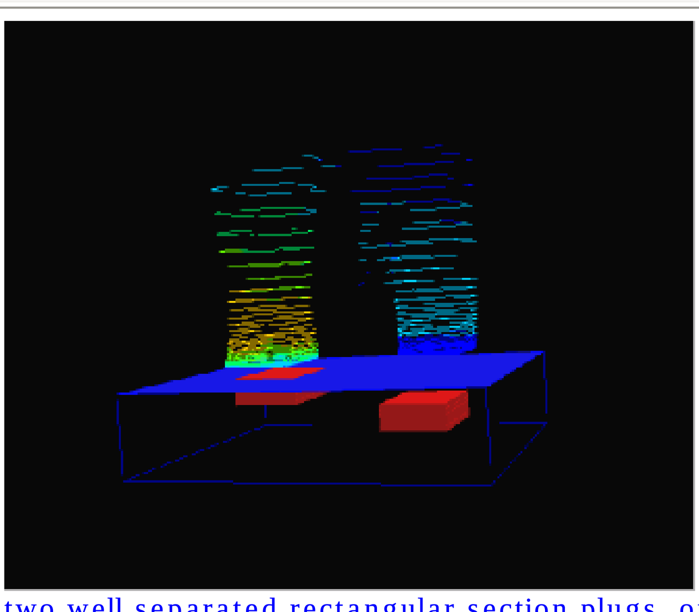

vertical dyke which does not outcrop

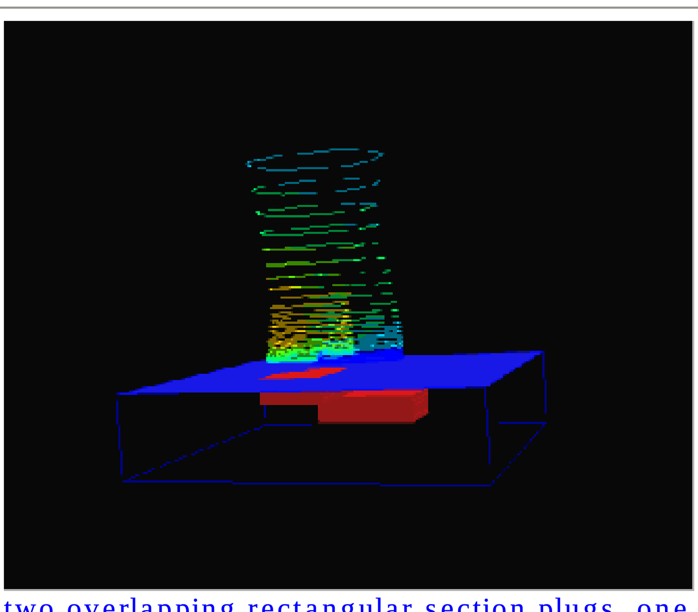

inclined dyke which outcrops


vertical cylindrical plug which outcrops


tapered plug which does not outcrop


plugning cylindrical plug which outcrops


two well separated rectangular section plugs, one outcrops


two overlapping rectangular section plugs, one outcrops

Key	Survey Parameters	Scales
high ρ = red background ρ = transparent image width 10,000 m		wavelet intensity max [colour bar] min

All models created using Noddy

WWW conversion by Ian Brayshaw

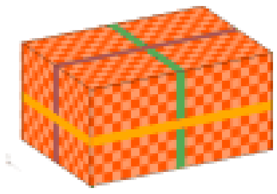
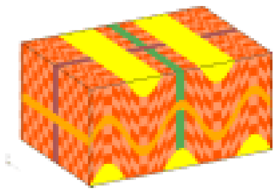
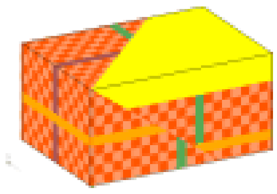
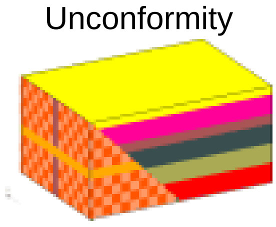
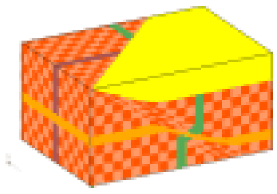
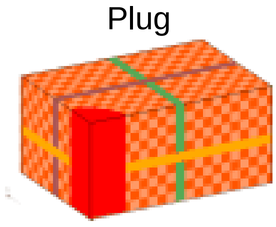
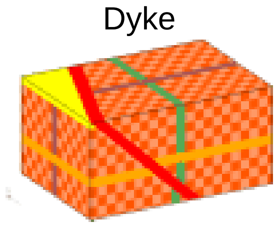
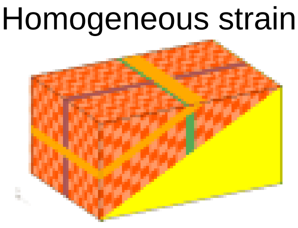
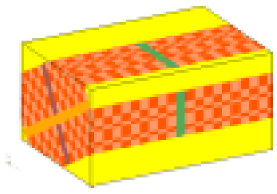
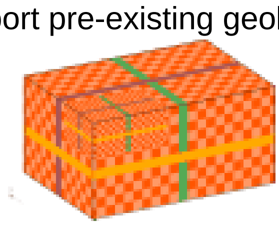
Appendix A: Geological Modelling Events

The following images show examples of all the distinct types of geological modelling events available within Noddy. With each type of event, there is a wide range of parameters which can be varied to alter its affect on the pre-existing geology. For these examples a base geology was used consisting of a three dimensional chequerboard of red and beige cubes, cut by three orthogonal planar bodies.

The chequerboard volume is in turn embedded in a uniform pale green unit which makes an appearance as a result of deformation of the line of the original volume.

Click on the images to launch Noddy.

In order to use these history files you will also need to download the following two files! chequer.g00 chequer.g12

Undeformed block  LOAD JPEG IMAGE Each cube and layer is 500 m wide. Outside the currently visible volume, there is a uniform yellow material.	Fold  LOAD JPEG IMAGE
Fault  LOAD JPEG IMAGE Normal fault.	Unconformity  LOAD JPEG IMAGE Very steep, graben wall like unconformity.
Shear zone  LOAD JPEG IMAGE Normal displacement chear zone.	Plug  LOAD JPEG IMAGE Vertical cylindrical plug.
Dyke  LOAD JPEG IMAGE	Homogeneous strain  LOAD JPEG IMAGE
Tilt  LOAD JPEG IMAGE	Import pre-existing geology  LOAD JPEG IMAGE Chequerboard re-imported with smaller cube size.

All models created using Noddy

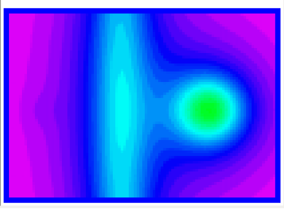
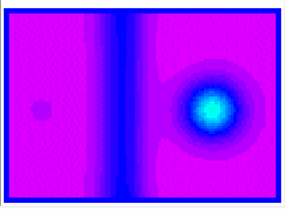
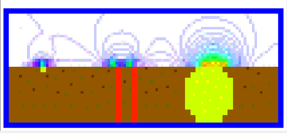
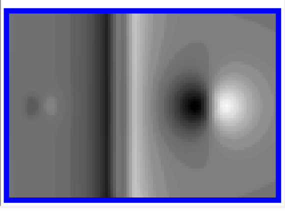
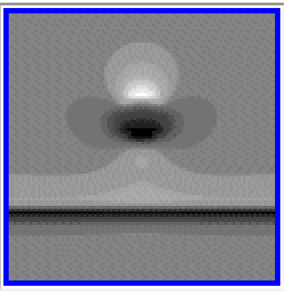
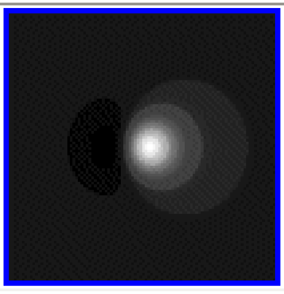
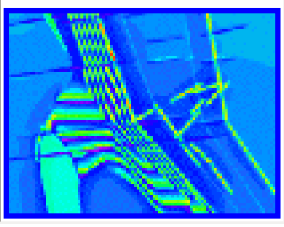
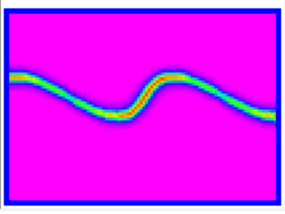
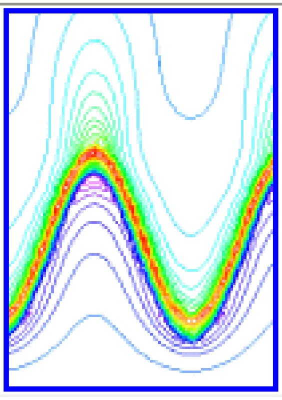
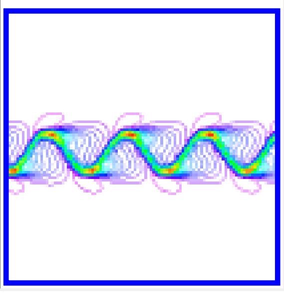
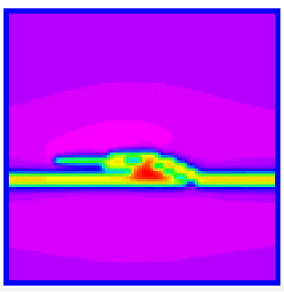
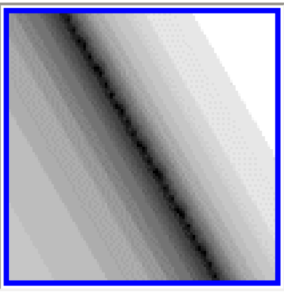
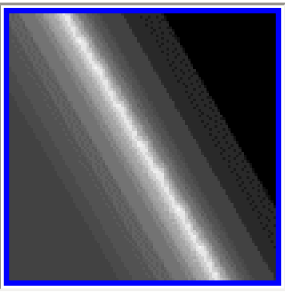
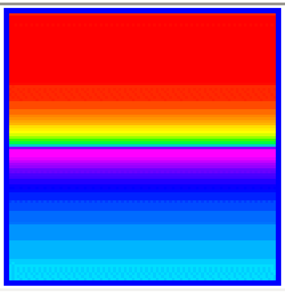
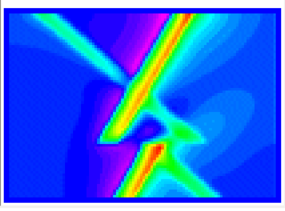
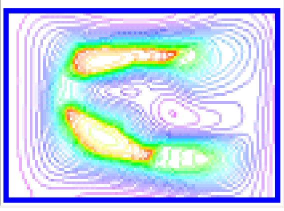
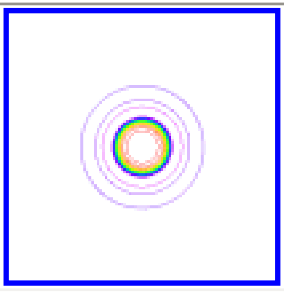
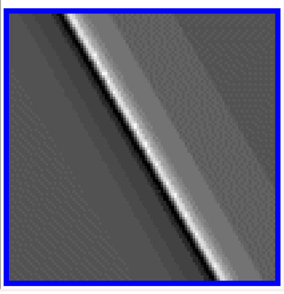
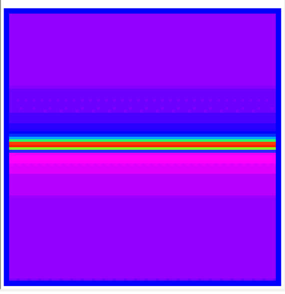
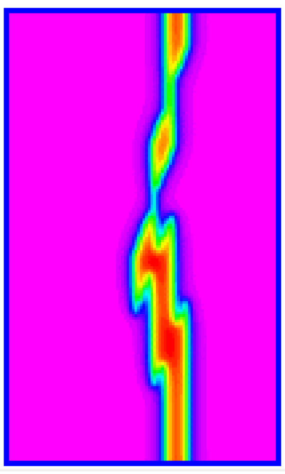
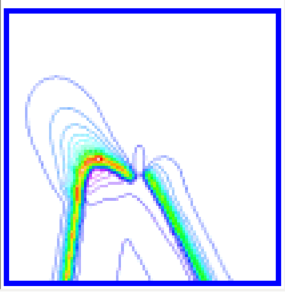
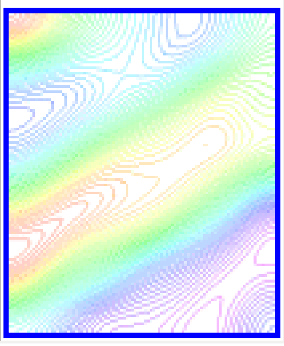
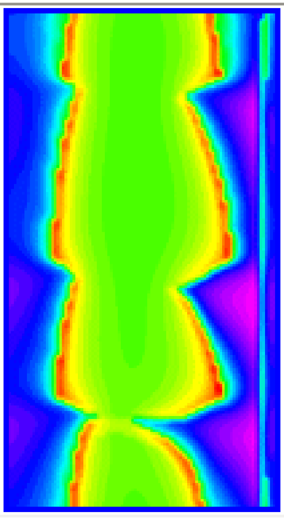
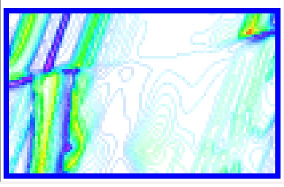
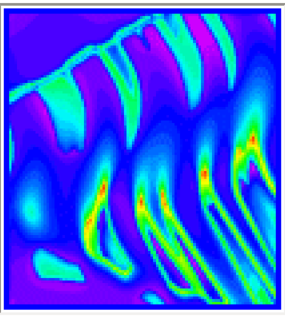
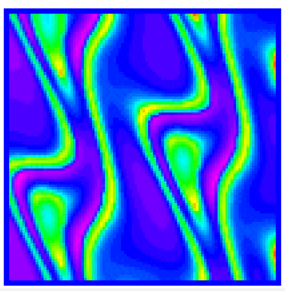
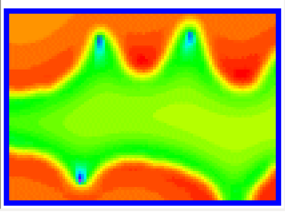
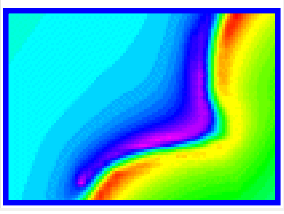
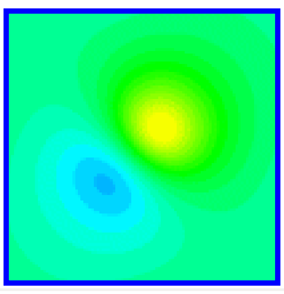
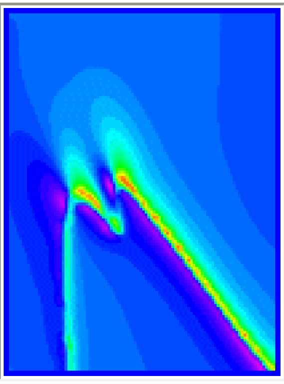
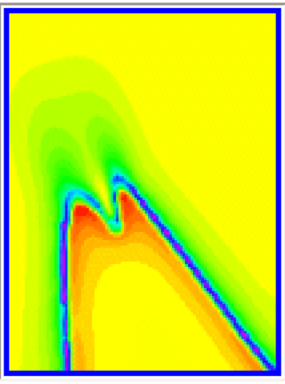
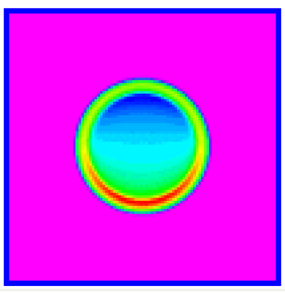
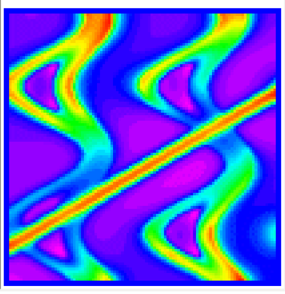
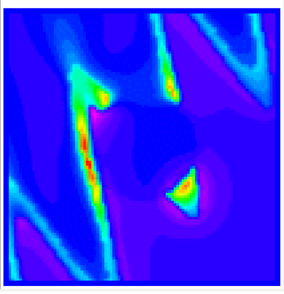
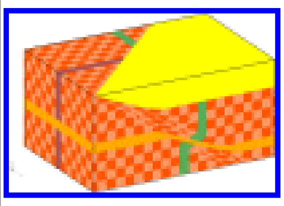
WWW conversion by Ian Brayshaw Sunday 26 April 1998

Journal of the Virtual Explorer
Volume 5, 2001

Image Index Southern Hemisphere Edition

This sequence of images show the scope of the models contained in this Atlas.

Clicking on any image brings up the appropriate page showing the full ranges of related models

					
Depth effects-grav	**Depth effects-mag**	**Section through field**	**Vector Components**	**Latitude effects**	**Causes of asymmetry**
					
Inclination & Declination	**Fold profiles**	**Plunge direction**	**Fold plunge**	**Ambiguous folds**	**Fault styles**
					
Fault dip direction:a	**Fault dip direction:b**	**Fault dip**	**Fault offsets**	**Unconformities**	**Ambiguous plutons**
					
Dyke dip directions	**Dyke dip**	**Faulted Dyke**	**Faulted Fold**	**Basin Setting**	**Block Faults**
					
Fold & Thrusts	**Dome & Basins**	**Refolded Folds**	**Topographic effects:a**	**Topographic effects:b**	**Remanent sphere**
					
Folded Remanence	**Folded Anisotropy**	**Remanent haloes**	**Alteration effects:a**	**Alteration effects:a**	**Geological Modelling Scheme**

All models created using Noddy

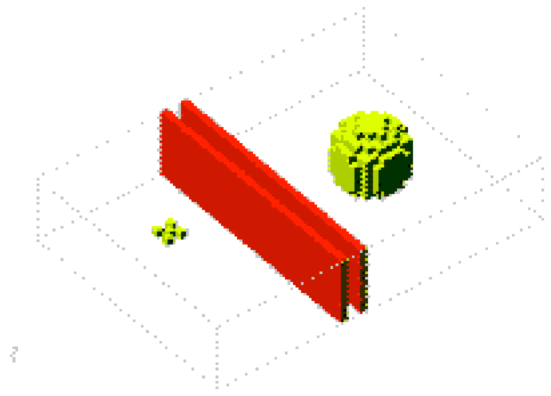
1.1 The effect on anomaly dimensions in gravity data

This sequence of images show the effect on anomaly amplitude and width of progressively burying a 1 km diameter sphere, two 200 m wide dykes and five 200 m on a side cubes by increments of 200 m.

The first row of images have the same absolute range, so this sequence shows the effect of depth on amplitude. The second row of images on have been clipped to the maximum and minimum values for each image, so this sequence shows the effect of depth on wavelength.

Click on the images to launch Noddy. A legend is provided at the end of this page.

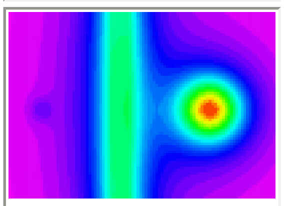
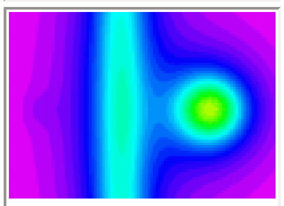
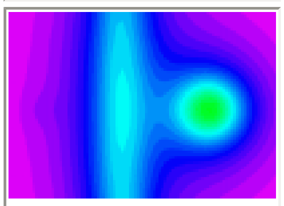
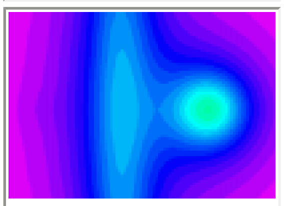
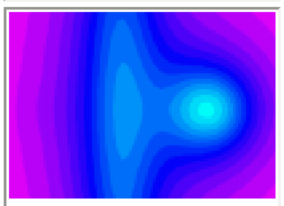
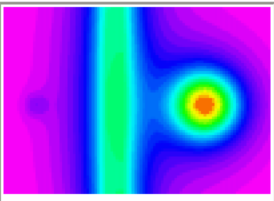
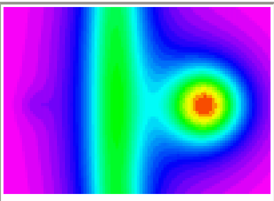
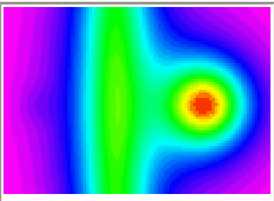
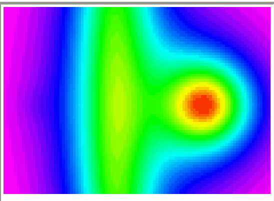
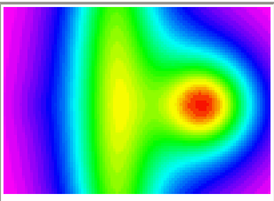
3D view of geology, looking from SW.



LOAD JPEG IMAGE

View VRML Geology Model

Summary wavelet transform animation comparing 3 different depths

	Pseudo colour gravity images at various depths measured from top				
	200 m	400 m	600 m	800 m	1000 m
Link					
Effect of depth on amplitude	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Effect of depth on wavelength	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Survey Parameters	Scales
plug & dyke ρ = 1 background ρ = 0 image width 10,000 m	flying height 200 m to 1000 m	100  0 max  min

All models created using Noddy

WWW conversion by Ian Brayshaw

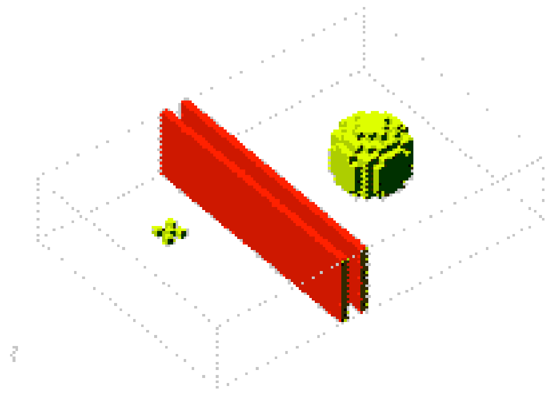
1.2 The effect on anomaly dimensions in magnetic data

This sequence of images show the effect on anomaly amplitude and width of progressively burying a 1 km diameter sphere, two 200 m wide dykes and five 200 m on a side cubes by increments of 200 m.

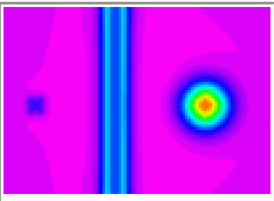
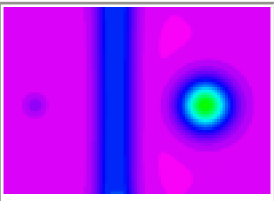
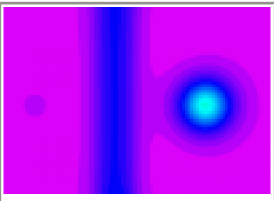
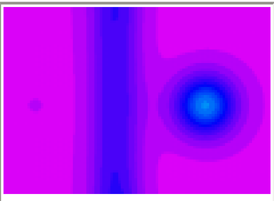
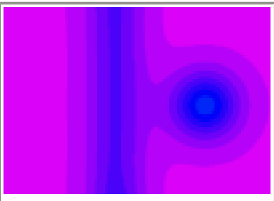
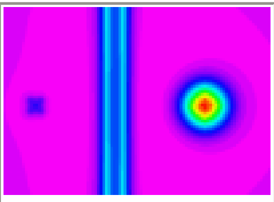
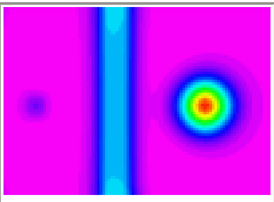
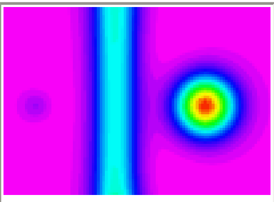
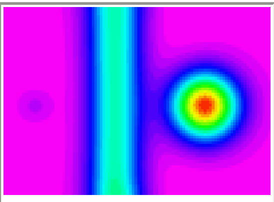
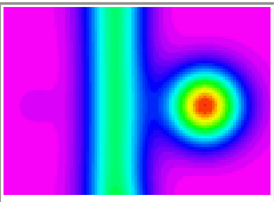
The first row of images have the same absolute range, so this sequence shows the effect of depth on amplitude. The second row of images on have been clipped to the maximum and minimum values for each image, so this sequence shows the effect of depth on wavelength.

Click on the images to launch Noddy. A legend is provided at the end of this page.

3D view of geology, looking from SW.



LOAD JPEG IMAGE

	Pseudo colour magnetic images at various depths measured from top				
Link	200 m	400 m	600 m	800 m	1000 m
Effect of depth on amplitude	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Effect of depth on wavelength	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key		Survey Parameters		Scales
plugs & dykes	$\kappa = 10^{-2}$	inclination	-90°	2500  -200
background	$\kappa = 0$	intensity	70,000 gamma	max  min
image width	10,000 m	flying height	200 m to 1000 m	

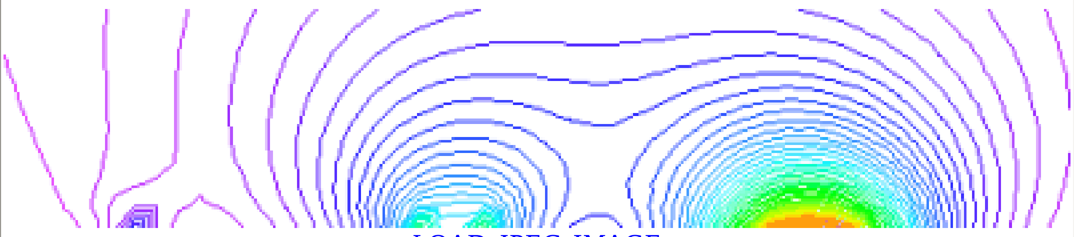
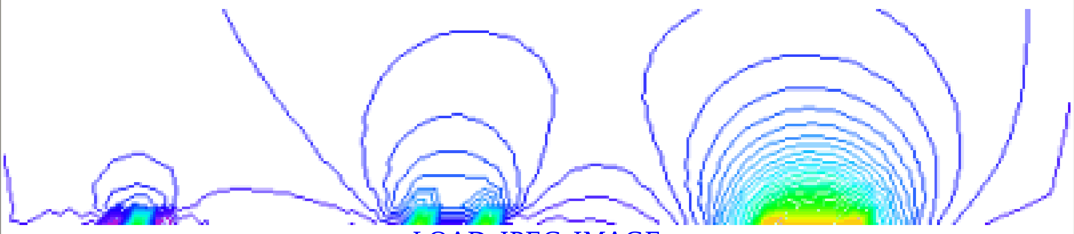
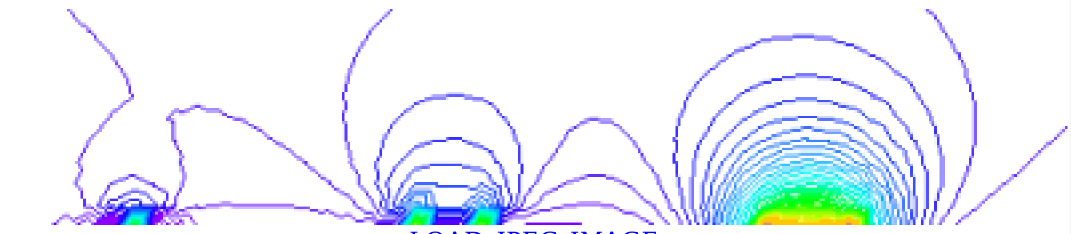
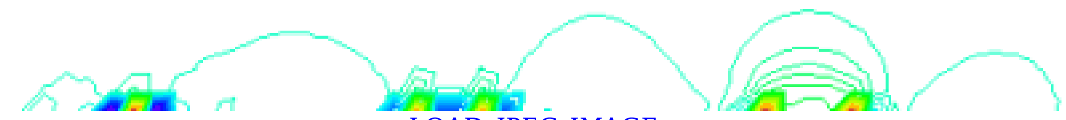
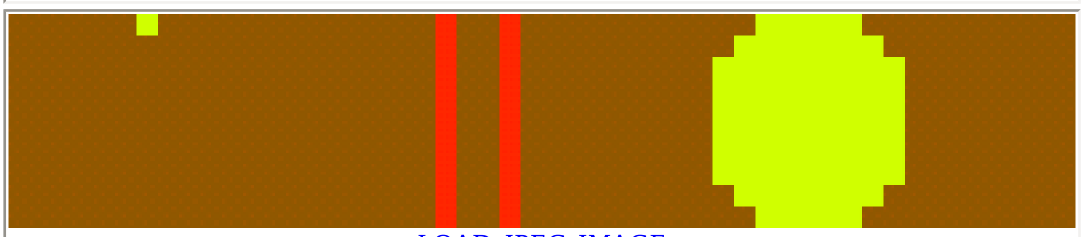
All models created using Noddy

WWW conversion by Ian Brayshaw

1.3 A cross section through the gravity and magnetic fields

These models show a vertical section through the gravity and magnetic fields, and their respective derivatives. The section is an East-West section drawn through the middle of the models used in sections 1.1 and 1.2. Each section (at equal horizontal and vertical scale) shows how the intensity of the field decays with height above the body, and at what height the distinct anomalies associated with each body merge with each other.
Notice the correlation between the first vertical derivative of the gravity field and the total field magnetics.

Click on the images to launch Noddy. A legend is provided at the end of this page.

East-West sections with altitude variations from 0 m to 2000 m	
Gravity 0 m 200 m 400 m 600 m 800 m 1000 m 1200 m 1400 m 1600 m 1800 m 2000 m	 LOAD JPEG IMAGE
Gravity First Vertical Derivative 0 m 200 m 400 m 600 m 800 m 1000 m 1200 m 1400 m 1600 m 1800 m 2000 m	 LOAD JPEG IMAGE
Magnetics 0 m 200 m 400 m 600 m 800 m 1000 m 1200 m 1400 m 1600 m 1800 m 2000 m	 LOAD JPEG IMAGE
Magnetics First Vertical Derivative 0 m 200 m 400 m 600 m 800 m 1000 m 1200 m 1400 m 1600 m 1800 m 2000 m	 LOAD JPEG IMAGE
Geology	 LOAD JPEG IMAGE

Key			Survey Parameters		Scale
plugs & dykes	ρ = 1	κ = 10^{-2}	inclination	-90°	max ▬ min
background	ρ = 0	κ = 0	intensity	70,000 gamma	
image width	10,000 m		flying height	0 m to 2000 m	
image height	2,000 m				

All models created using Noddy

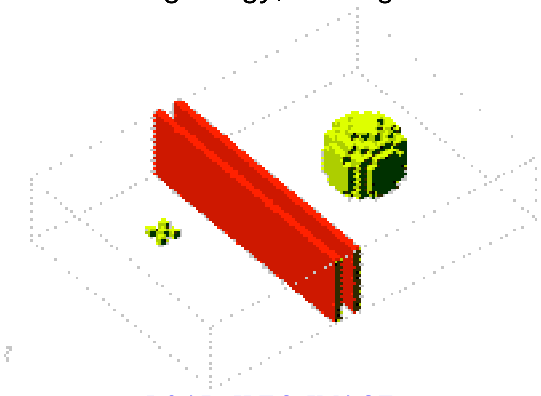
WWW conversion by Ian Brayshaw

1.4 Vector components of a magnetic field

These models use the same base geology as the previous sections, but compare the total magnetics with the three vector components of the field, for a model calculated first at an inclination of -50° and then at -90°. The assymetries in the vector and total field images arise from a combination of obliquity of the Earth's field (for the first two columns of images) combined with the superposition of the symmetric anomalies for all images.

Click on the images to launch Noddy. A legend is provided at the end of this page.

3D view of geology, looking from SW.



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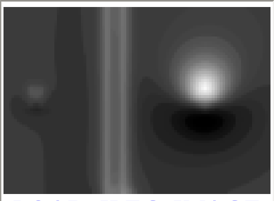
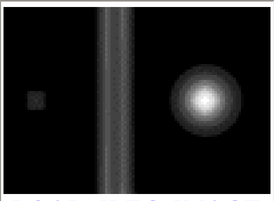
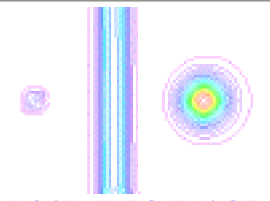
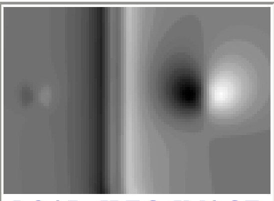
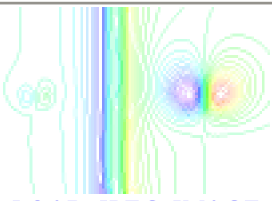
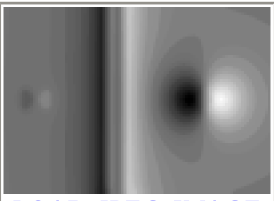
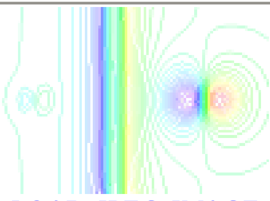
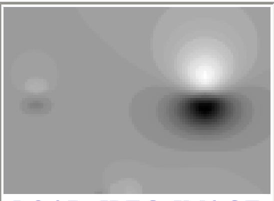
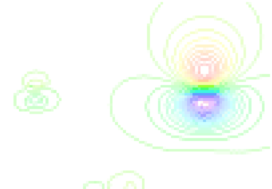
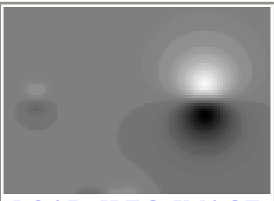
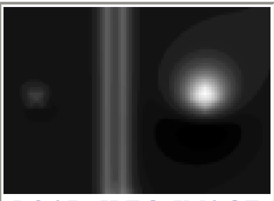
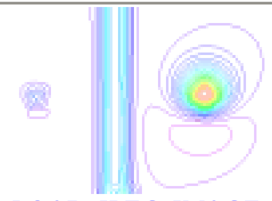
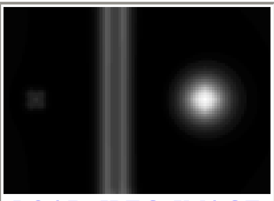
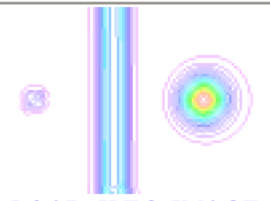
	Inclination of -50°		Inclination of -90°	
Link	**Grey Scale**	**Pseudo Colour Contours**	**Grey Scale**	**Pseudo Colour Contours**
Anomalous component of total field	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
X component of total field	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Y component of total field	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE
Z component of total field	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key		Survey Parameters		Scales
plugs & dykes	$\kappa = 10^{-2}$	inclination	-50° or -90°	max ▭ min (grey)
background	$\kappa = 0$	intensity	50,000 or 70,000 gamma	max ▭ min (colour)
image width	10,000 m	flying height	200 m	

All models created using Noddy

WWW conversion by Ian Brayshaw

1.5 The effect of changing latitude on anomaly shapes in magnetic data

The sequence of images show the effect on anomaly shape of calculating the TMI for an East-West dyke and vertical cylinder, at different southern hemisphere latitudes. For latitudes between -30°S and -60°S the anomaly shapes are quite similar, with the main changes being the increasing anomaly amplitude with higher latitudes (because the Earth's field increases in intensity towards the poles). At latitudes near the pole and the equator the anomaly shape starts to become noticeably more symmetric, with highs over the bodies at the pole and lows over the bodies at the equator.

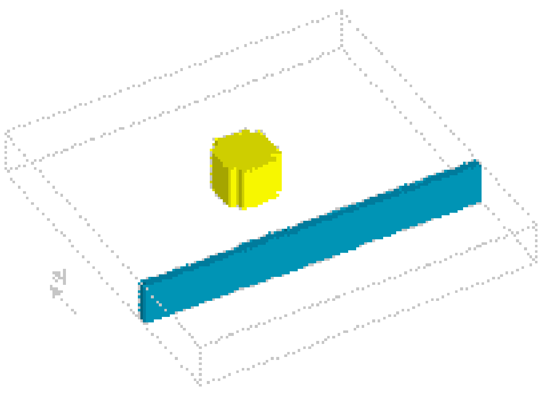
The cylindrical plug shows only orthogonal symmetry at the equator, whereas at the pole it shows radial symmetry.
Note how the offset of the magnetic high varies with latitude.

The grey scale images share a fixed look up table to illustrate the anomaly amplitude variations.
The colour images each have a look up table clipped to their maximum and minimum values to highlight the anomally shapes.

The plug is centred at 4800N 4000E and the dyke is centred on 2100N. The grid overlay has 1000 m spacing.

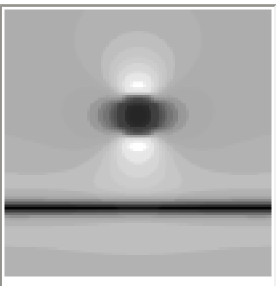
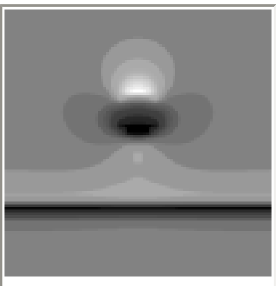
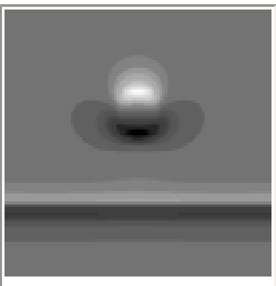
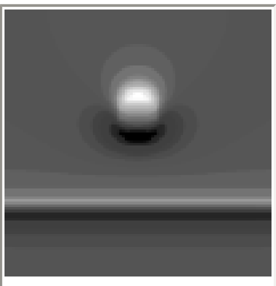
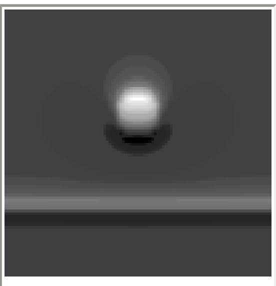
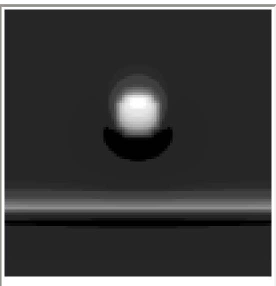
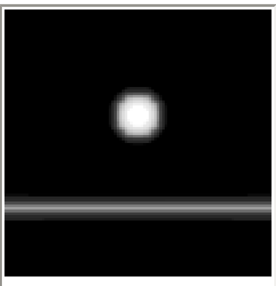
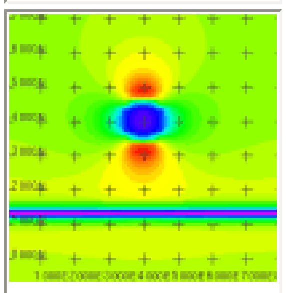
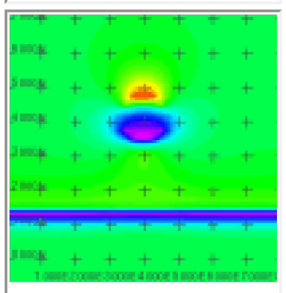
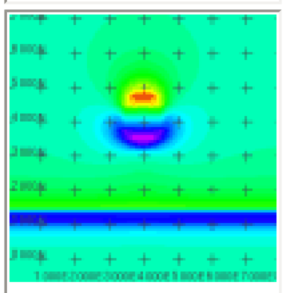
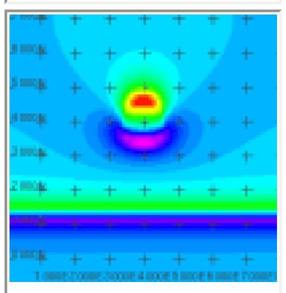
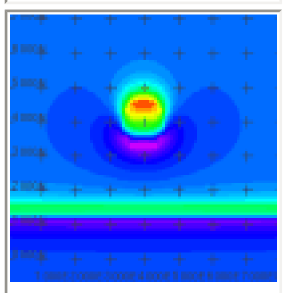
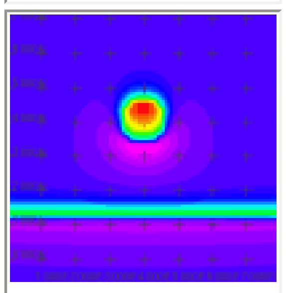
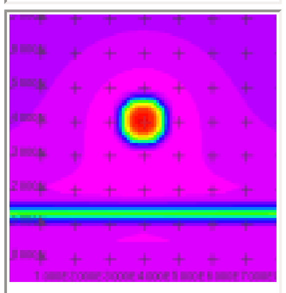
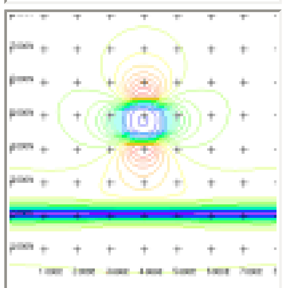
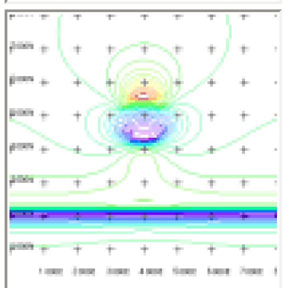
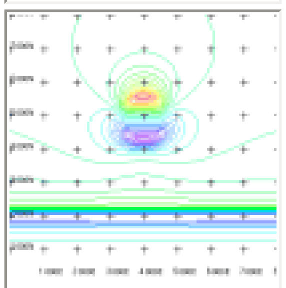
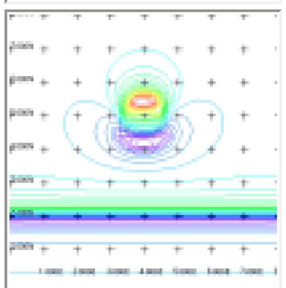
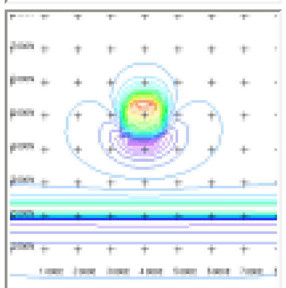
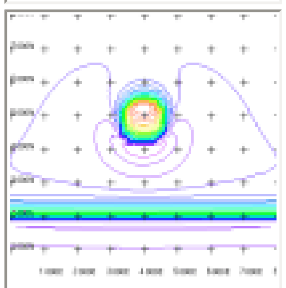
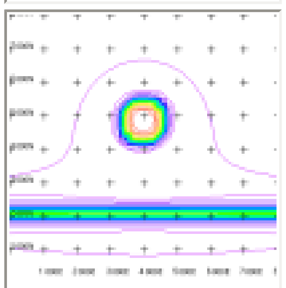
Click on the images to launch Noddy. A legend is provided at the end of this page.

View of 500 m wide East-West dyke and 1000 m radius vertical cylindrical plug.



LOAD JPEG IMAGE

View direction is from SW.

	TMI at different latitudes with varying intensity of the Earth's magnetic field						
Link	-0° eg Jakarta	-15° eg Singapore	-30° eg PNG	-45° eg Townsville	-60° eg Broken Hill	-75° eg South of Tasmania	-90° ie South Pole
Grey Scale	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Psuedo Colour	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Psuedo Colour Contours	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Earth's Field	25,000 gamma	35,000 gamma	44,000 gamma	50,000 gamma	56,000 gamma	64,000 gamma	70,000 gamma
Comment	*Notice the orthogonal plug symmetry.*						*Notice the radial plug symmetry*

Key	Survey Specifications	Scales
plug $\kappa = 10^{-2}$ dyke $\kappa = 10^{-2}$ background $\kappa = 0$ image width 10,000 m	flying height 80 m	3000 -2000 max min

All models created using Noddy

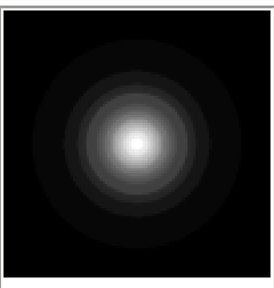
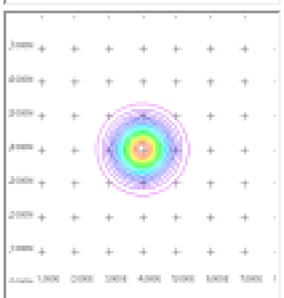
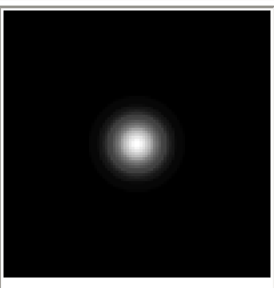
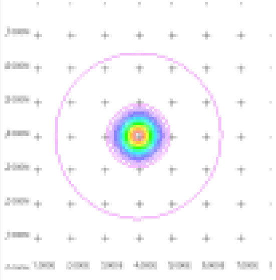
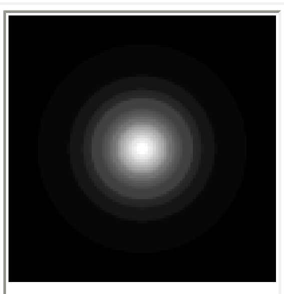
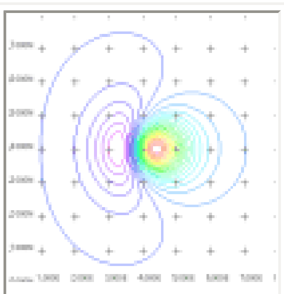
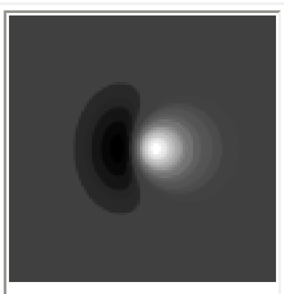
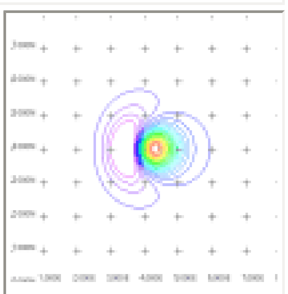
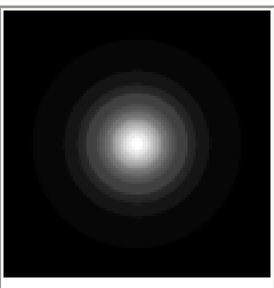
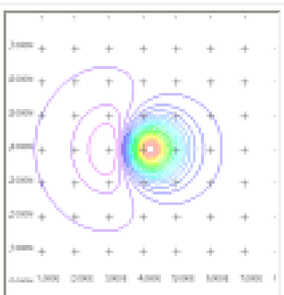
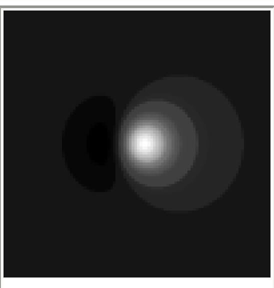
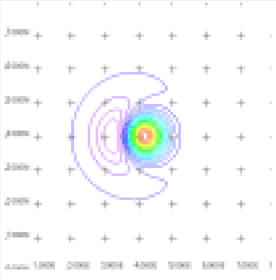
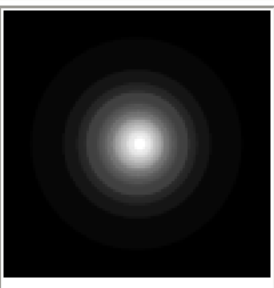
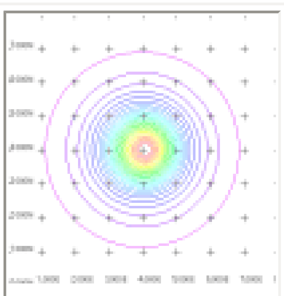
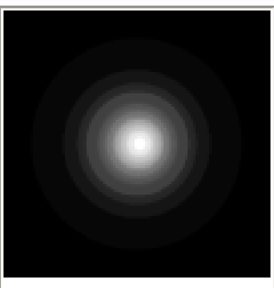
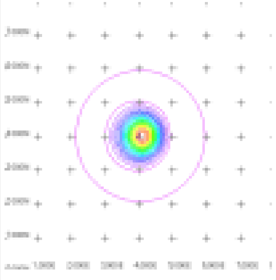
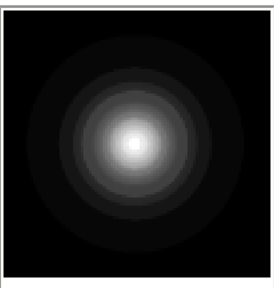
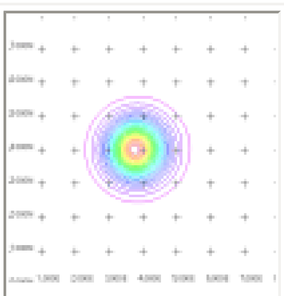
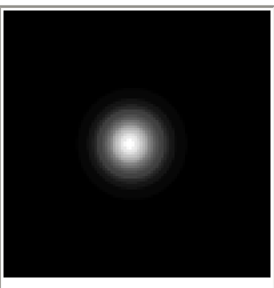
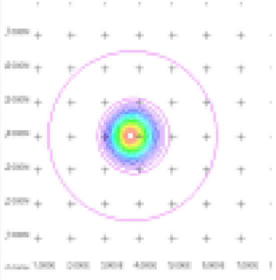
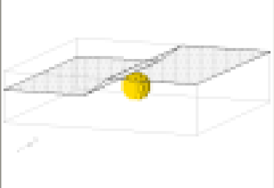
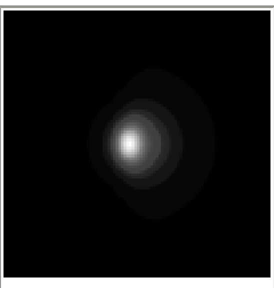
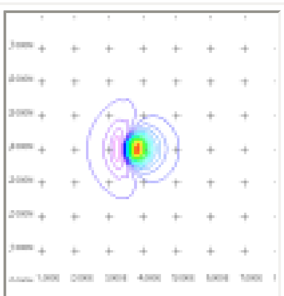
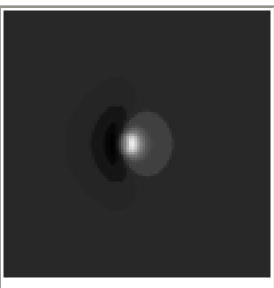
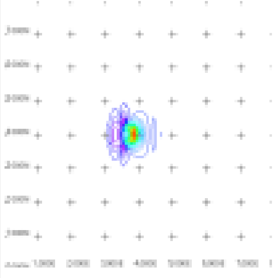
WWW conversion by Ian Brayshaw

1.6 Asymmetries in magnetic and gravity data

These models show some of the possible causes of asymmetry in gravity and magnetic anomalies. The first shows the symmetric anomaly due to a uniformly magnetised sphere at the South Pole and the subsequent images show the effect of individually varying the inclination of the Earth's magnetic field, adding a remanent magnetisation to the sphere, changing the shape of the body to an ellipsoid, varying the rock properties within the sphere and finally measuring the field at a non-uniform height above the body. The grid spacing is 1000 m and the sphere is centred over 4000E 4000N.
Similar images are also displayed for gravity models.

Geology is viewed from SE.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics 1VD
Spherical body calculated at South Pole	LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows radially symmetric gravity and magnetic fields.				
Spherical body calculated at an inclination of -50° and a declination of 90°	LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows a radially symmetric gravity and an asymmetric magnetic field with an EW symmetry plane.				
Spherical body calculated at South Pole with remanent magnetisation	LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows a radially symmetric gravity and an asymmetric magnetic field with an EW symmetry plane. The remanent vector has an inclination of 45° and a declination of 90°.				
Elliptical body calculated at South Pole	LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows asymmetric gravity and magnetic fields with an EW symmetry plane. Body dips at 45° towards 270°.				
Spherical body calculated at South Pole with asymmetric alteration pattern	LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows asymmetric gravity and magnetic fields with an EW symmetry plane. Panels of equal rock properties dip at 45° towards 90° (red is high density/susceptibility).				
Spherical body calculated at South Pole with variable survey heights	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This body shows asymmetric gravity and magnetic fields with an EW symmetry plane. The survey heights are displayed as a stippled plane.				

Key	Survey Parameters	Scales
sphere ρ = 1 κ = 10^{-2} background ρ = 0 κ = 0 image width 8,000 m	inclination -50° or -90° declination 0° or 90° intensity 50,000 or 70,000 gamma flight height 80 m or variable	max min max min

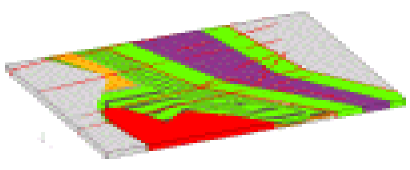
All models created using Noddy

WWW conversion by Ian Brayshaw

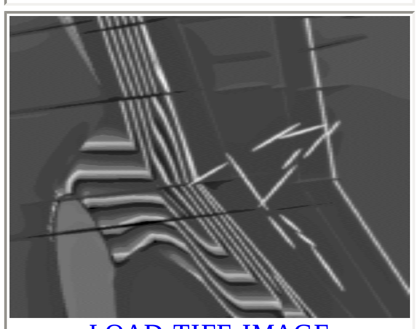
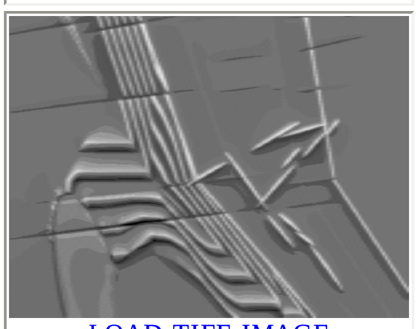
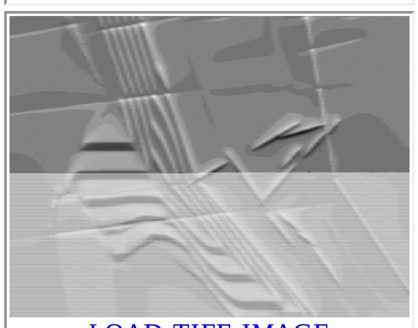
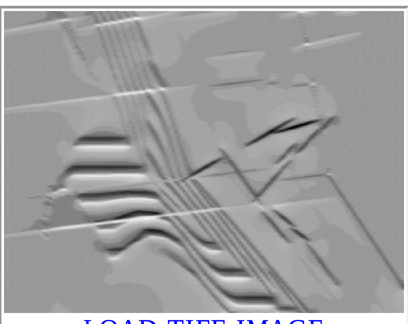
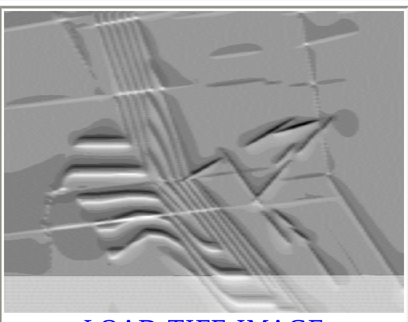
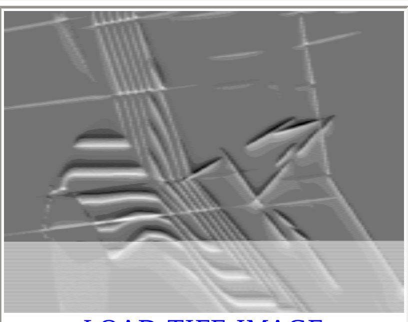
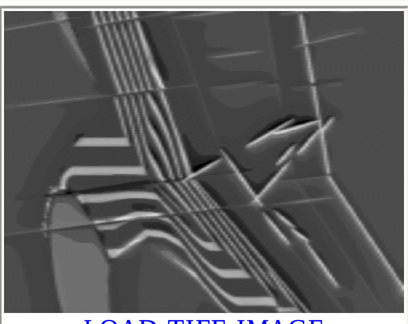
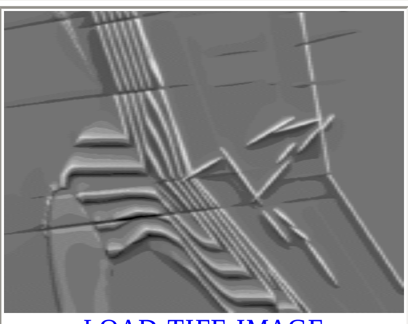
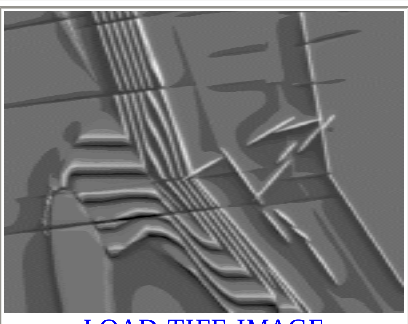
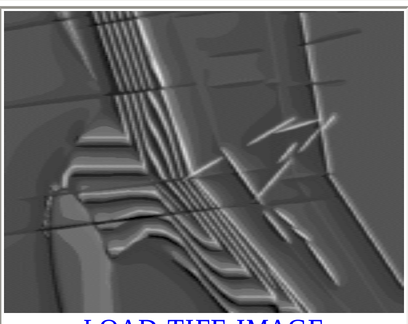
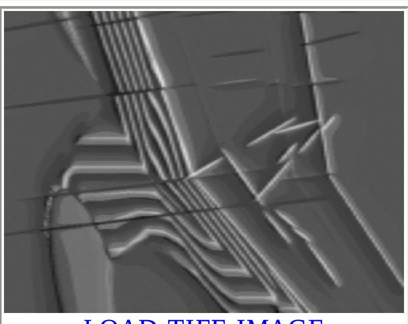
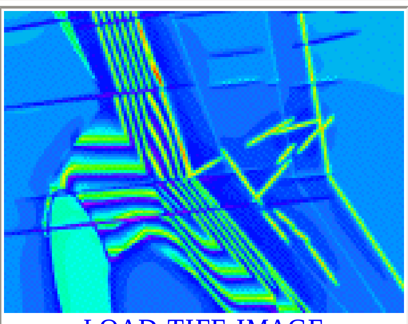
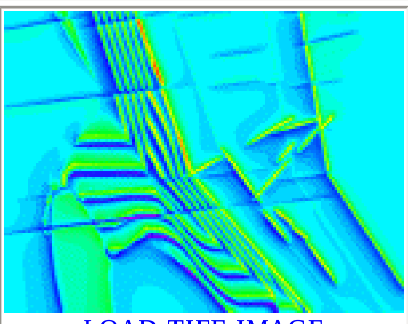
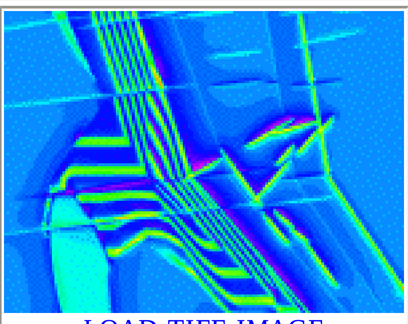
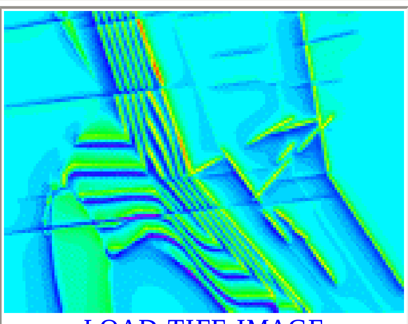
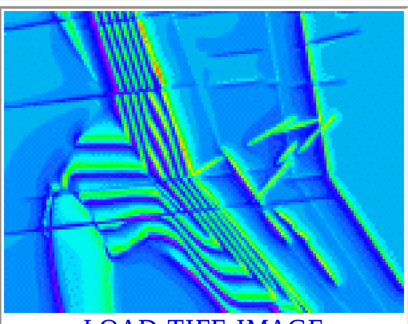
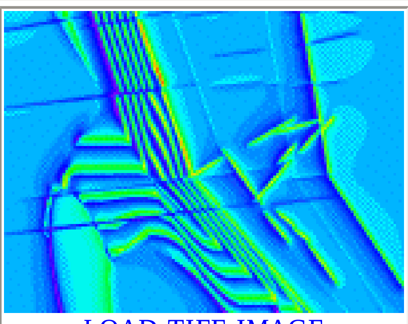
1.7 Magnetic inclination and declination effects for complex structures

This sequence shows the variations in anomaly patterns in an area of complex structure, resulting from systematically varying the magnetic inclination and declination. The original model is based on the geology seen at the North end of the Widgiemoollltha Dome in the Yilgarn Craton of Western Australia, and was developed by Rick Valenta.

Click on the images to launch Noddy. A legend is provided at the end of this page.



LOAD TIFF IMAGE

Link	Magnetics	Magnetics	Magnetics	Magnetics
Widgiemooltha model at various magnetic inclinations - greyscale image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination -90 Declination 0	*Inclination -60 Declination 0*	*Inclination -30 Declination 0*	*Inclination -15 Declination 0*
Widgiemooltha model at various magnetic inclinations - greyscale image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination +0 Declination 0	*Inclination +15 Declination 0*	*Inclination +30 Declination 0*	*Inclination +60 Declination 0*
Widgiemooltha model at various magnetic inclinations - greyscale image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination -60 Declination 0	*Inclination -60 Declination 30*	*Inclination -60 Declination 60*	*Inclination -60 Declination 90*
Widgiemooltha model at various magnetic declinations - colour image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination -90 Declination 0	*Inclination -60 Declination 0*	*Inclination -30 Declination 0*	*Inclination -15Declination 0*
Widgiemooltha model at various magnetic inclinations - colour image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination +00 Declination 0	*Inclination +15 Declination 0*	*Inclination +30 Declination 0*	*Inclination +60 Declination 0*
Widgiemooltha model at various magnetic declinations - colour image	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	Inclination -60 Declination 0	*Inclination -60 Declination 30*	*Inclination -60 Declination 60*	*Inclination -60 Declination 90*

Key	Survey Parameters	Scales
image width 28,000 m	Inclination varied Intensity 63,000 gamma Flight height 60 m	max min max min

All models created using Noddy

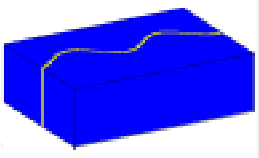
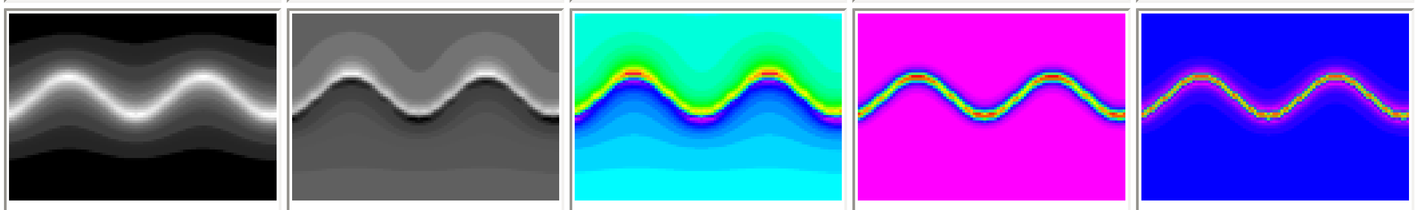
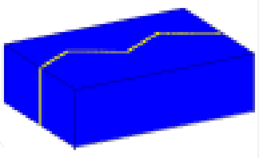
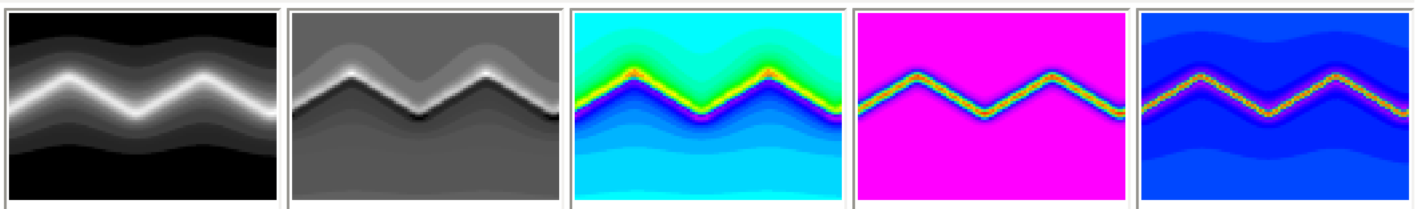
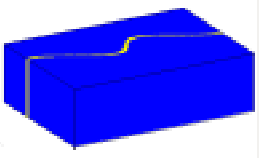
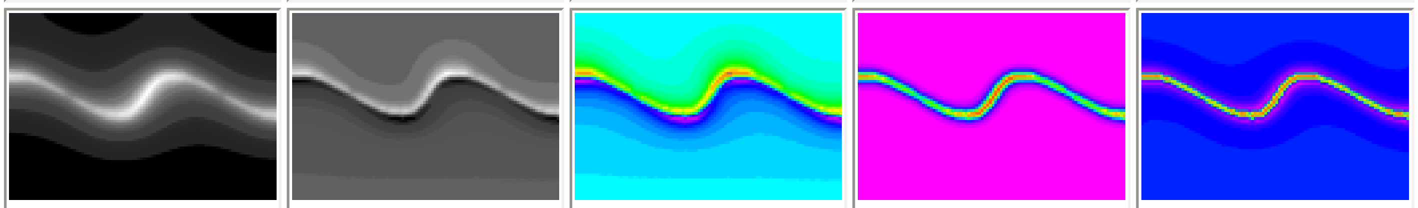
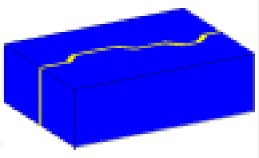
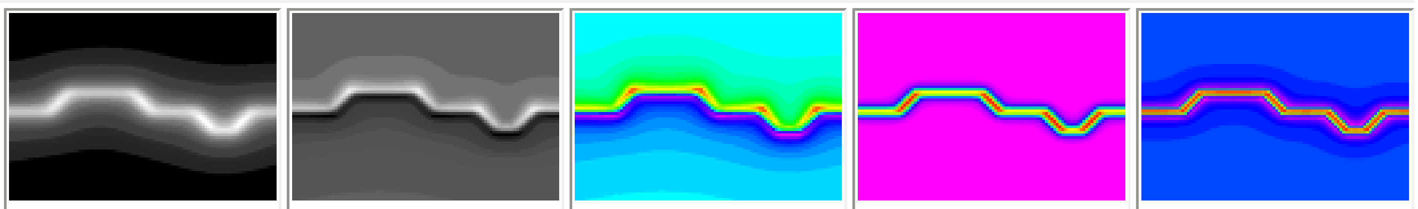
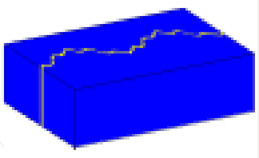
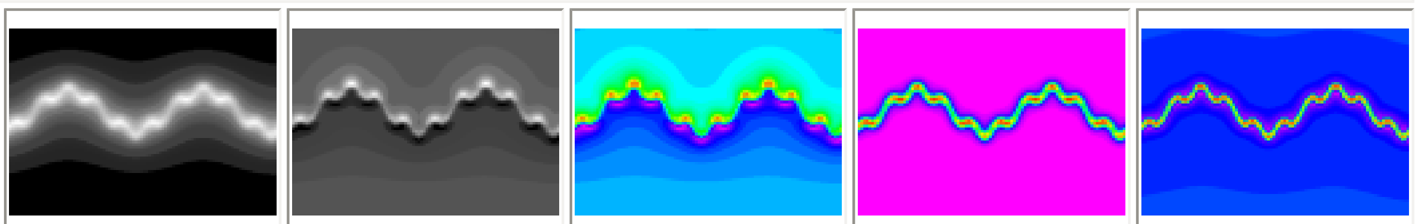
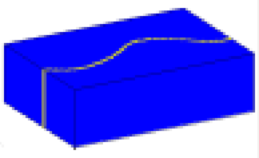
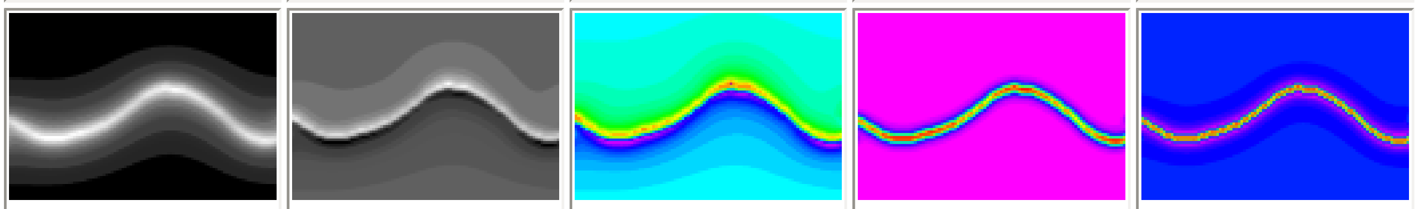
WWW conversion by Ian Brayshaw Thursday 30 April 1998

2.1.1 Variation in fold profile

This sequence shows the affect of varying the fold profile geometry for a 200 m thick layer.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Sinusoidal Folds	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This model was generated using a similar fold style, so there is some hinge thickening relative to the limbs.					
Chevron Folds	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
Asymmetric Folds	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	The west limbs of this fold are structurally thickened.					
Box Folds	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	These folds are actually formed as a result of conjugate kink sets, and results in the thickening of the limbs relative to the hinges.					
Anticlinoriums & Synclinoriums	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
Buckle Fold	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This fold has uniform limb and hinge thickness, but still shows anomaly peaks at the hinges.					

Key	Survey Parameters	Scales
layer κ = 10^{-2} background κ = 0 image width 10,000 m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max min max min

All models created using Noddy

WWW conversion by Ian Brayshaw

2.1.2 Variation in fold plunge direction of sinusoidal folds

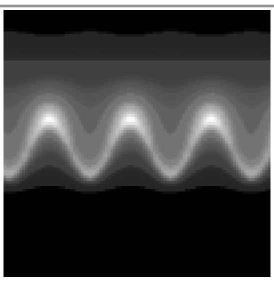
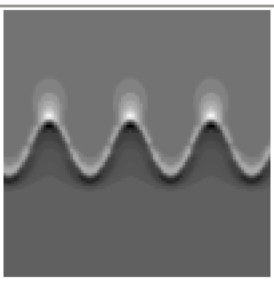
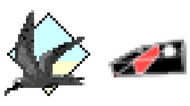
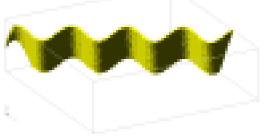
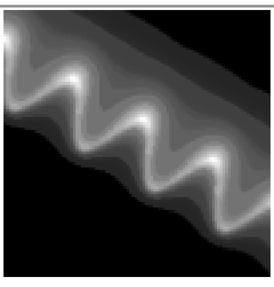
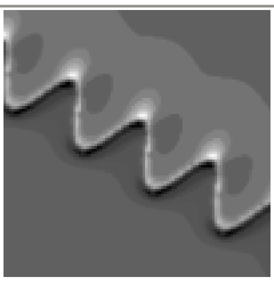
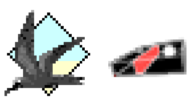
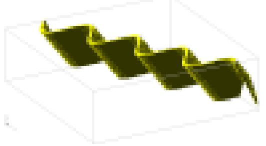
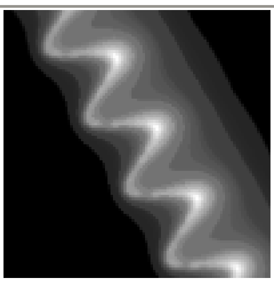
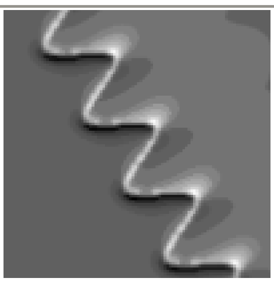
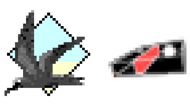
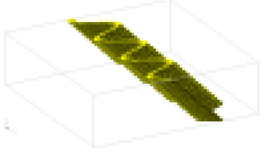
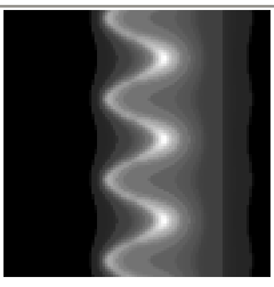
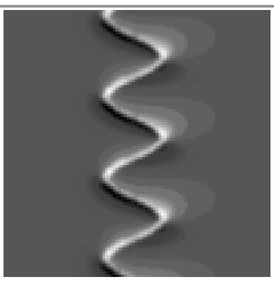
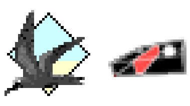
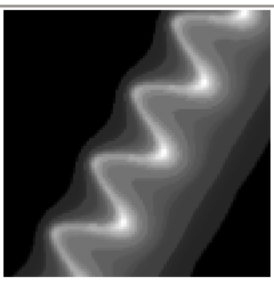
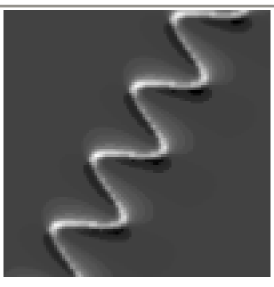
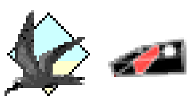
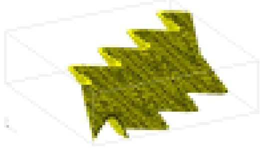
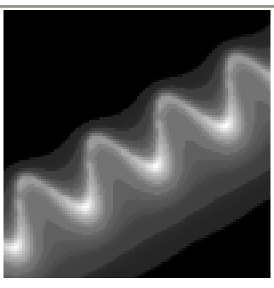
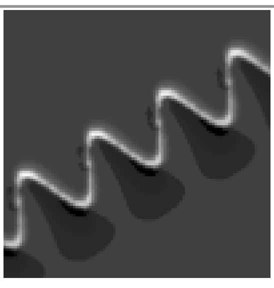
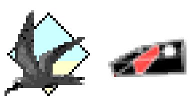
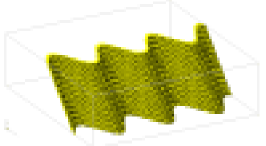
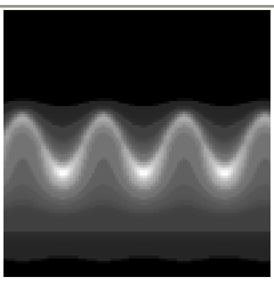
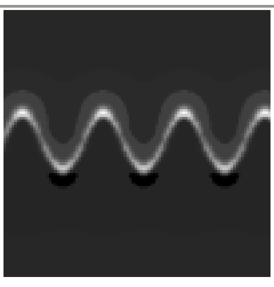
2.1.2b

This sequence shows the affect of varying the fold plunges direction for a set of open sinusoidal folds in a 200 m thick layer, with fold axes plunging at 60°.

Notice the variations in field strength between hinges and limbs in both the gravity and magnetic images, the assymmetry between limbs in folds which are not plunging due north or south, and the marked differences between the north and south plunging magnetic images.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics
Folds plunging to 000 (North) 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the strong asymmetry of the magnetic anomaly in north-south sections, and the asymmetry between the anticlines in the north and the synclines in the south.		
Folds plunging to 030 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the asymmetry of the magnetic anomaly between north-east and south-west facing limbs.		
Folds plunging to 060 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging to 090 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging to 120 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging to 150 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging to 180 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the symmetry of the magnetic anomaly in north-south sections, but the asymmetry between the anticlines in the north and the synclines in the south for the gravity but not magnetic images.		

Key	Survey Parameters	Scale
layer $\rho = 1$ $\kappa = 10^{-2}$	Inclination -50°	max — min
background $\rho = 0$ $\kappa = 0$	Intensity 50,000	
image width 10,000 m	Flight height 80 m	

All models created using Noddy

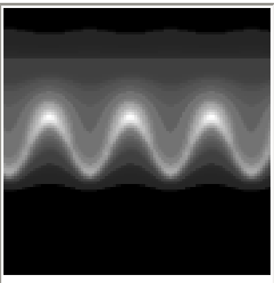
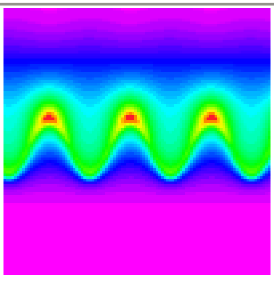
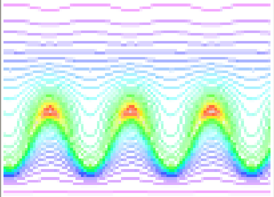
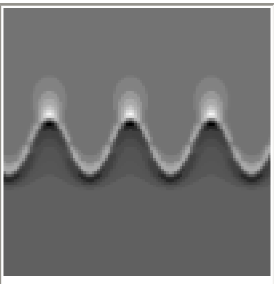
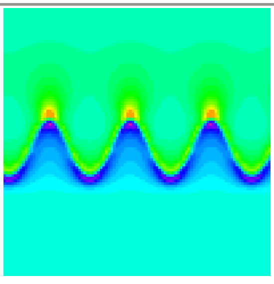
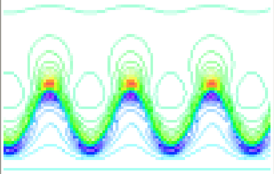
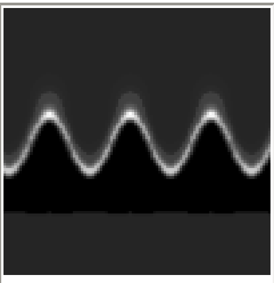
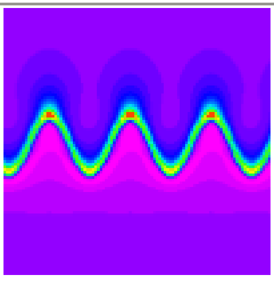
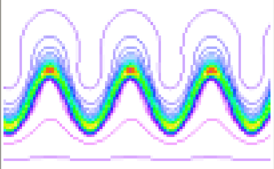
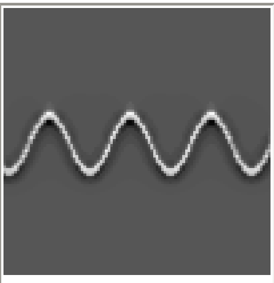
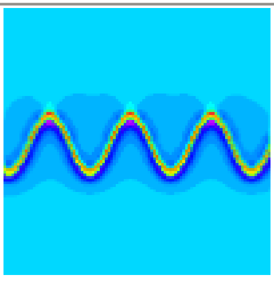
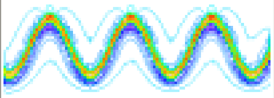
WWW conversion by Ian Brayshaw

2.1.2b Variation in fold plunge direction of sinusoidal folds (continued)

2.1.2

This sequence shows the affect of a sinusoidal fold in a 200 m thick layer, plunging to the North. Other orientations are not shown as reduced to the pole images would simply vary by rotation. The images show the variation in display formats between grey scale and pseudo-colour look up tables, and colour contours, and the differences between folds at inclinations of -50° and -90°, together with first vertical derivative images at the pole.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Grey Scale	Pseudo Colour	Contours
Folds plunging to 000 (North) -- Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the strong asymmetry of the anomaly in north-south sections, and the asymmetry between the anticlines and synclines in the south.		
Folds plunging to 000 (North) -- Magnetics at -50°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the asymmetry of the anomaly in north-south sections, and the asymmetry between the anticlines and synclines in the south.		
Folds plunging to 000 (North) -- Magnetics at -90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the weaker asymmetry of the anomaly in north-south sections, and the asymmetry between the anticlines and synclines in the south.		
Folds plunging to 000 (North) -- Magnetics at -90° First Vertical Derivative	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the weaker asymmetry of the anomaly in north-south sections.		

Key	Survey Parameters	Scales
layer ρ = 1 κ = 10^{-2} background ρ = 0 κ = 0 image width 10,000 m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max (grey scale) min max (colour scale) min

All models created using Noddy

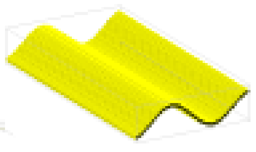
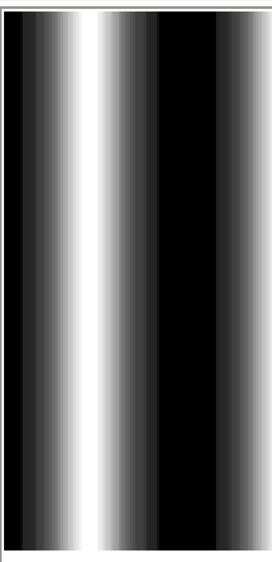
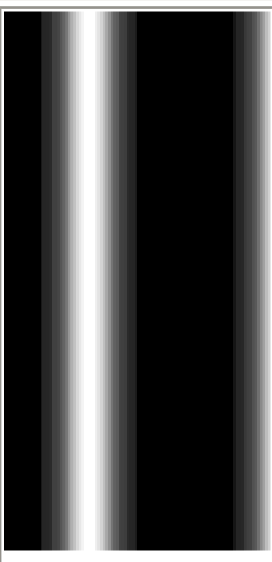
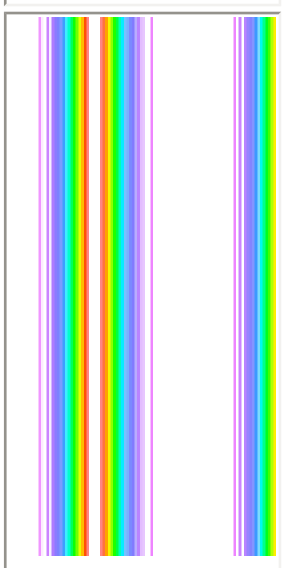
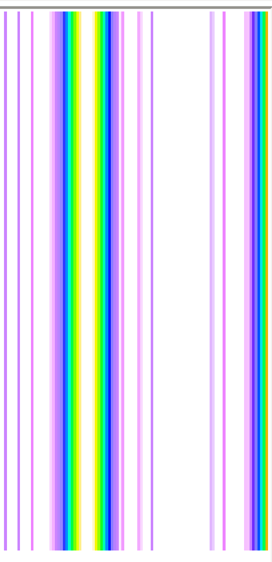
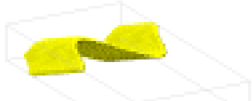
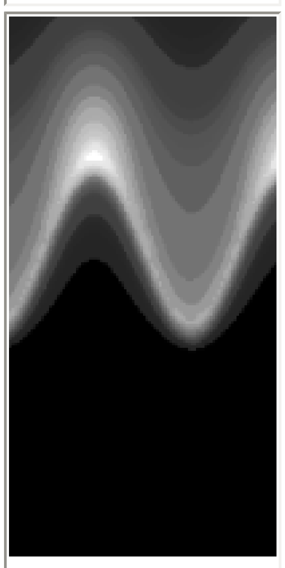
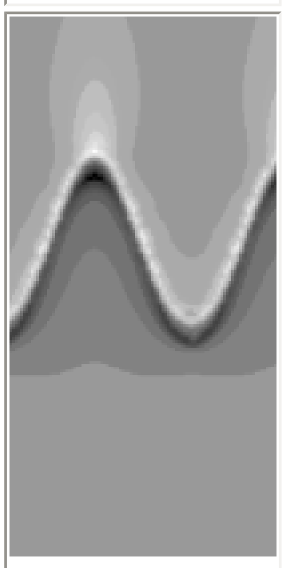
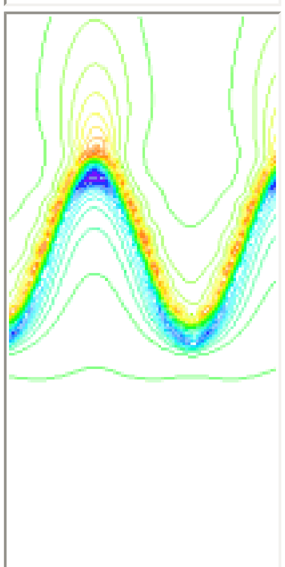
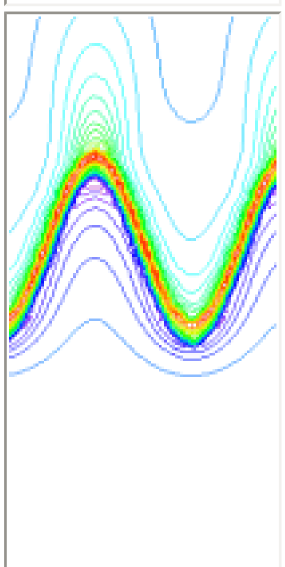
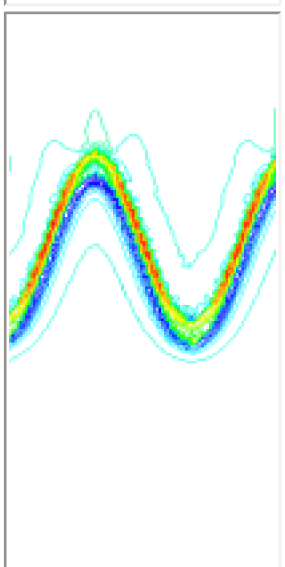
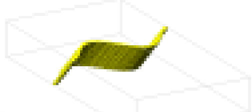
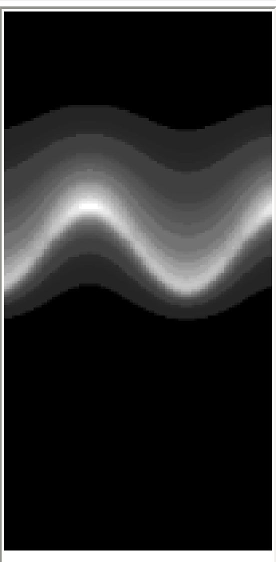
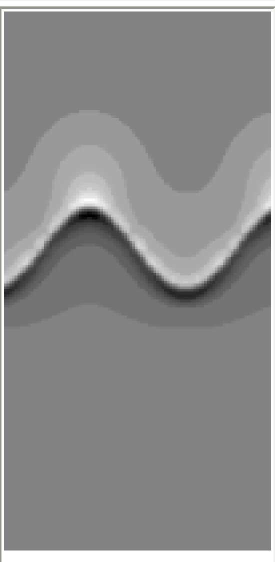
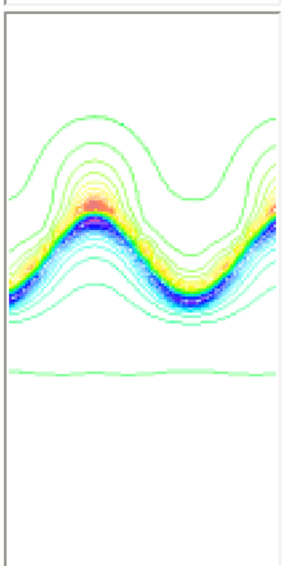
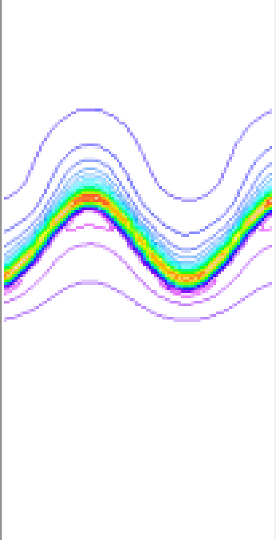
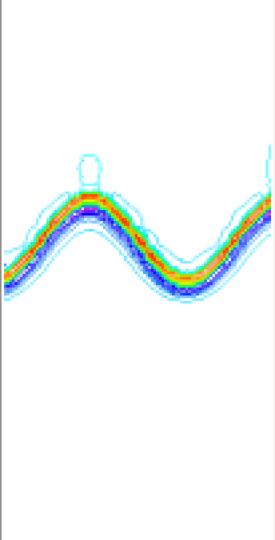
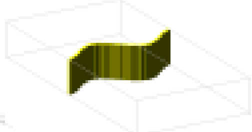
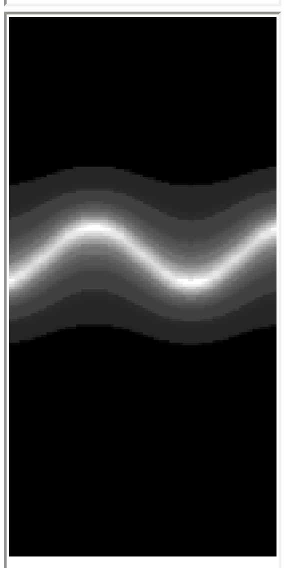
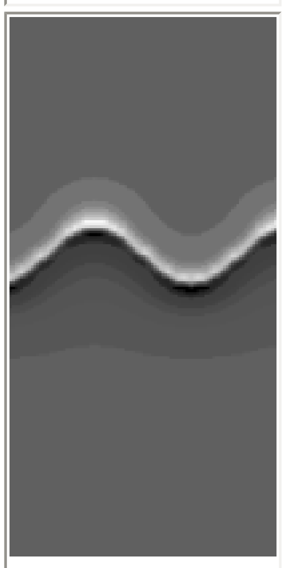
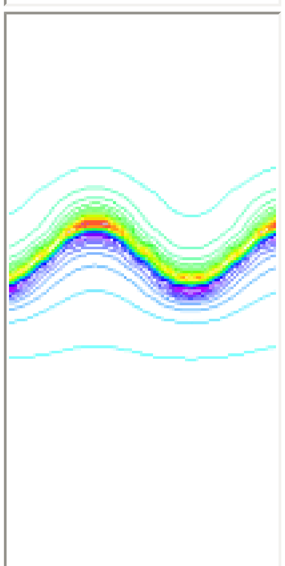
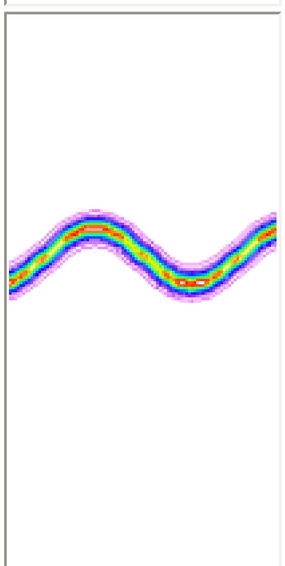
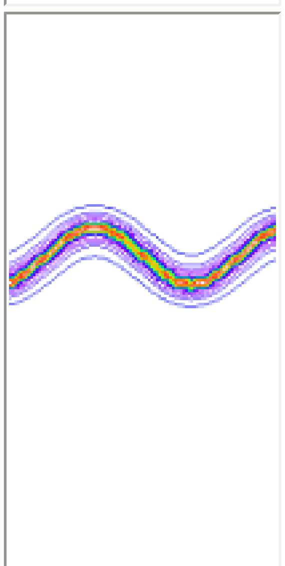
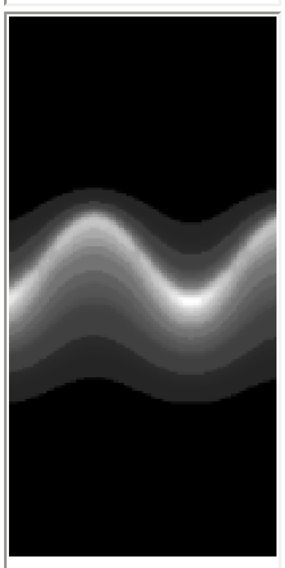
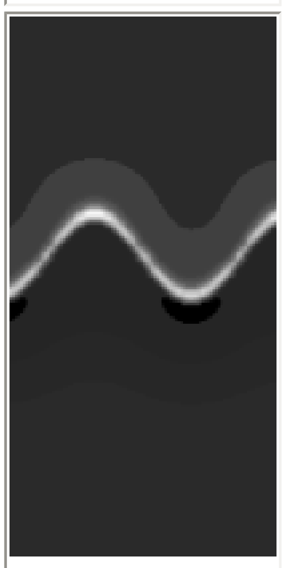
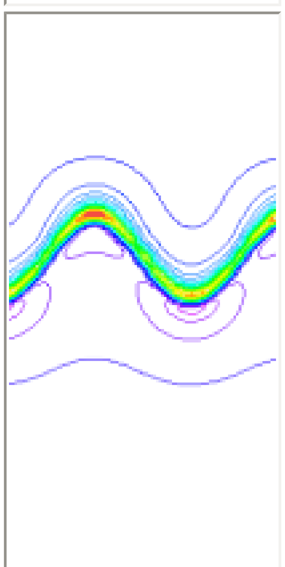
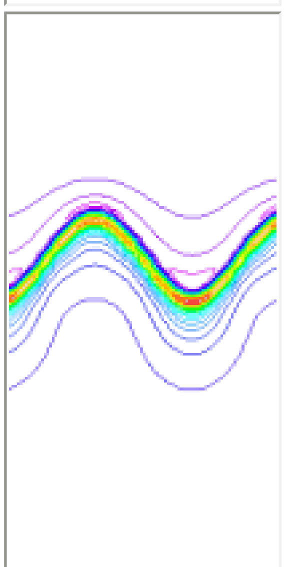
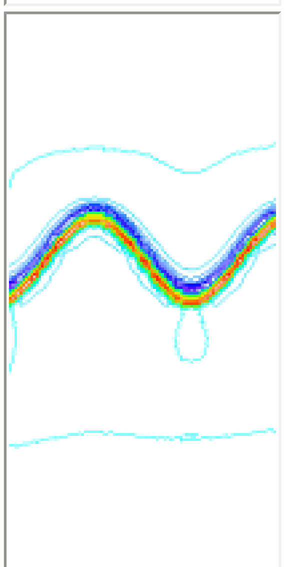
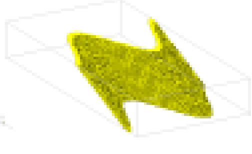
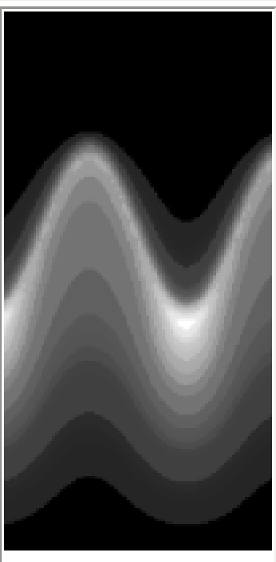
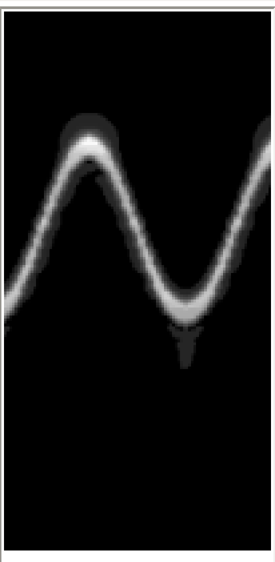
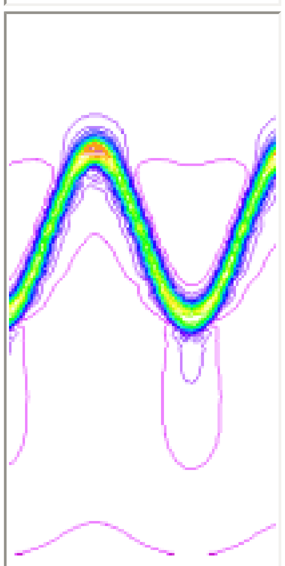
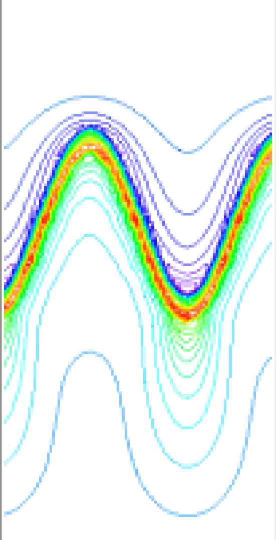
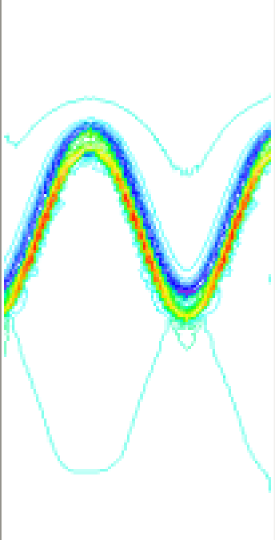
WWW conversion by Ian Brayshaw

2.1.3 Variation in fold plunge of sinusoidal folds

This sequence shows the affect of varying the fold plunge for a set of open sinusoidal folds in a 200 m thick layer.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Folds plunging 0° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging 20° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging 45° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging 90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging 45° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Folds plunging 20° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key		Survey Parameters		Scales
layer	$\rho = 1$ $\kappa = 10^{-2}$	Inclination	-50°	max (grey scale) min
background	$\rho = 0$ $\kappa = 0$	Intensity	50,000 gamma	max (colour scale) min
image width	7,000 m	Flight height	80 m	

All models created using Noddy

WWW conversion by Ian Brayshaw

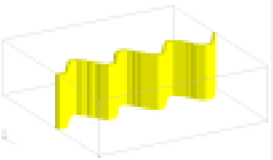
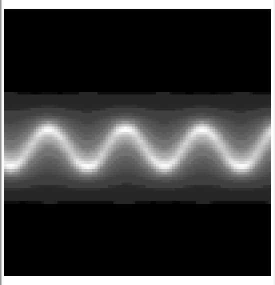
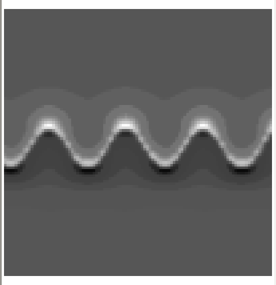
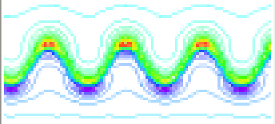
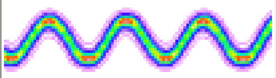
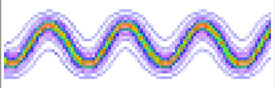
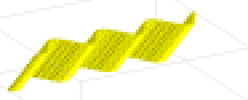
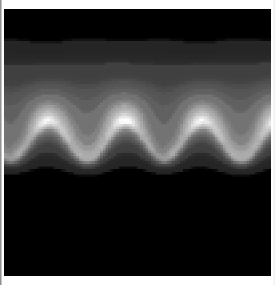
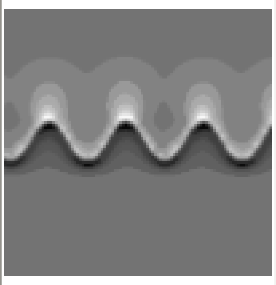
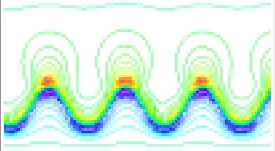
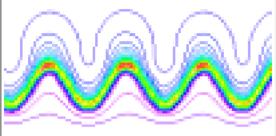
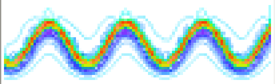
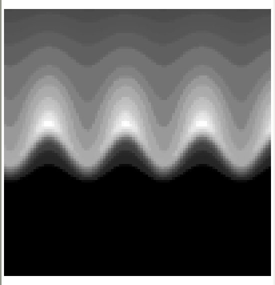
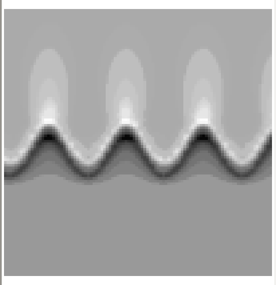
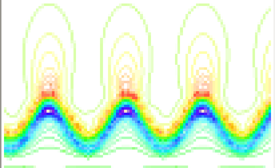
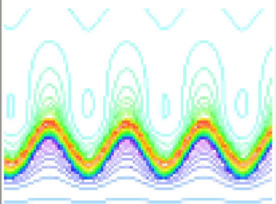
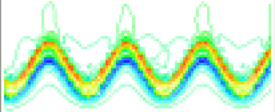
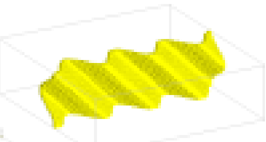
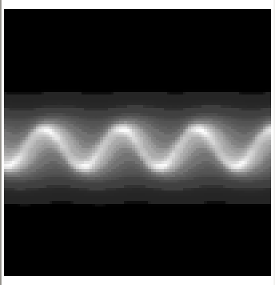
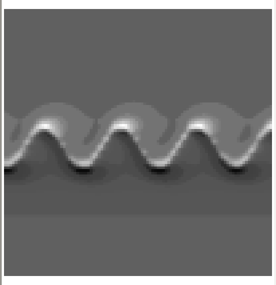
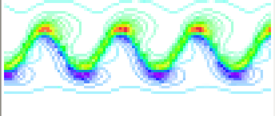
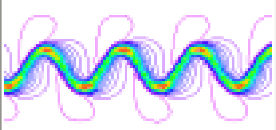
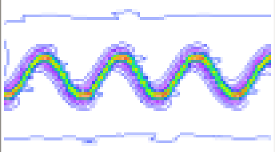
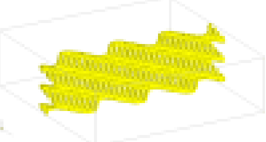
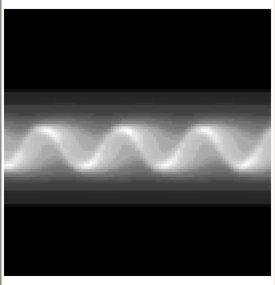
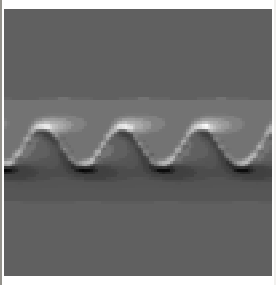
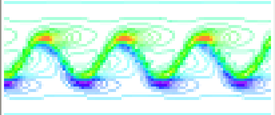
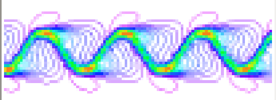
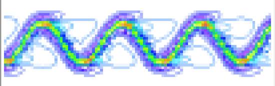
2.1.4 Ambiguities in the interpretation of sinusoidal folds

This sequence of images shows the effect of varying the orientation, amplitude and wave-length of sinusoidally folded 200 m thick layer in such a way that the outcrop pattens remain the same.

All block diagrams are viewed from SW.

Summary wavelet transform animation comparing 3 different orientations

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Sinusoidal folds plunging vertically	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the full EW and NS symmetry of gravity and EW symmetry of the magnetic images.					
Sinusoidal folds plunging 45° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Both gravity and magnetic images now only show EW symmetry.					
Sinusoidal folds plunging 20° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Both gravity and magnetic images now only show EW symmetry, with exaggerated differences between North and South hinges.					
Sinusoidal folds reclined 45° to East	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	The EW symmetry has now broken down in the gravity and magnetic images, and the magnetic images show neither EW or NS symmetries.					
Sinusoidal folds reclined 20° to East	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the EW trending high background band in the gravity and oblique tails off the North hinges of the folds in the magnetic image.					

Key	Survey Parameters	Scales
layer ρ = 1 κ = 10^{-2}	Inclination -50°	max min
background ρ = 0 κ = 0	Intensity 50,000 or 70,000 gamma	max min
image width 10,000 m	Flight height 80 m	

All models created using Noddy

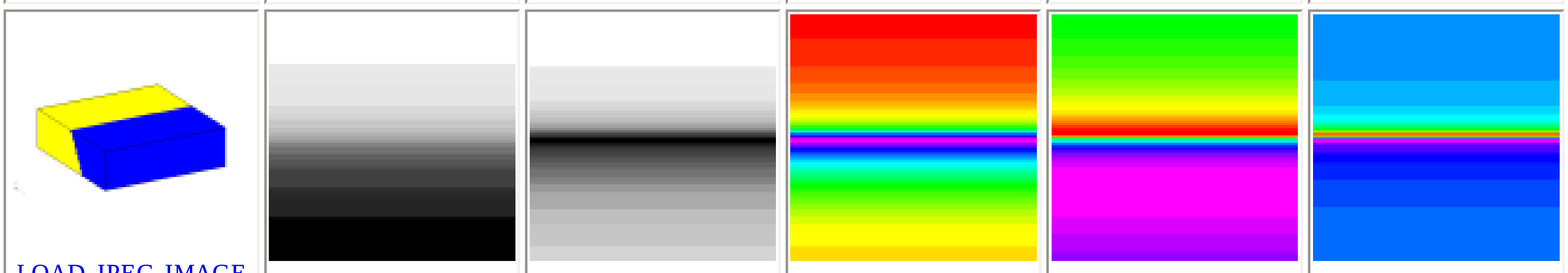
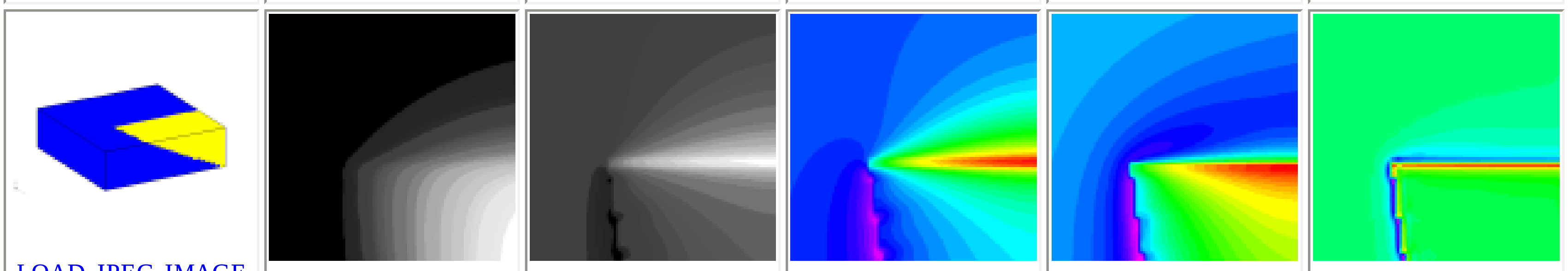
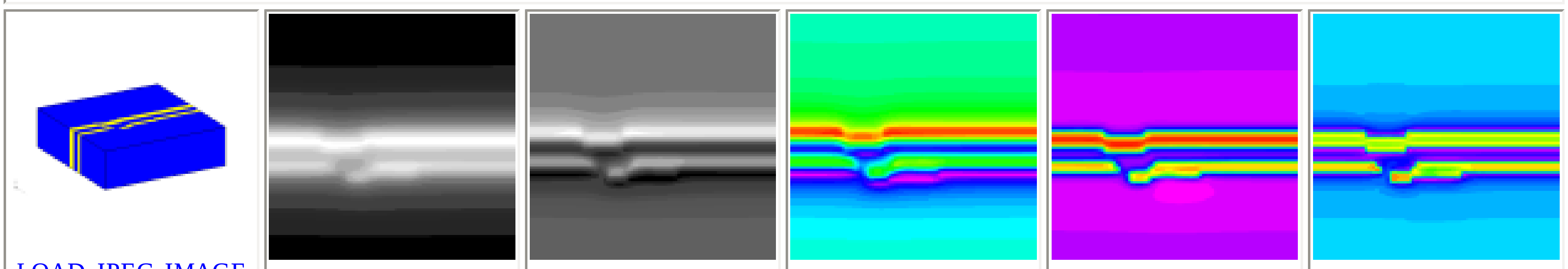
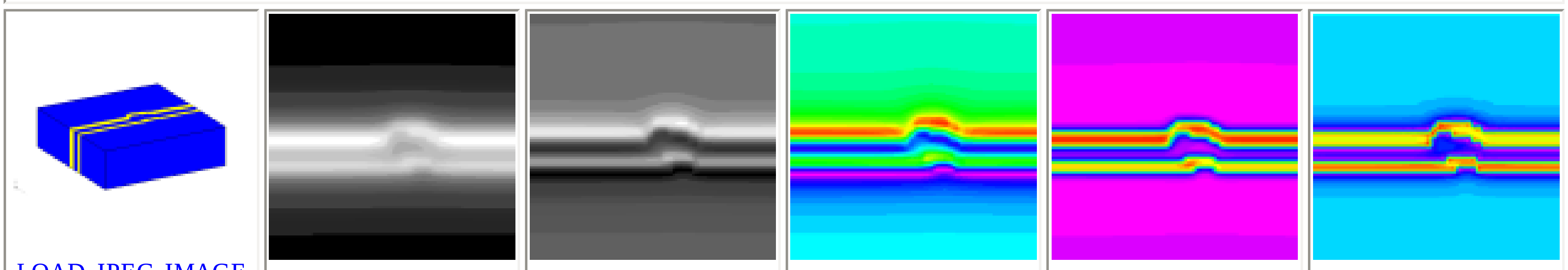
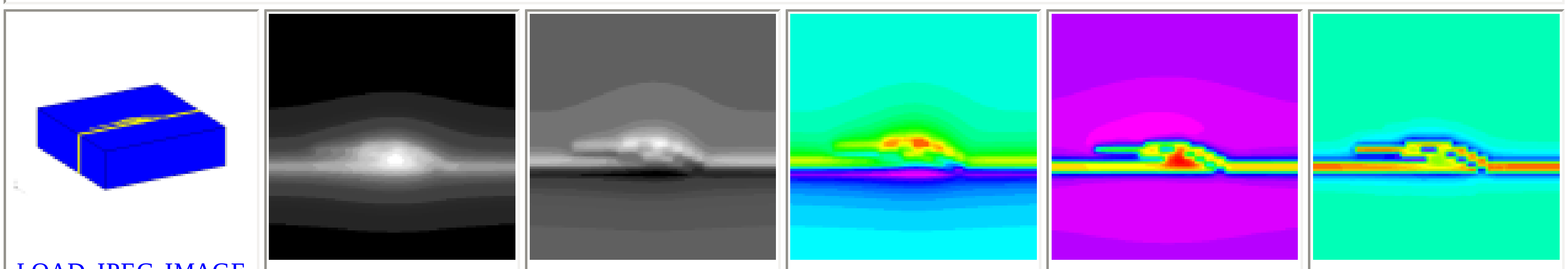
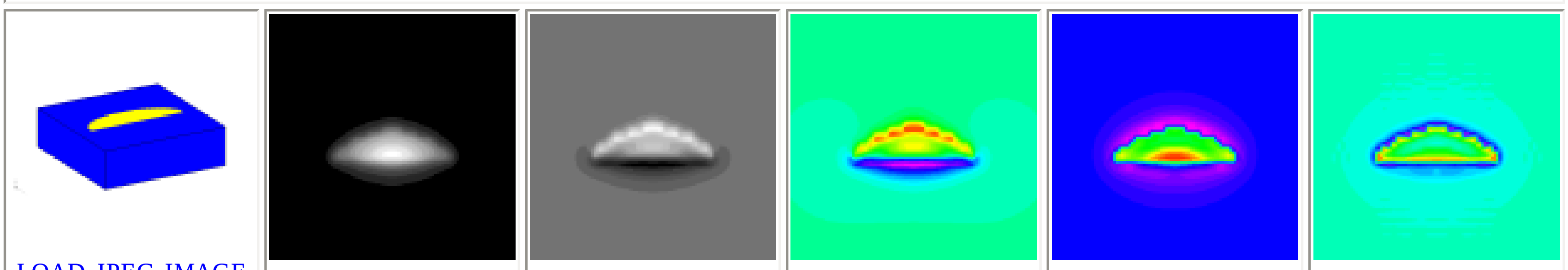
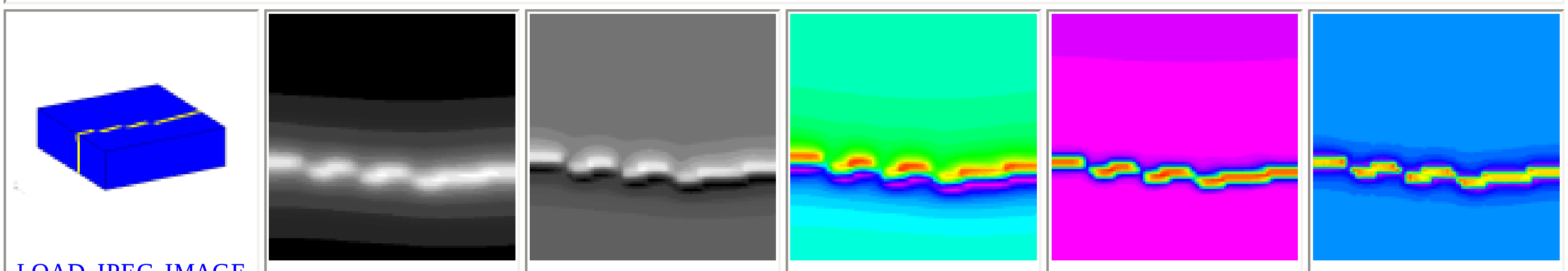
WWW conversion by Ian Brayshaw

2.2.1 Variation in fault geometry

This sequence shows a number of different fault styles.

All block diagrams are viewed from SW

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Normal Fault	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
Rotational Fault	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	In this case the fault produces a wedge of high density and high susceptibility material sloping to the East, with an increasing gravity response as the thickness increases, but a very localised magnetic high associated with the sharp change in susceptibilities.					
Growth Fault	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	In this model the middle, low susceptibility unit is significantly thickened due to the fault being active during deposition.					
Fault Inversion	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This model shows the effect of late shortening on an early growth fault.					
Thrust Ramp Fault	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	In this model a pair of thrust ramps have produced an antiformal stack.					
Elliptical Normal Fault	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	The magnitude of the slip vector decays away from centre of elliptical fault surface.					
Normal Fault Set	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE

Key		Earth's Magnetic Field		Scales
layer	ρ = 3.5 κ = 10^{-2}	Inclination	-50° or -90°	max – min (greyscale)
background	ρ = 2.5 κ = 10^{-4}	Intensity	50,000 or 70,000 gamma	max – min (colour)
width of image	10,000 m	Flying height	80 m	

All models created using Noddy

WWW conversion by Ian Brayshaw

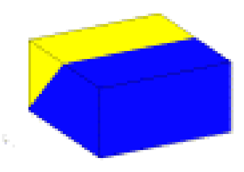
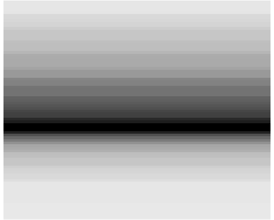
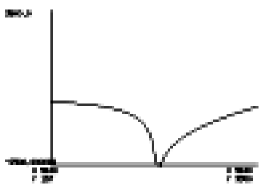
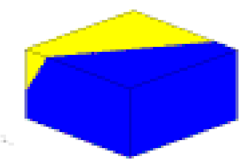
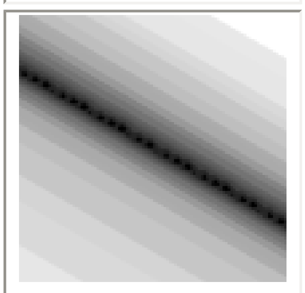
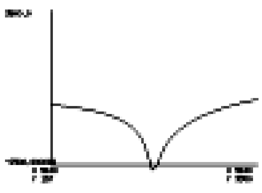
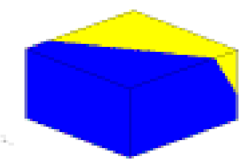
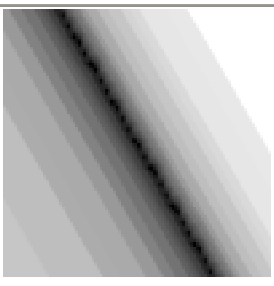
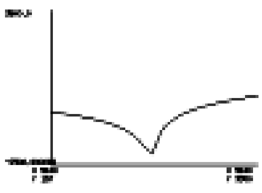
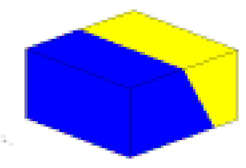
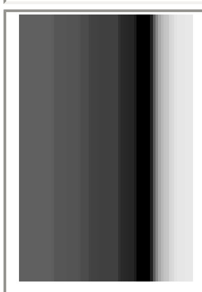
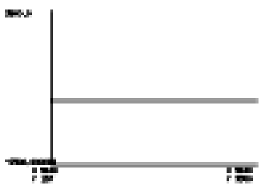
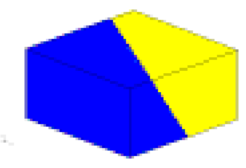
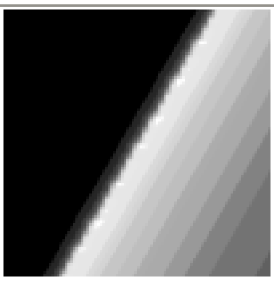
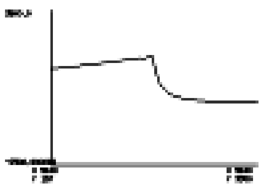
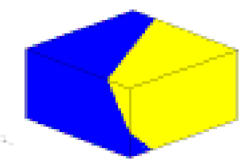
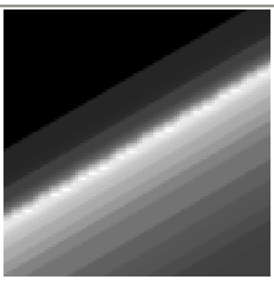
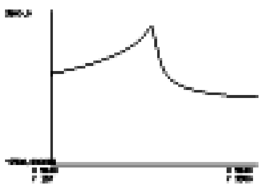
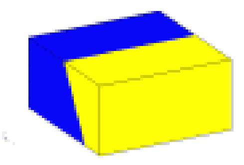
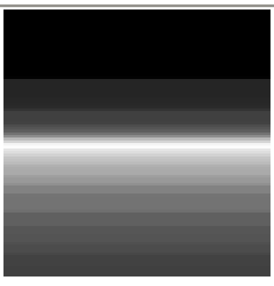
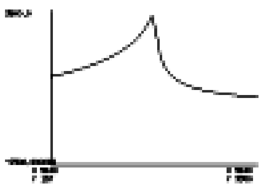
2.2.2 Variation in fault dip direction of low susceptibility footwall faults

2.2.2b

This sequence shows the affect of varying the fault dip direction for faults which have a low susceptibility footwall block and a high susceptibility hangingwall block. Since these are essentially two-dimensional models, South to North profiles through the centre of the block are also provided.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Magnetics	South Intensity North
Faults dipping to 000 (North)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 030	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 060	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 090 (East)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 120	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 150	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 180 (South)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scale
foot wall $\kappa = 0$ hanging wall $\kappa = 10^{-2}$ Image width 10,000 m	Inclination -50° Intensity 50,000 gamma Flying height 80 m	max min

All models created using Noddy

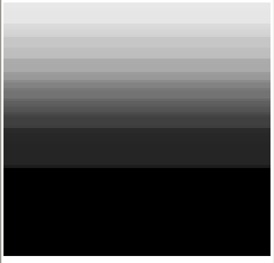
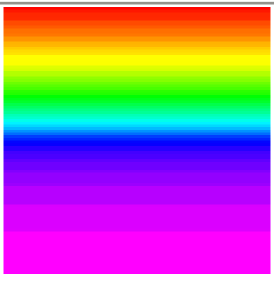
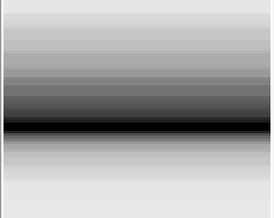
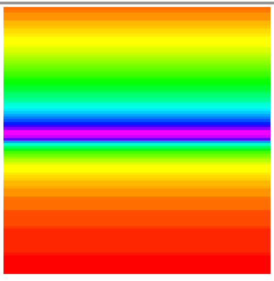
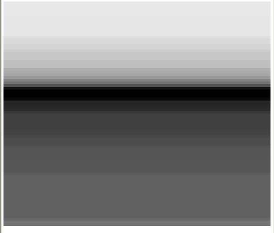
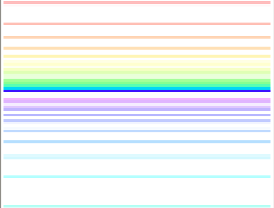
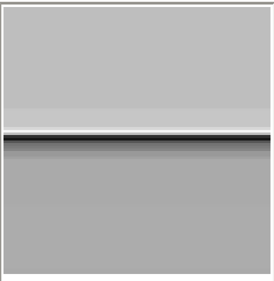
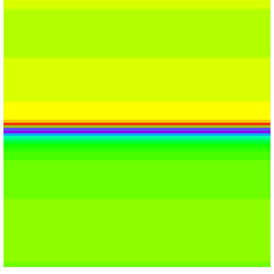
WWW conversion by Ian Brayshaw

2.2.2b Variation in fault dip direction of low susceptibility footwall faults (continued)

2.2.2

This sequence shows the affect of a fault which has a low susceptibility footwall block and a high susceptibility hangingwall block. Other orientations are not shown as reduced to pole images would simply vary by rotation. The images show the variation in display formats between grey scale and pseudocolour look up tables, and colour contours, and the differences between folds at magnetic inclinations of -50° and -90°, together with first vertical derivative images at the pole.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Grey Scale	Pseudo Colour	Contours
Faults dipping to 000 (North) -- Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE
Faults dipping to 000 (North) -- Magnetics at an inclination of -50°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE
Faults dipping to 000 (North) -- Magnetics at an inclination of -50°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 000 (North) -- First Vertical Derivative	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scales
foot wall $\rho = 0$ $\kappa = 0$ hanging wall $\rho = 1$ $\kappa = 10^{-2}$ Image width 10,000 m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flying height 80 m	max min max min

All models created using Noddy

WWW conversion by Ian Brayshaw

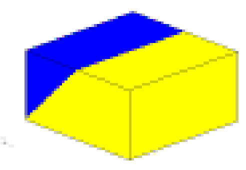
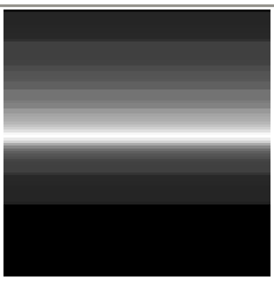
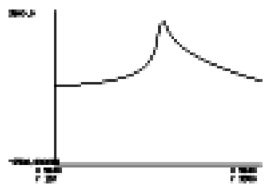
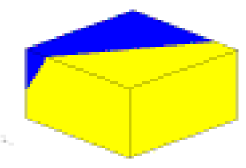
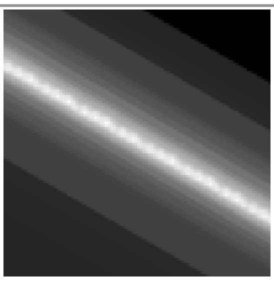
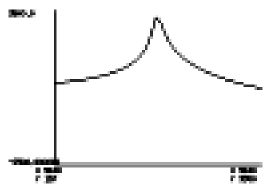
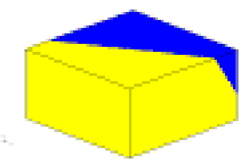
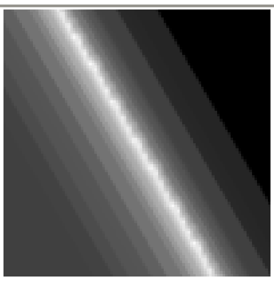
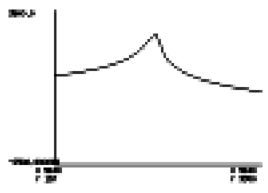
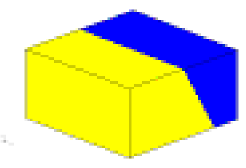
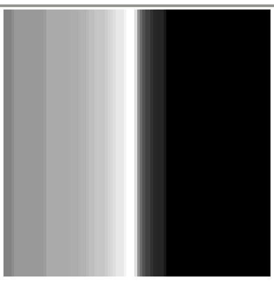
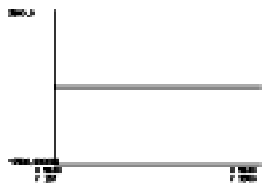
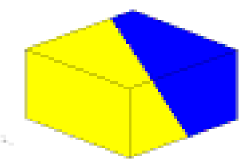
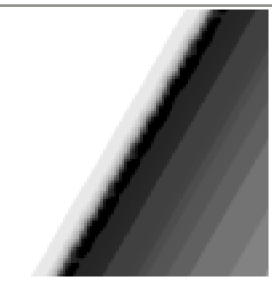
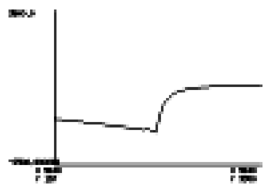
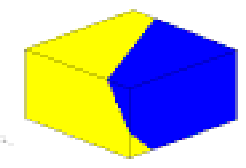
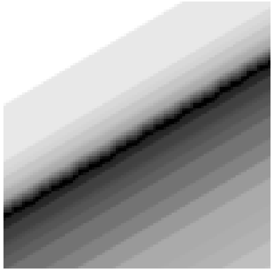
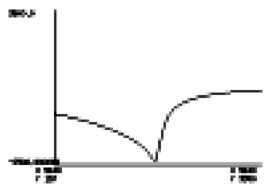
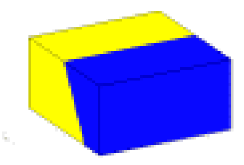
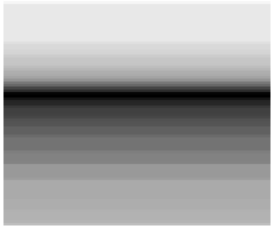
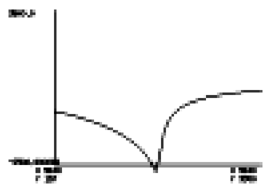
2.2.3 Variation in fault dip direction of high susceptibility footwall faults

2.2.3b

This sequence shows the affect of varying the fault dip direction for faults which have a high susceptibility footwall block. Since these are essentially two-dimensional models, South to North profiles through the centre of the block are also provided.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Magnetics	South Intensity North
Faults dipping to 000 (North)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 030	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 060	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 090 (East)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 120	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 150	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 180 (South)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scale
foot wall $\kappa = 10^{-2}$ hanging wall $\kappa = 0$ Image width 10,000 m	Inclination -50° Intensity 50,000 gamma Flying height 80 m	max min

All models created using Noddy

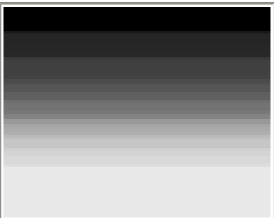
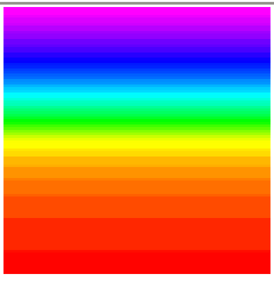
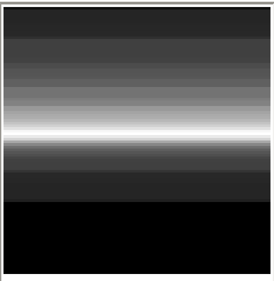
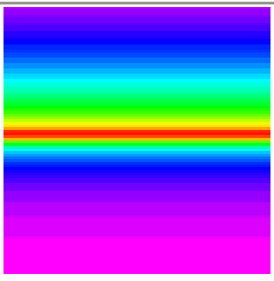
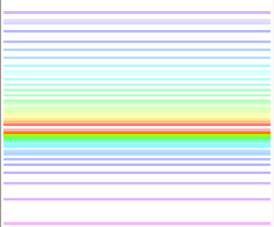
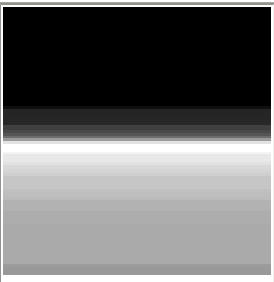
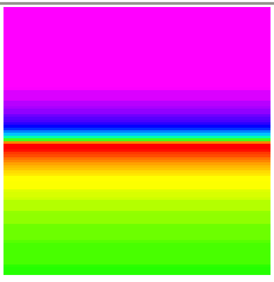
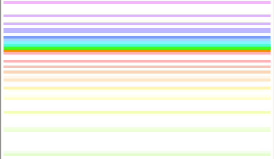
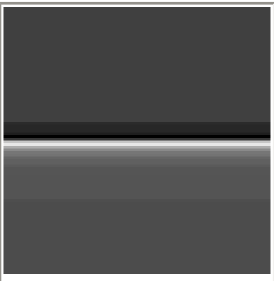
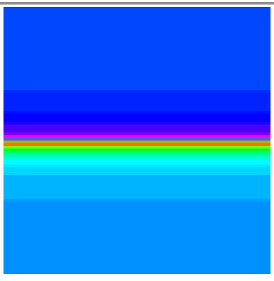
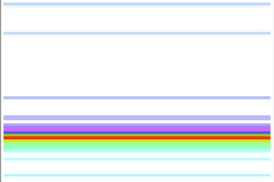
WWW conversion by Ian Brayshaw

2.2.3b Variation in fault dip direction of high susceptibility footwall faults (continued)

2.2.3

This sequence shows the affect of a fault which has a high susceptibility footwall block. Other orientations are not shown as reduced to pole images would simply vary by rotation. The images show the variation in display formats between grey scale and pseudocolour look up tables, and colour contours, and the differences between folds at magnetic inclinations of -50° and -90°, together with first vertical derivative images at the pole.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Grey Scale	Pseudo Colour	Contours
Faults dipping to 000 (North) -- Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	LOAD JPEG IMAGE
Faults dipping to 000 (North) -- Magnetics at an inclination of -50°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 000 (North) -- Magnetics at an inclination of -90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping to 000 (North) -- First Vertical Derivative	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scales
foot wall $\rho = 1$ $\kappa = 10^{-2}$ hanging wall $\rho = 0$ $\kappa = 0$ Image width 10,000 m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flying height 80 m	max [grey scale] min max [colour scale] min

All models created using Noddy

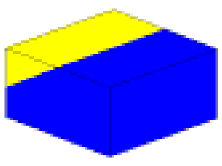
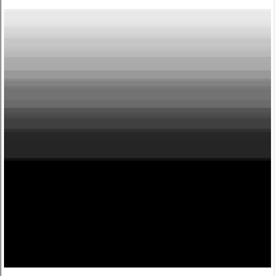
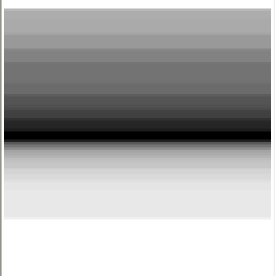
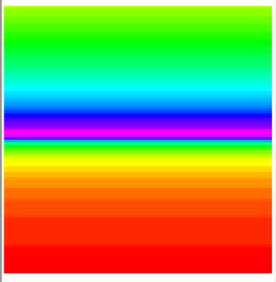
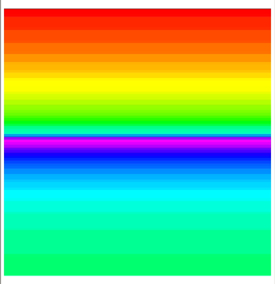
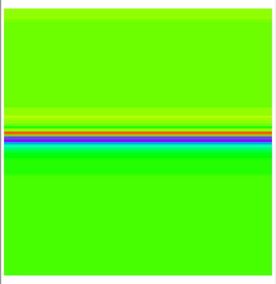
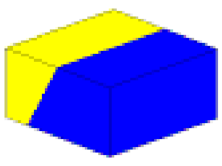
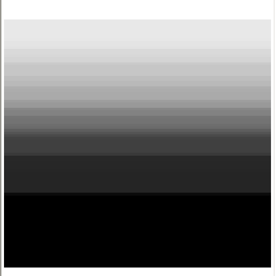
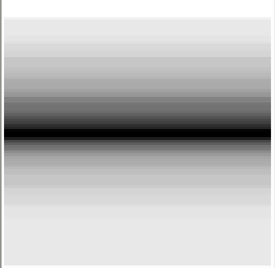
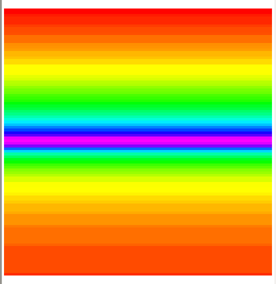
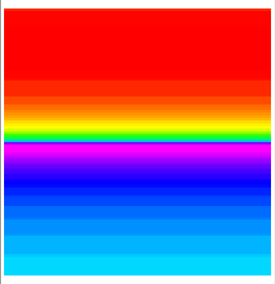
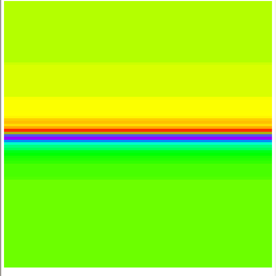
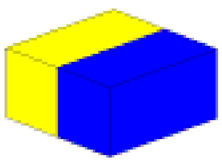
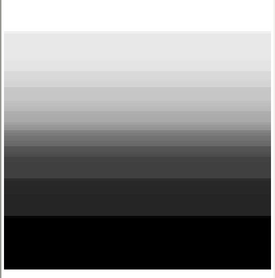
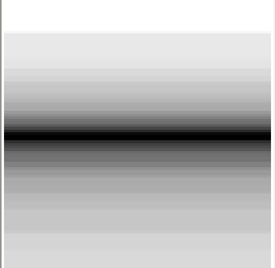
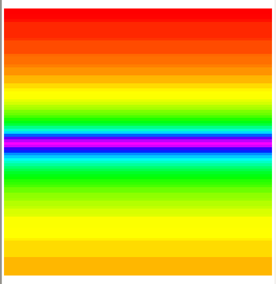
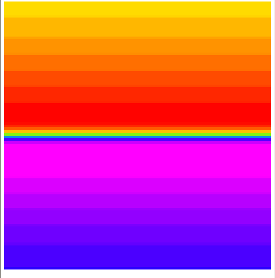
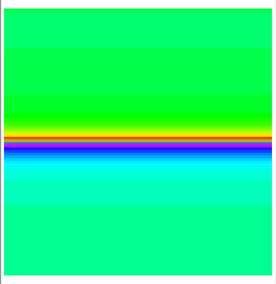
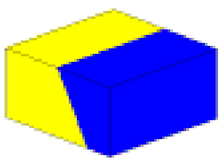
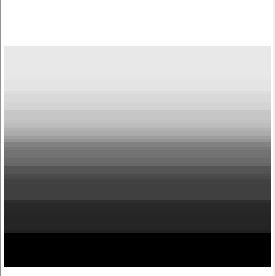
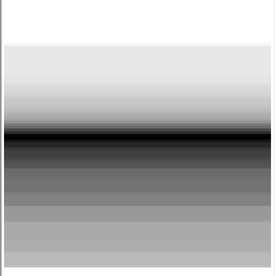
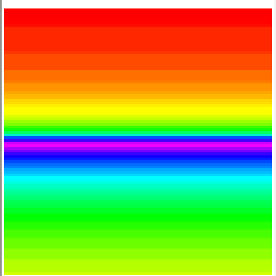
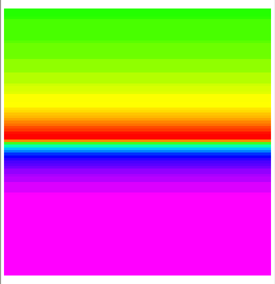
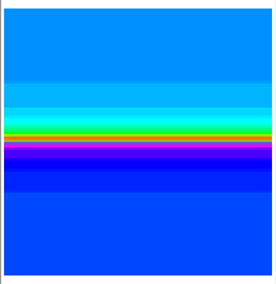
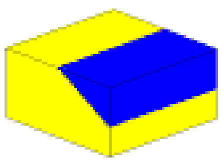
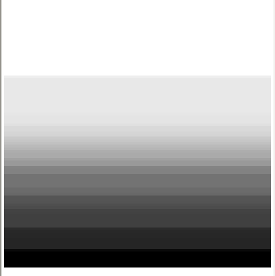
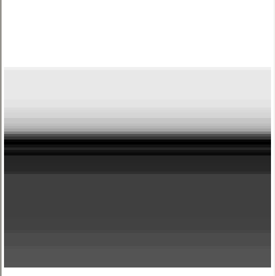
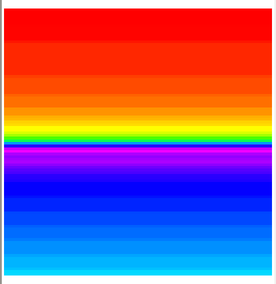
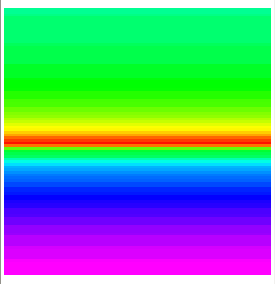
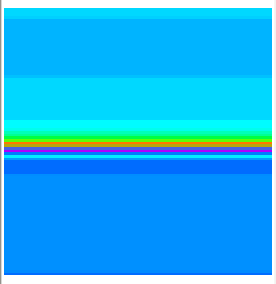
WWW conversion by Ian Brayshaw

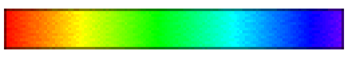
2.2.4 Variation in fault dip

This sequence shows the affect of varying the fault dip direction for faults with a high susceptibility and density block to the North.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Faults dipping 30° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping 60° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping 90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping 60° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Faults dipping 30° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scales
North Block $\rho = 3.5$ $\kappa = 10^{-2}$ South Block $\rho = 2.5$ $\kappa = 10^{-4}$ Image width 10,000 m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flying height 80 m	max  min max  min

All models created using Noddy

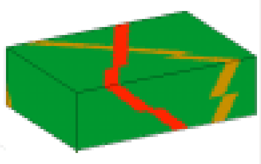
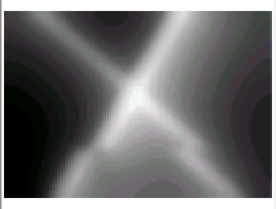
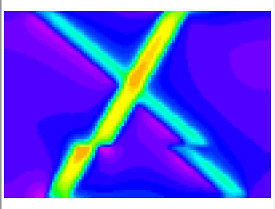
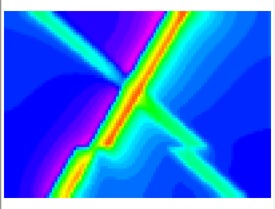
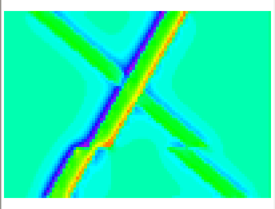
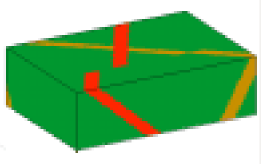
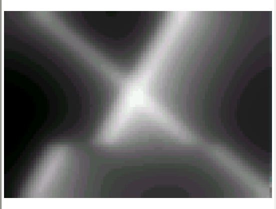
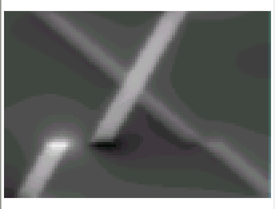
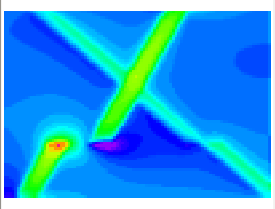
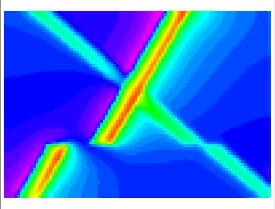
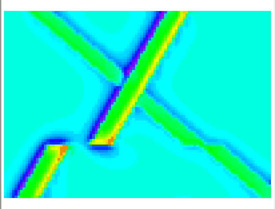
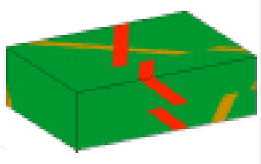
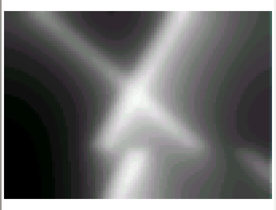
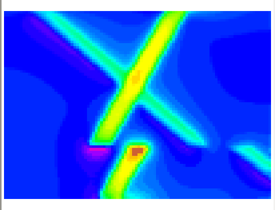
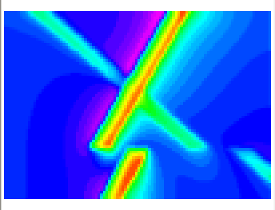
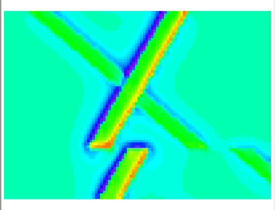
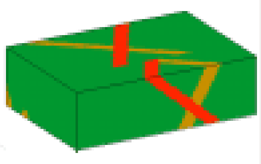
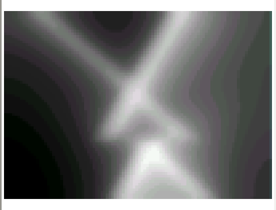
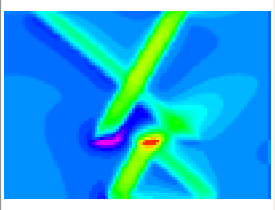
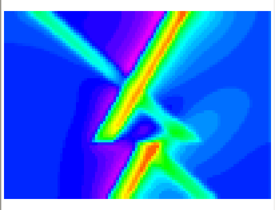
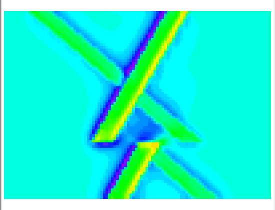
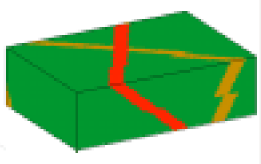
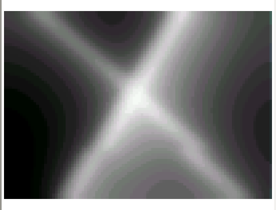
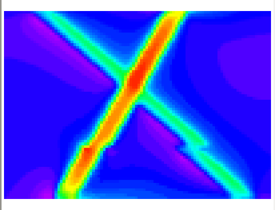
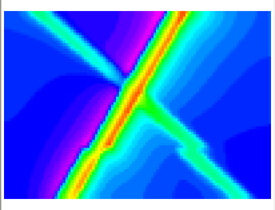
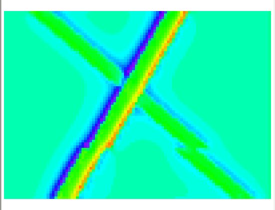
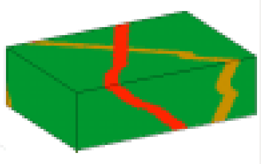
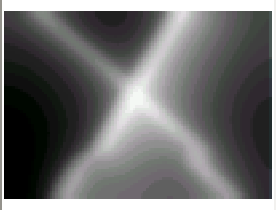
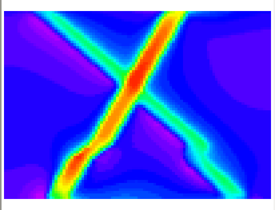
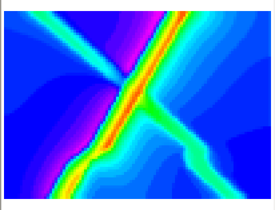
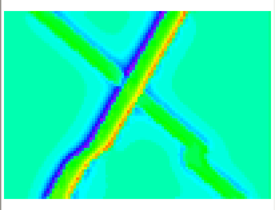
WWW conversion by Ian Brayshaw

2.2.5 Interpretating fault offsets

These images demonstrate the difficulties in determining true offsets (or even projected offsets), simply based on outcrop patterns. A model with 2 dipping dykes is faulted by an East-West striking translational fault with the same magnitude of slip, but variations in dip, dip direction, and the direction of slip movement.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Fault dipping 40° to South, down slip vector, normal fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the uniform apparent senses of movement of the two dykes.					
Fault dipping 40° to North, down slip vector, normal fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the apparent opposite senses of movement of the two dykes.					
Faults dipping 40° to South, horizontal slip vector, sinistral fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the uniform apparent senses of movement of the two dykes, and that the movement appears to be sinistral on the top surface, and dextral on the front surface of the block.					
Fault dipping 80° to South, down slip vector, normal fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the apparent opposite senses of movement of the two dykes.					
Faults dipping 40° to South, slip vector 10° off down dip to East	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Notice the uniform apparent senses of movement of the two dykes. In this model the actual projected slip vector is sinistral, but the apparent offsets on the top surface are dextral.					
Shear zone dipping 40° to South, down slip vector, normal fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Earth's Magnetic Field	Scales
Dyke $\rho = 1$ $\kappa = 10^{-2}$	Inclination -50° or -90°	max (greyscale) min
Background $\rho = 0$ $\kappa = 1$	Intensity 50,000 or 70,000 gamma	max (colour) min
Image width 10,000 m	Flying height 80 m	

All models created using Noddy

WWW conversion by Ian Brayshaw

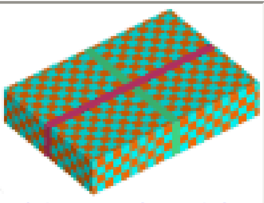
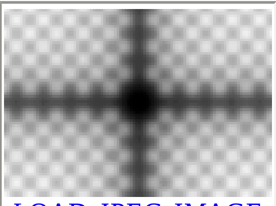
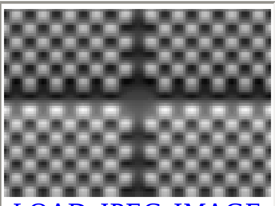
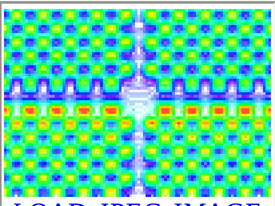
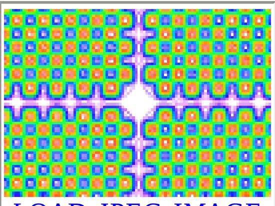
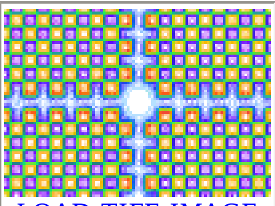
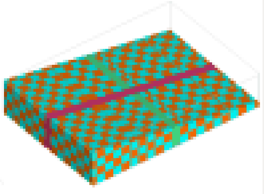
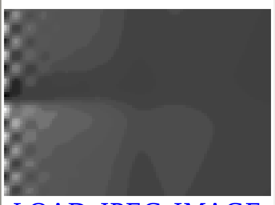
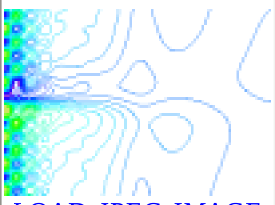
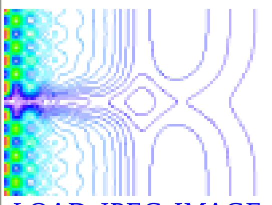
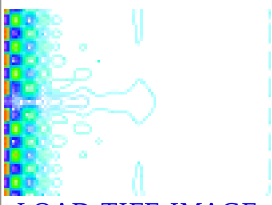
2.3 Unconformity Geometries

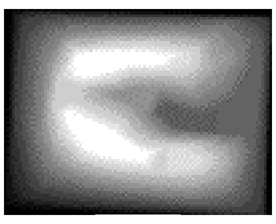
These models show the effect of low susceptibility/low density cover overlaying a regular chequerboard pattern or uniform high susceptibility structures in the basement.
The basement is taken from the models in Appendix A.

Block models viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

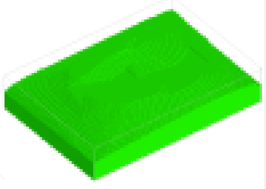
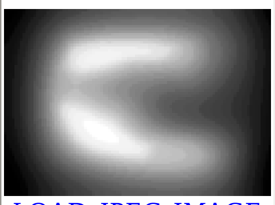
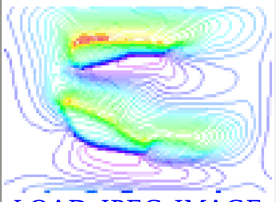
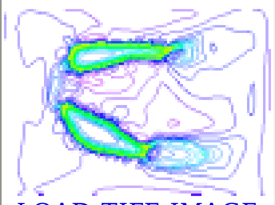
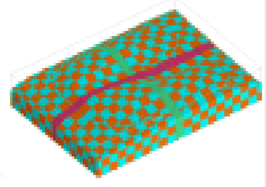
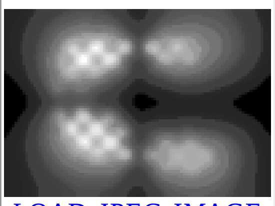
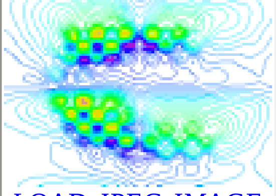
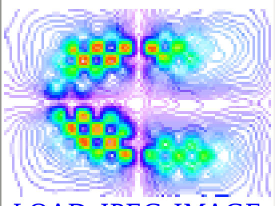
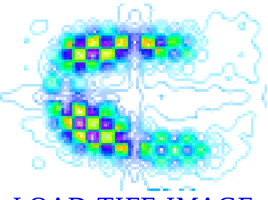
In order to use these history files you will also need to download the following three files!
uncon2.dxf chequer.g00 chequer.g12

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Chequerboard pattern with no overlying cover	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE
Chequerboard pattern with low susceptibility/density overlying cover, unconformity dipping at 10° to East.	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE



LOAD JPEG IMAGE

Image of the topography of unconformity surface used in next two models. Brighter areas have unconformity surface closer to land surface. Total range is 250 m.

Uniform high susceptibility/density rock with low susceptibility/density overlying cover, unconformity defined by buried land surface with 250 m topography.	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE
Chequerboard pattern with low susceptibility/density overlying cover, unconformity defined by buried land surface with 250 m topography.	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD TIFF IMAGE

Key		Survey Parameters		Scales
cover	$\kappa = 10^{-4}$ $\rho = 2.5$	Inclination	-50° or -90°	max (grey scale) min
basement layer	$\kappa = 10^{-3}$ $\rho = 2.5$ & 3.5	Intensity	50,000 or 70,000 gamma	max (colour scale) min
image width	10,000 m	Flight height	80 m	

All models created using Noddy

WWW conversion by Ian Brayshaw

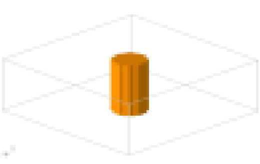
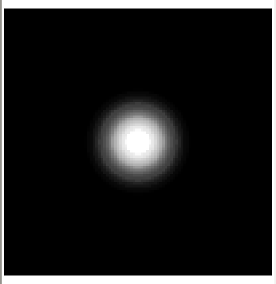
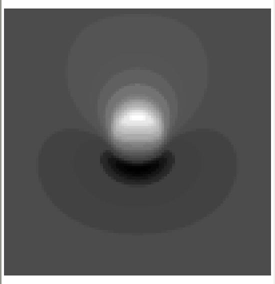
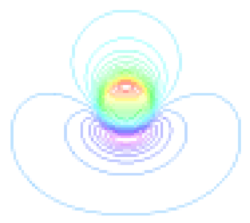
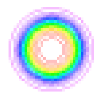
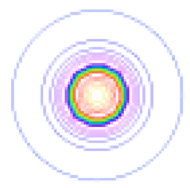
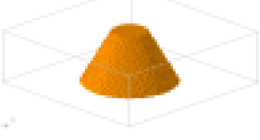
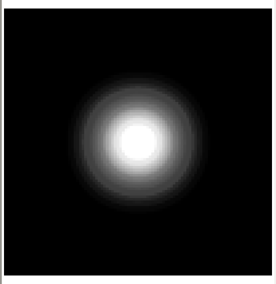
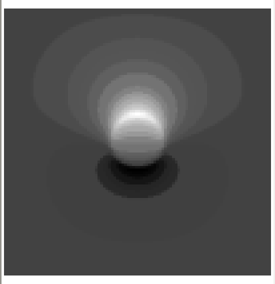
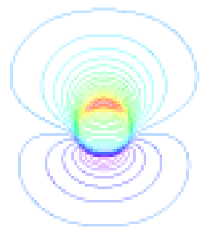
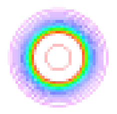
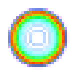
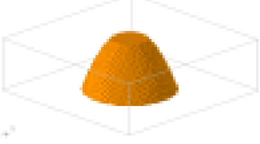
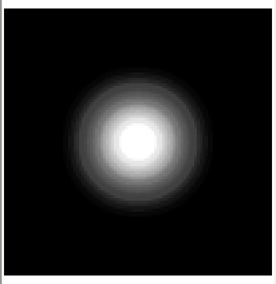
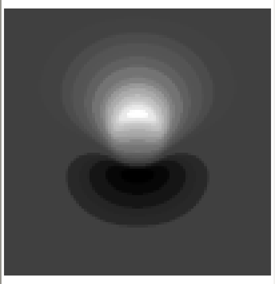
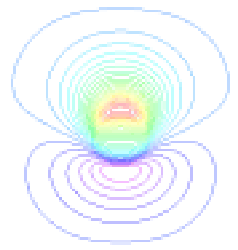
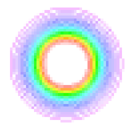
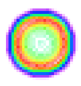
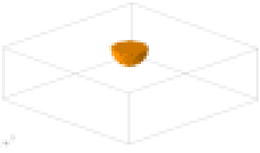
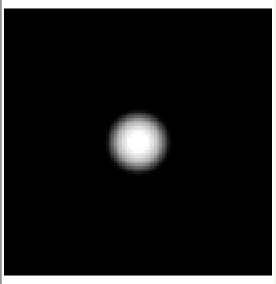
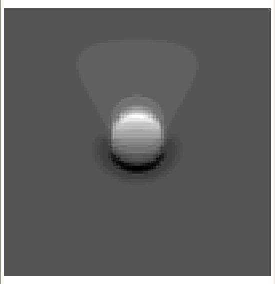
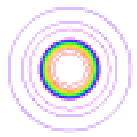
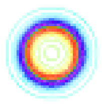
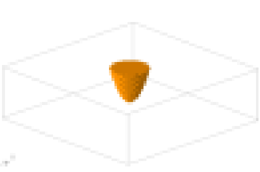
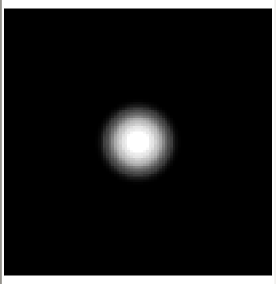
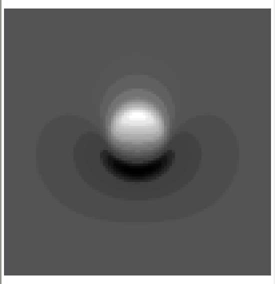
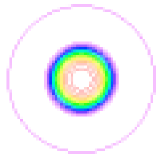
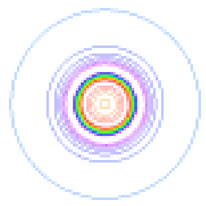
2.4.1 Simple Plug Geometries

These models all result in 1000 m radius circular outcrops, but have significantly different sub-surface geometries. The lack of obvious differences between the results suggest that careful modelling of the data would have to be carried out to distinguish between these cases.

Block models are viewed from SE.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Summary wavelet transform animation comparing 4 different geometries

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Upright Circular Cylinrical Plug	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Truncated Circular Conic Plug	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Truncated Parabolic Plug	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Truncated Spherical Plug	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Truncated Inverted Parabolic Plug	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Survey Parameters	Scales
plug ρ = 1 κ = 10^{-2} background ρ = 0 κ = 0 image width 10,000 m	Inclination -50° Intensity 50,000 or 70,000 gamma Flight height 200 m	max [greyscale] min max [colour scale] min

All models created using Noddy

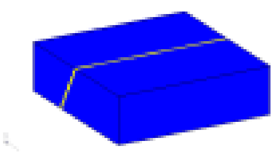
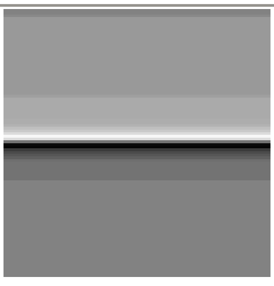
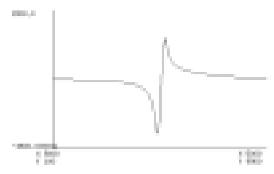
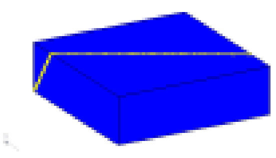
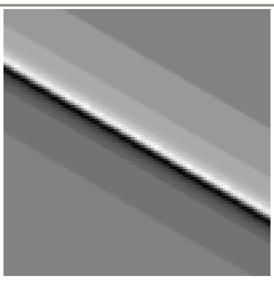
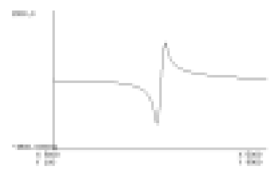
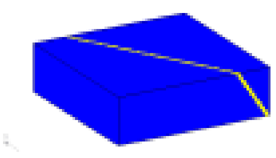
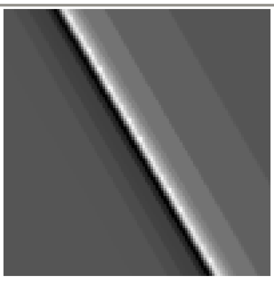
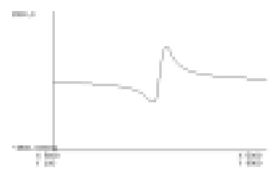
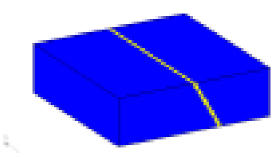
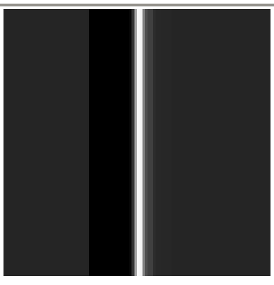
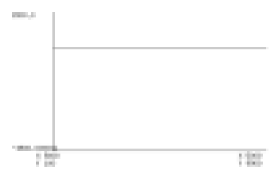
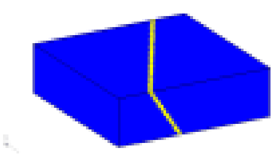
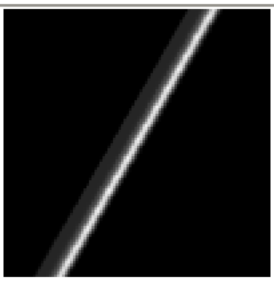
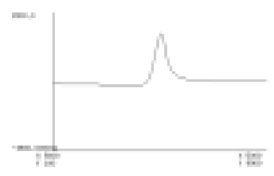
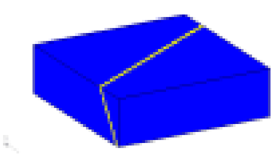
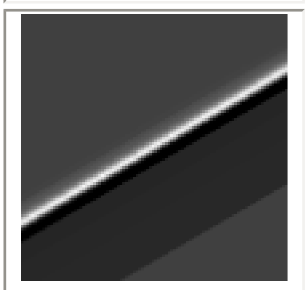
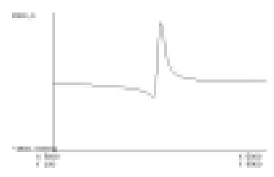
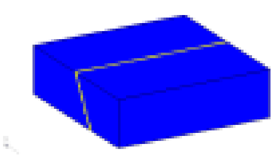
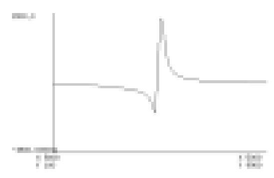
WWW conversion by Ian Brayshaw

2.4.2 Variation in Dip Direction for a Thin Dyke

2.4.2b

This sequence shows the affect of varying the dip direction for a 200 m thick dyke. Since these are essentially two-dimensional models, South to North profiles are also provided. All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Magnetics	South Intensity North
Dyke dipping to 000 (North)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 030	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 060	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 090	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 120	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 150	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 180 (South)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key		Survey Parameters		Scale
dyke	$\rho = 1$ $\kappa = 10^{-2}$	Inclination	-50°	max [gradient] min
background	$\rho = 0$ $\kappa = 0$	Intensity	50,000 gamma	
image width	10,000 m	Flight height	80 m	

All models created using Noddy

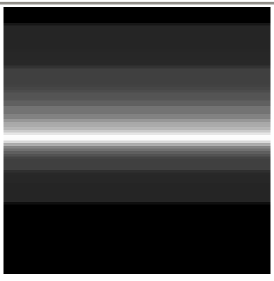
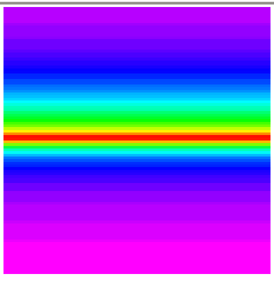
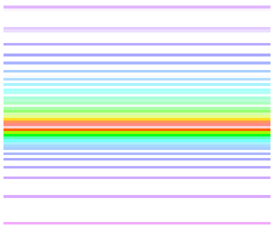
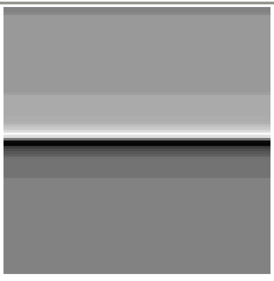
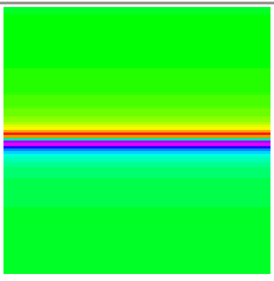
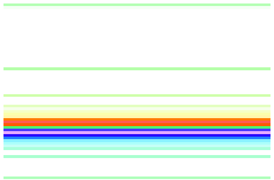
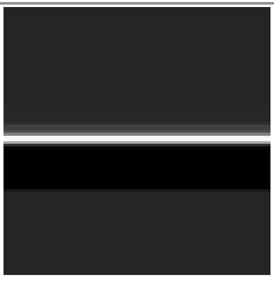
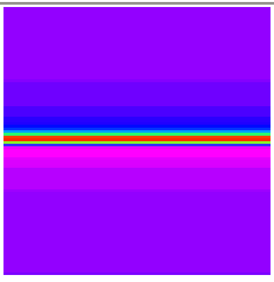
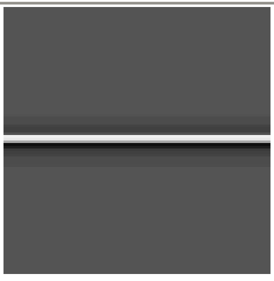
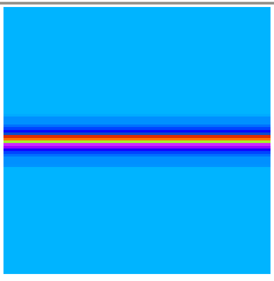
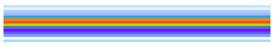
WWW conversion by Ian Brayshaw

2.4.2b Variation in Dip Direction for a Thin Dyke (continued)

2.4.2

This sequence shows the affect of a 200 m dyke. Other images are not shown as reduced to the pole images would only vary by rotation. The images show the variation in display formats between grey scale and psuedocolour look up tables, and colour contours, and the differences between folds at an inclination of -50° and -90°, together with first vertical derivative images at the pole.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Grey Scale	Pseudo Colour	Contours
Dyke dipping to 000 (North) Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 000 (North) Magnetics at an inclination of -50°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 000 (North) Magnetics at an inclination of -90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping to 000 (North) First Vertical Derivative	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Survey Parameters	Scales
dyke $\rho = 1$ $\kappa = 10^{-2}$ background $\rho = 0$ $\kappa = 0$ image width 10,000 m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max (grey scale) min max (colour scale) min

All models created using Noddy

WWW conversion by Ian Brayshaw

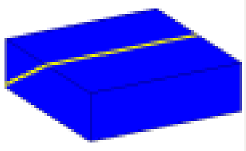
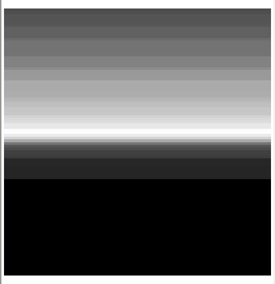
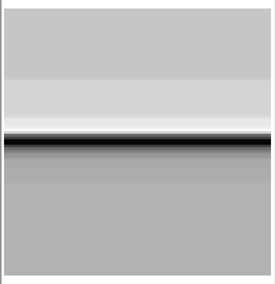
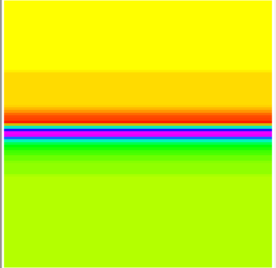
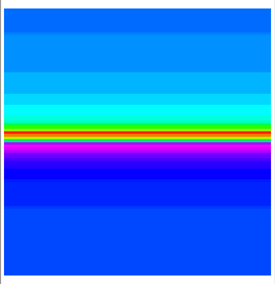
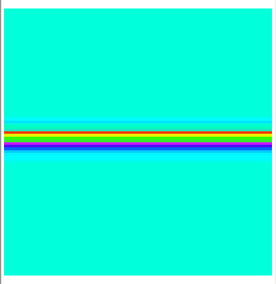
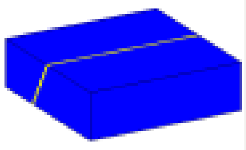
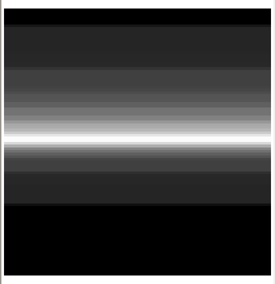
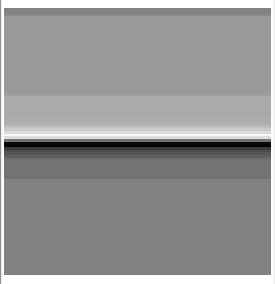
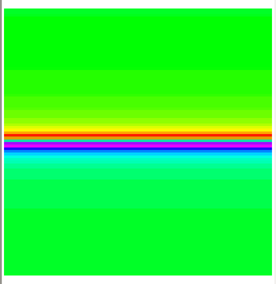
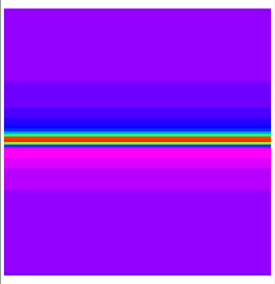
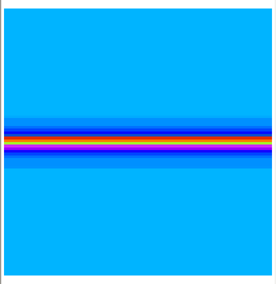
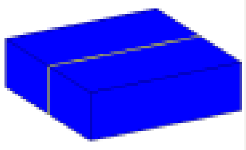
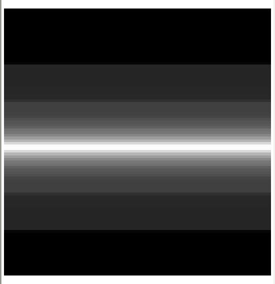
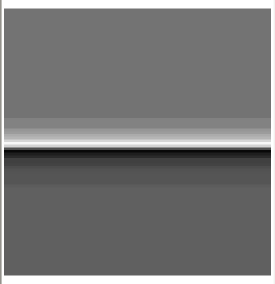
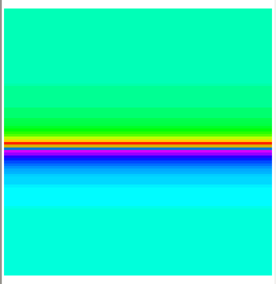
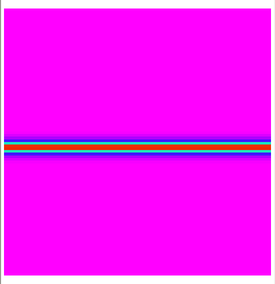
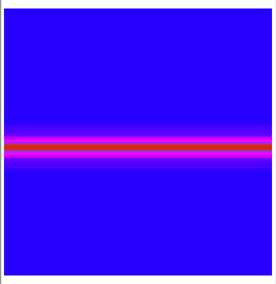
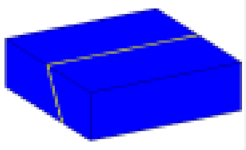
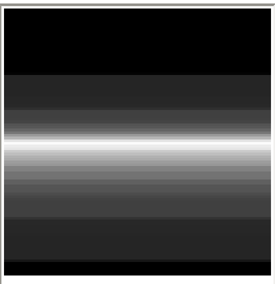
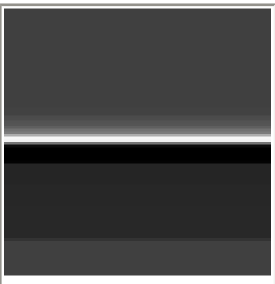
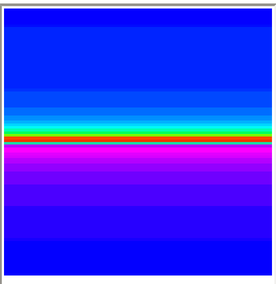
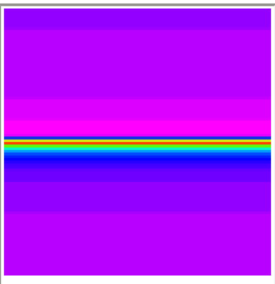
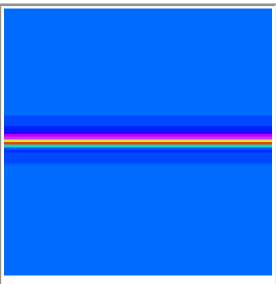
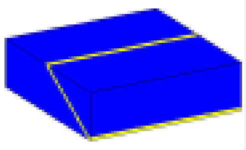
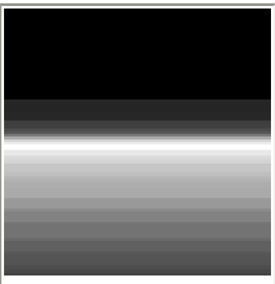
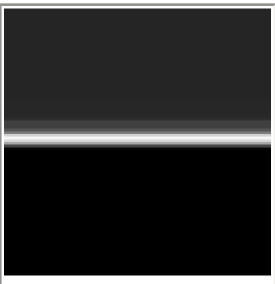
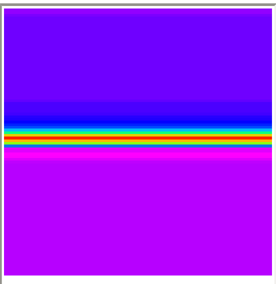
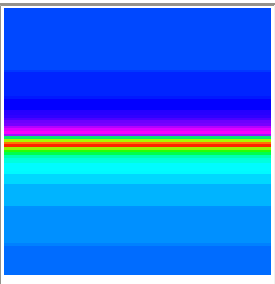
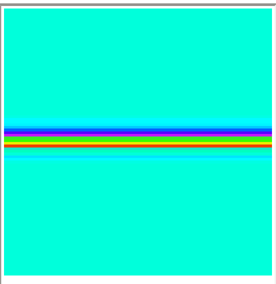
2.4.3 Variation in dyke dip

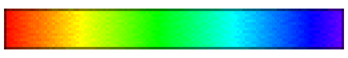
This sequence shows the affect of varying the dip of a 200 m thick EW striking dyke.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Summary wavelet transform animation comparing 3 different dips

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Dyke dipping 30° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping 60° to North	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping 90°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping 60° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Dyke dipping 30° to South	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Survey Parameters	Scales
dyke $\rho = 1$ $\kappa = 10^{-2}$ background $\rho = 0$ $\kappa = 0$ image width 10,000 m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max  min max  min

All models created using Noddy

WWW conversion by Ian Brayshaw

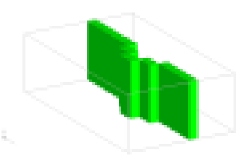
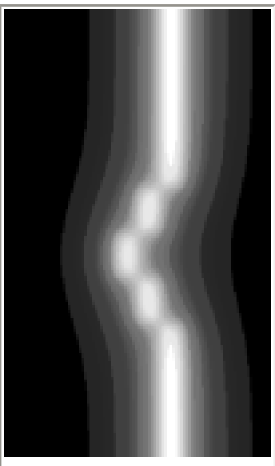
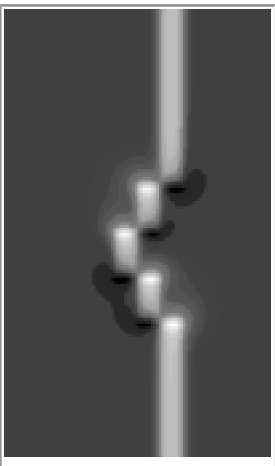
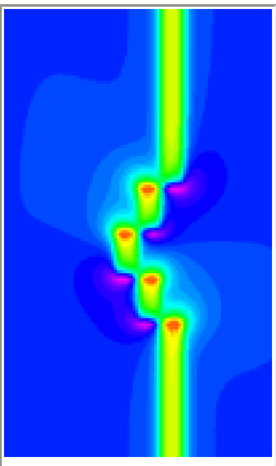
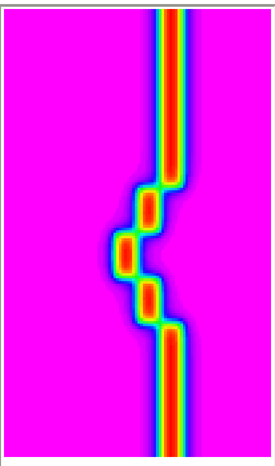
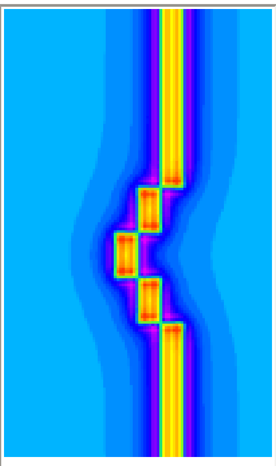
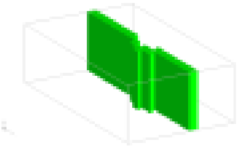
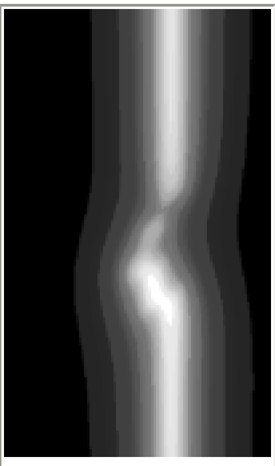
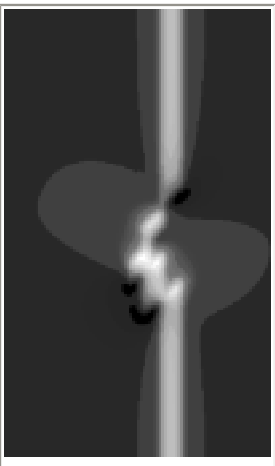
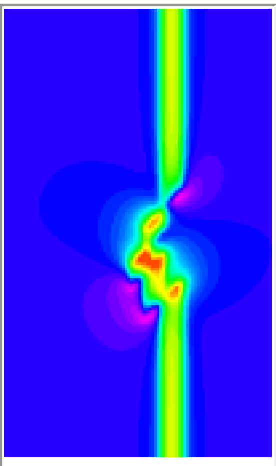
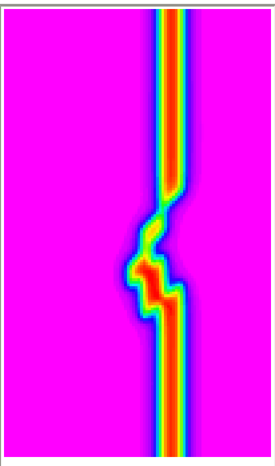
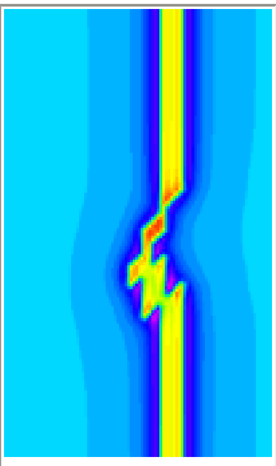
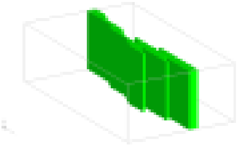
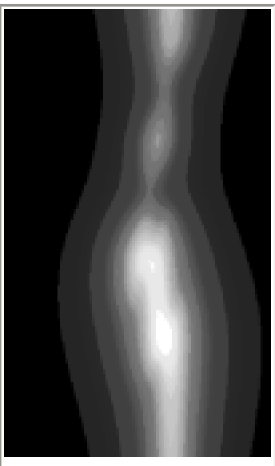
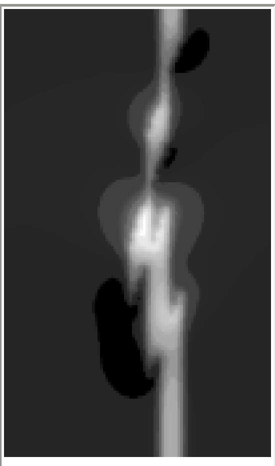
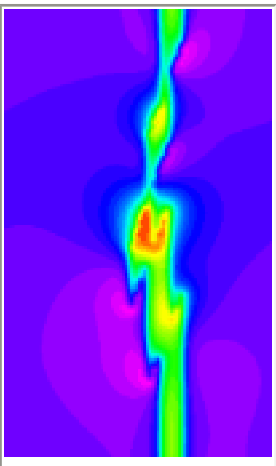
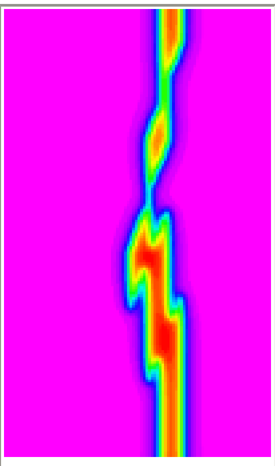
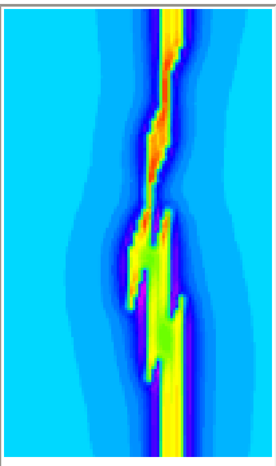
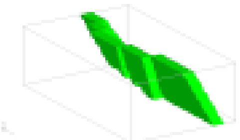
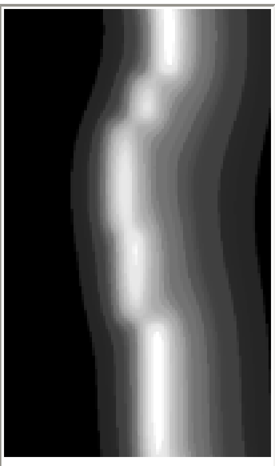
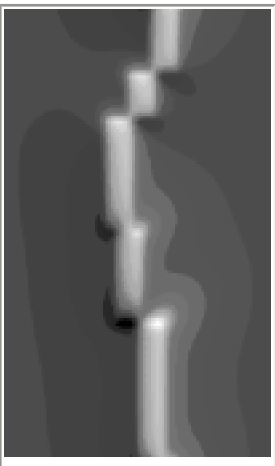
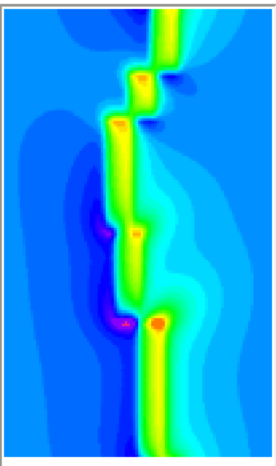
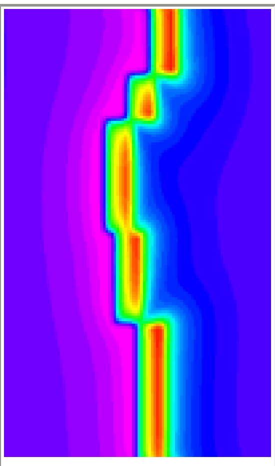
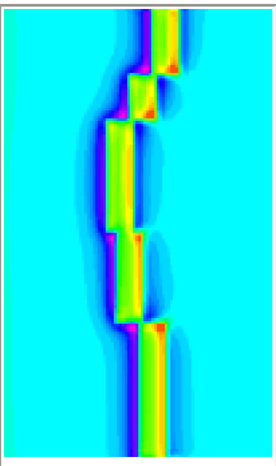
Atlas of
Structural Geophysics II

3.1 Faulted dyke

These models demonstrate the effects of varying the fault orientation with respect to a vertical dyke, and the ease with which the fault orientations cand displacements can be recognised.

All block diagrams are viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Faults at 90° to dyke	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this model the apparent offsets are quite clear, although the results of section 2.2.5 show that the true offsets cannot actually be determined from this data.					
Faults at 45° to dyke	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this case the fault positions are still quite clear in the magnetic data					
Faults at 20° to dyke	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In these images the fault positions and orientations start to become unclear, and the variations in dyke appearance along strike could be interpreted as thickness variations or rock property variations.					
Faults at 60° to dyke, dipping at 60°	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	This model re-emphasises the problem with reinterpreting true fault offsets from faults cutting a single marker horizon. (See section 2.2.5 for further examples.)					

Key	Survey Parameters	Scales
dyke ρ = 1 κ = 10^{-2} background ρ = 0 κ = 0 image width 10,000 m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max (greyscale) min max (colour) min

All models created using Noddy

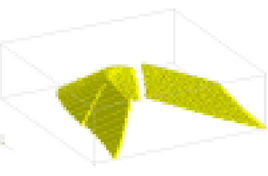
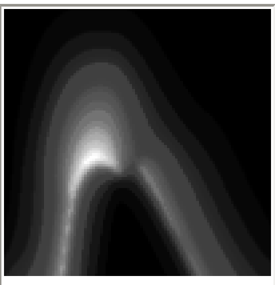
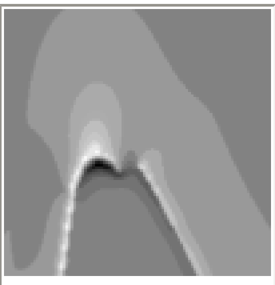
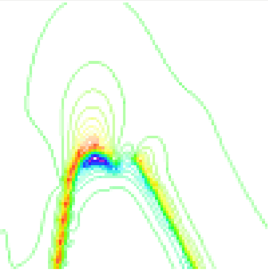
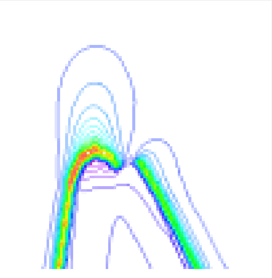
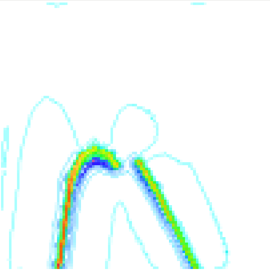
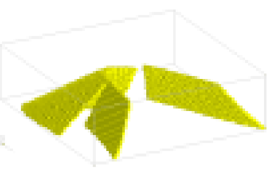
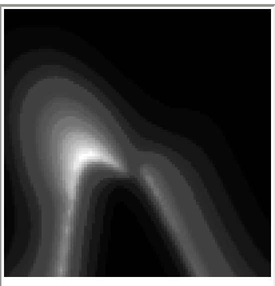
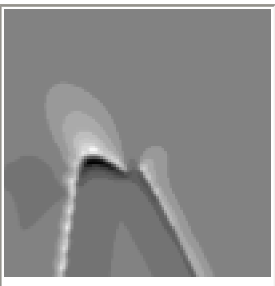
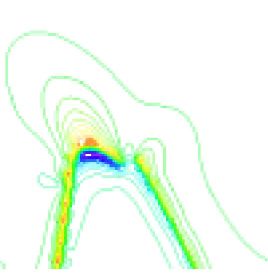
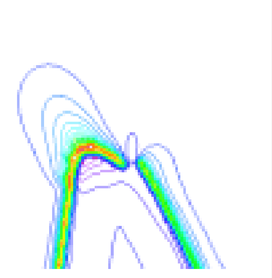
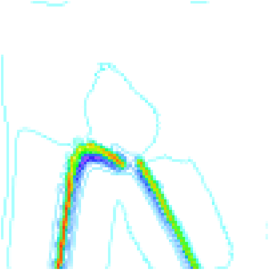
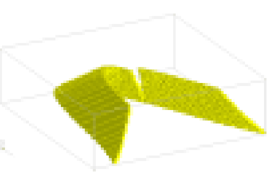
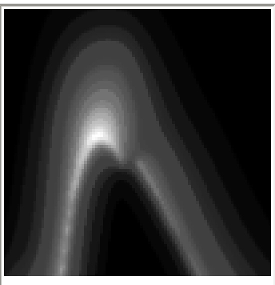
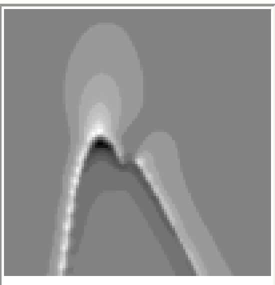
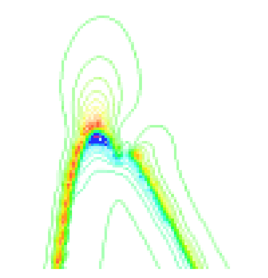
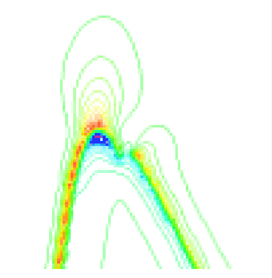
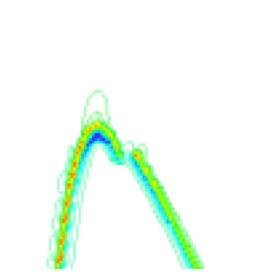
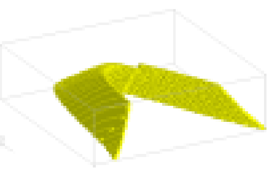
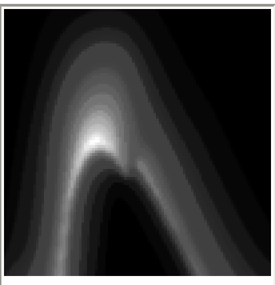
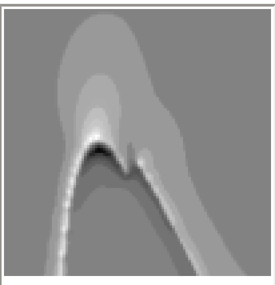
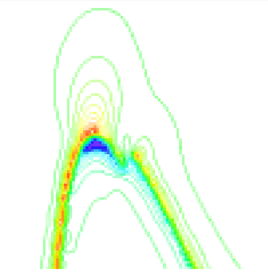
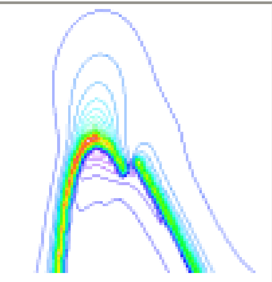
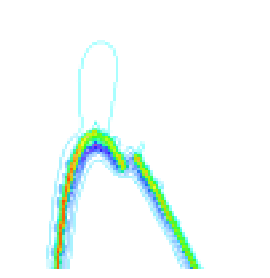
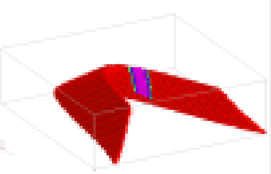
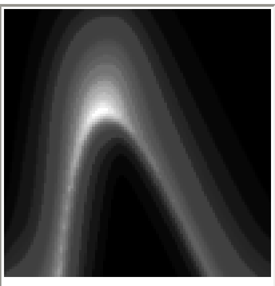
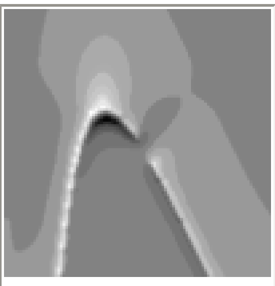
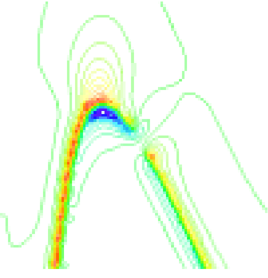
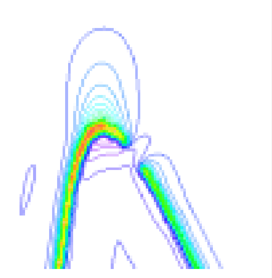
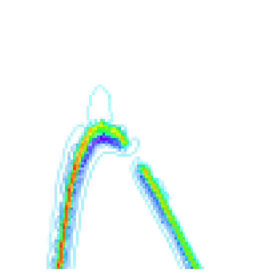
WWW conversion by Ian Brayshaw

3.2 Faulted Fold

These models demonstrate another aspect of the ambiguities that may arise when interpreting folds. In each model a single fault cuts through the nose of a plunging anticline, producing offset on one side of the fold but not on the other. A number of different fault geometries are shown which all result in similar outcrop geometries. It is likely that only mapping at the outcrop scale (of slickenside lineations of fault trace for example) would enable one to distinguish between these models.

All block diagrams viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Oblique Slip Translational fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this model we have a simple translational fault in which the slip vector is approximately parallel to the dip of the west limb of the fold, so that the offset is only apparent in the east limb.					
Scissor fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this model the north block is rotated clockwise around a point at the surface near where the fault cuts the west limb, so again the west limb appears to be un-displaced.					
Variable displacement fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Here the fault displacement decays towards the west, so that by the time the fault plane reaches the west limb, the amount of displacement is minimal.					
Curved fault	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Here the fault starts off cutting through the east limb of the fold and then swings around parallel to the layering as it reaches the west limb, so no offest occurs.					
Alteration zone around a fracture	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this case we have a fracture with no displacement, and instead an alteration zone around the fracture causes the disruption in the east limb (which could be misinterpreted as a fault offset).					

Key	Survey Parameters	Scales
plug $\rho = 1$ $\kappa = 10^{-2}$ background $\rho = 0$ $\kappa = 0$ image width 10,000 m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flight height 80 m	max (greyscale) min max (colour) min

All models created using Noddy

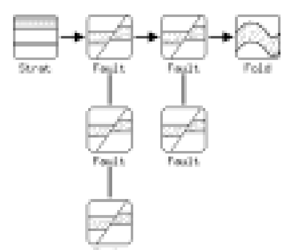
3.3 Basin Setting (Flat-lying sediments)

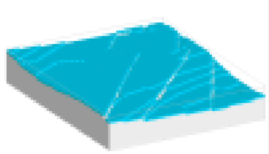
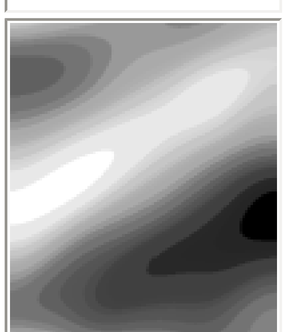
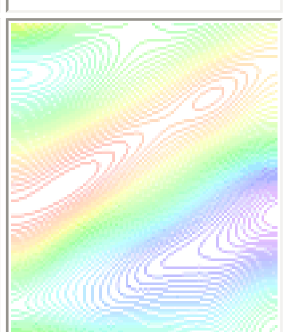
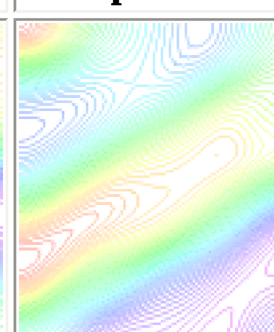
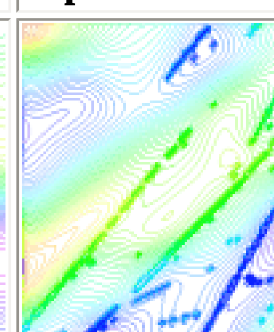
Very gently folded sediments cut by high angle normal and transfer faults. For example, North-West Shelf of Australia. The blue high susceptibility/high density layer is 100m thick.

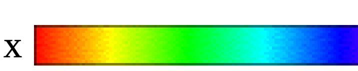
Block is viewed from SW.

Click on the images to launch Noddy. A legend is provided at the end of this page.

The icon below shows the deformation history used for this model.



Link	Block	Gravity	Magnetics	Magnetics	Magnetics at pole	Magnetics at pole 1VD
	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

Key	Survey Specifications	Scales
layer $\rho = 1$ $\kappa = 10^{-2}$ background $\rho = 0$ $\kappa = 0$ image width 10,000m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flying height 80m	max  min max  min

All models created using Noddy

WWW conversion by Ian Brayshaw

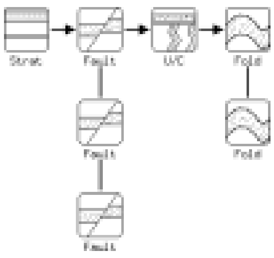
3.4 Block faulted, rifted and folded region

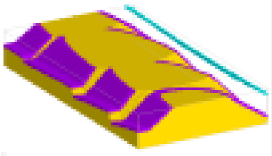
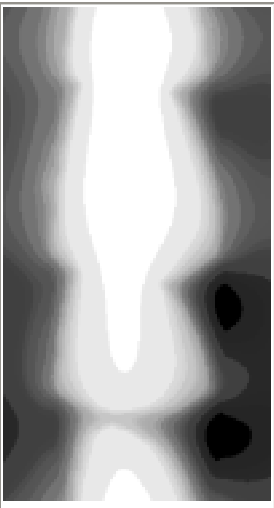
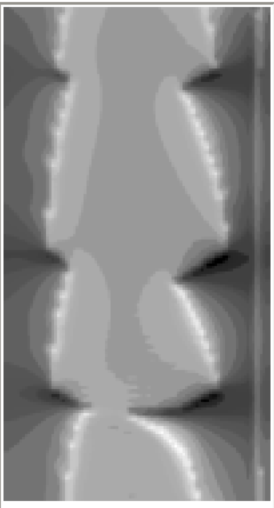
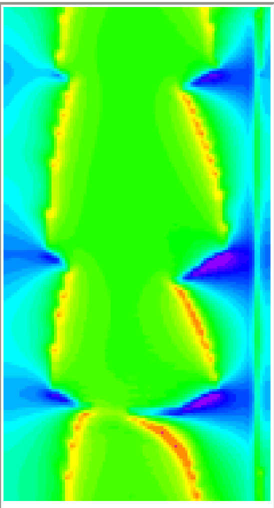
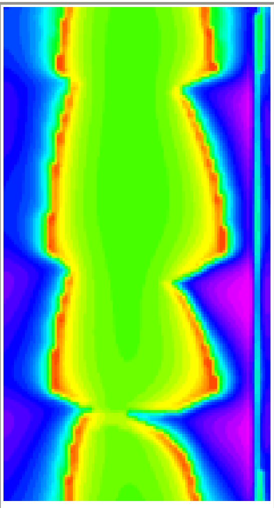
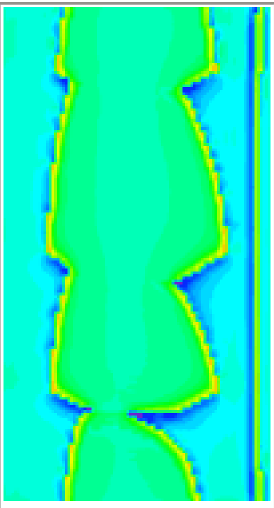
This model shows a set of East-West striking growth faults which have subsequently been overlain by a flat unconformity and then folded around a North-South trending anticline. For example, the Leichardt River Fault Trough, Mt Isa, Australia.

Block is viewed from SW.

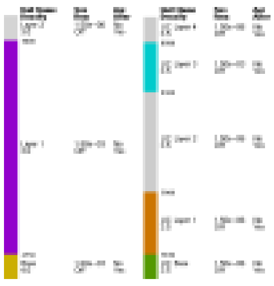
Click on the images to launch Noddy. A legend is provided at the end of this page.

The icon below shows the deformation history used for this model.



Link	Block	Gravity	Magnetics	Magnetics	Magnetics at pole	Magnetics at pole 1VD
	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

The following details the rock properties.



Key	Survey Specifications		Scales
image width 10,000m	Inclination	-50o or -90o	max min
	Intensity	50,000 or 70,000 gamma	max min
	Flying height	80m	

All models created using Noddy

WWW conversion by Ian Brayshaw

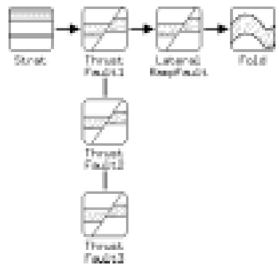
3.5 Fold & Thrust setting

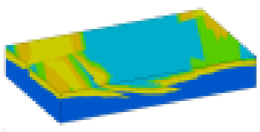
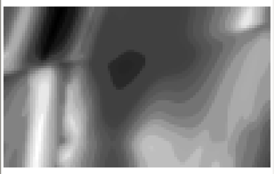
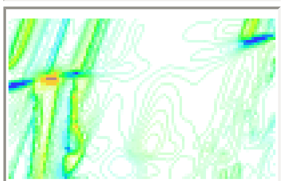
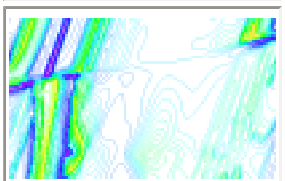
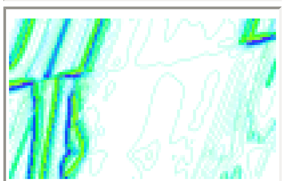
Thrusted sequence with ramp anticlines and late gentle folding. For example, the Rocky Mountains, Nth America.

Block diagram viewed from SW.

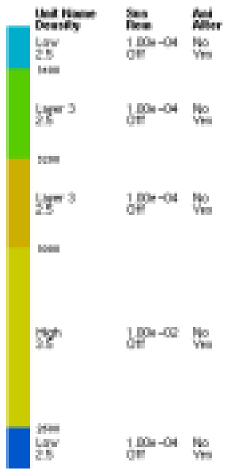
Click on the images to launch Noddy. A legend is provided at the end of this page.

The icon below shows the deformation history used for thie model.



Link	Block	Gravity	Magnetics	Magnetics	Magnetics at pole	Magnetics at pole 1VD
	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

The following details the rock properties.



Key	Survey Specifications	Scales
image width 20,000m	Inclination -50° or -90° Intensity 50,000 or 70,000 gamma Flying height 80m	max  min max  min

All models created using Noddy

WWW conversion by Ian Brayshaw

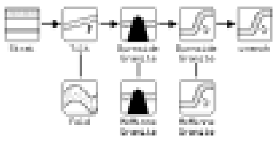
3.6 Dome and Basin setting

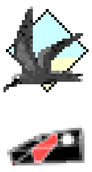
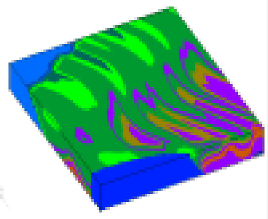
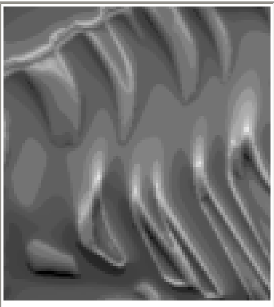
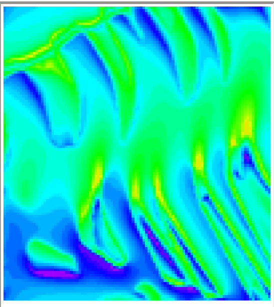
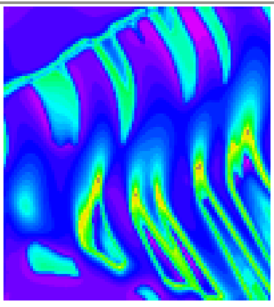
The dome and basin pattern is in this case produced by the interaction between early North-South trending folds with a later buttressing against a pair of granites. For example, Pine Creek Geosyncline, Northern Territory, Australia.

Block viewed from SW.

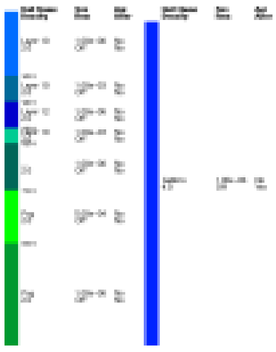
Click on the images to launch Noddy. A legend is provided at the end of this page.

The icon below shows the deformation history used for this model.



Link	Block	Magnetics	Magnetics	Magnetics at pole	Magnetics at pole 1VD
	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE

The following details the rock properties.



Key	Survey Specifications		Scales
image width 14,000m	Inclination	-50o or -90o	max [greyscale] min
	Intensity	50,000 or 70,000 gamma	max [colour scale] min
	Flying height	80m	

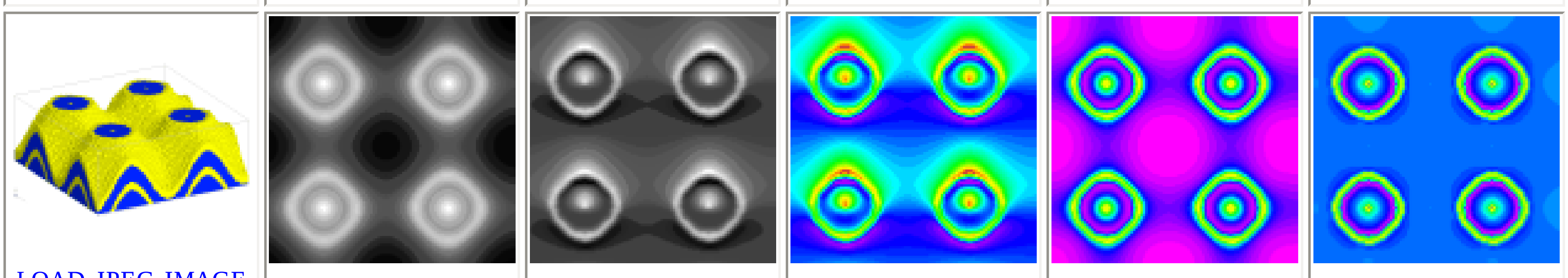
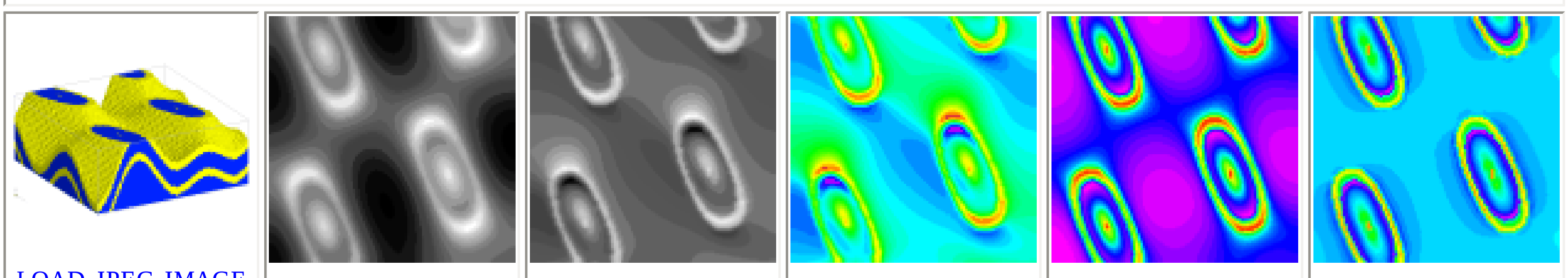
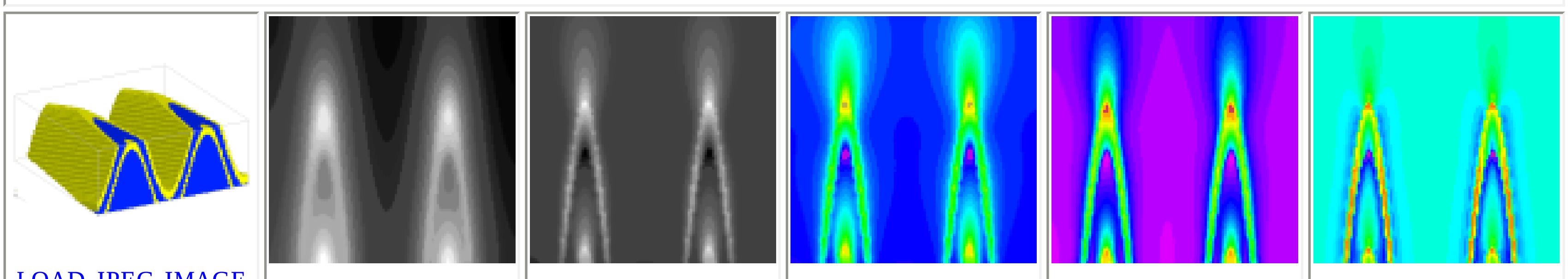
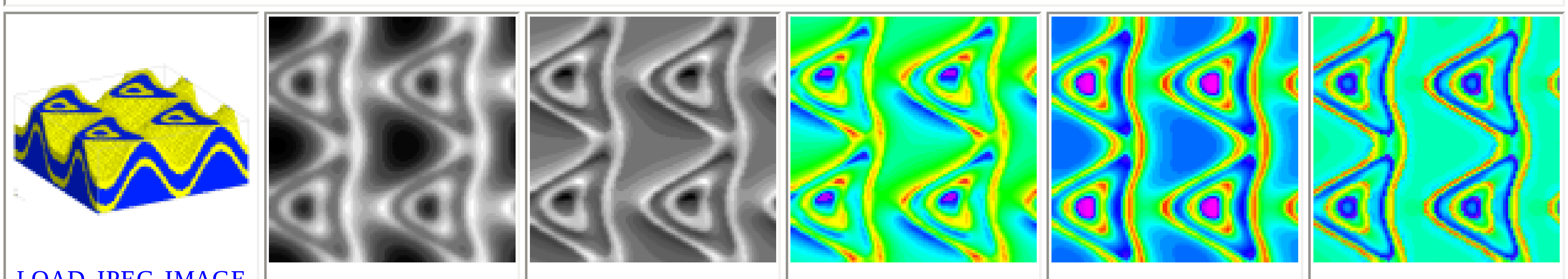
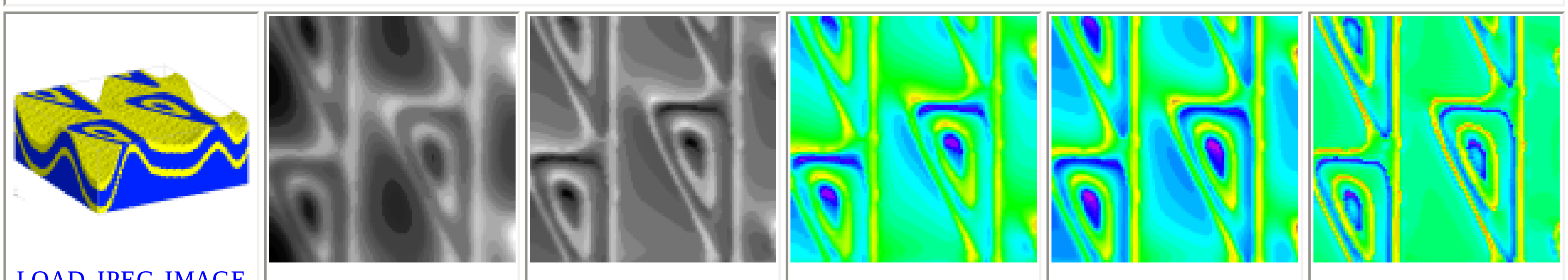
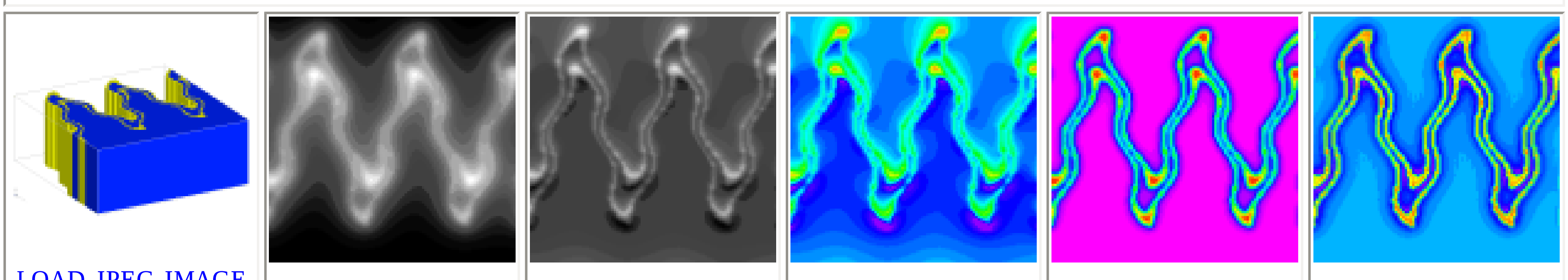
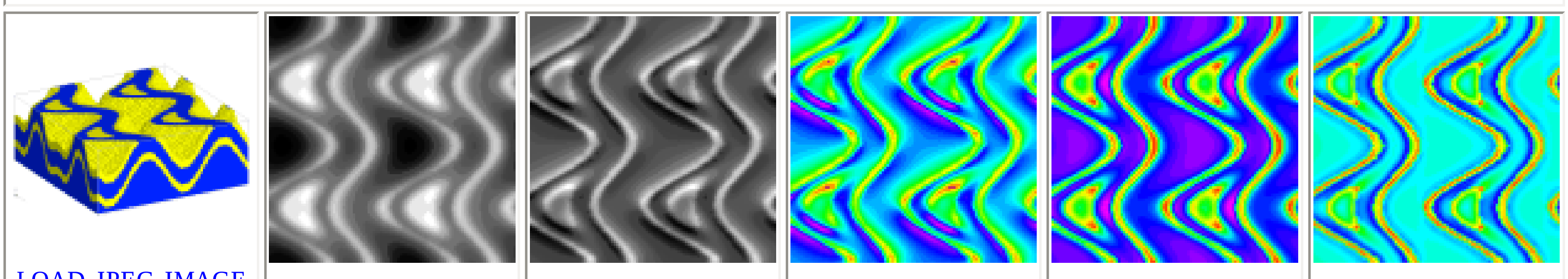
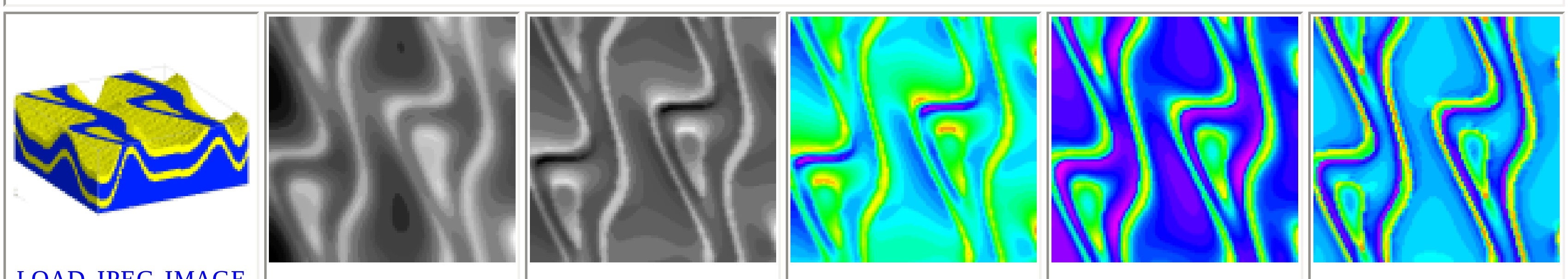
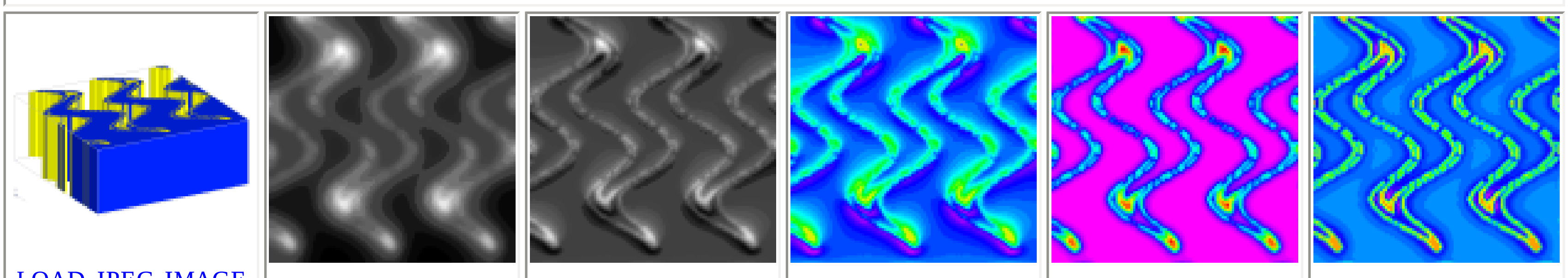
All models created using Noddy

WWW conversion by Ian Brayshaw

3.7 Fold Interference Patterns

This sequence duplicates the well known fold interference patterns of Ramsay, although see Theissen & Means and Theissen for a more complete scheme.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
A	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 1 pattern, also known as a dome and basin pattern.					
B	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 1 pattern, and is also a form of dome and basin pattern.					
C	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 0 pattern, where the two fold systems are completely parallel (and it is thus unlikely you would be able to distinguish the two phases of folding).					
D	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 1 (+2) pattern.					
E	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 1 (+2) pattern.					
F	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 3 pattern.					
G	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 2 pattern, also known as a mushroom pattern.					
H	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 2 pattern, also known as a mushroom pattern.					
I	 LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE	LOAD JPEG IMAGE
	This is a type 3 pattern.					

Key	Survey Specifications		Scales
blue layer $\rho = 0$ $\kappa = 0$	Inclination	-50° or -90°	max min
yellow layer $\rho = 1$ $\kappa = 10^{-2}$	Intensity	50,000 or 70,000 gamma	max min
image width 10,000m	Flying height	80m	

Ramsay, 1967, Folding and Fracturing of Rocks, MacGraw-Hill, p531.
Theissen & Means, Journal of Structural Geology, 2, pp311-316.
Theissen, 1986, Journal of Structural Geology, 8, pp563-573.

All models created using Noddy

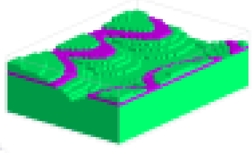
WWW conversion by Ian Brayshaw

4.1 Horizontal stratigraphy

In this model an East-West trending valley dissects a simple horizontal layered stratigraphy, so that the outcrop pattern follows the contours of the topography. The results are compared for a barometric survey, where the survey locations are at a constant height above sea level (in this case 400 m above the top of the block), and a draped survey, where the survey locations maintain a constant height above the local land surface (in this case 400 m above the land surface).

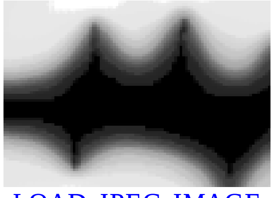
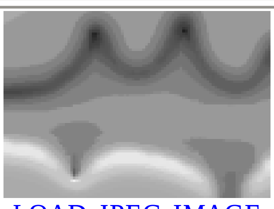
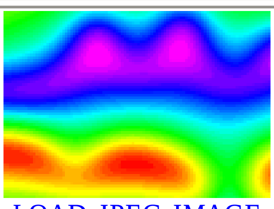
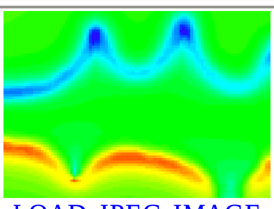
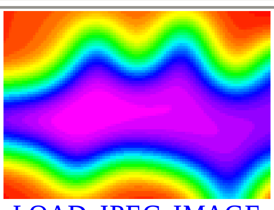
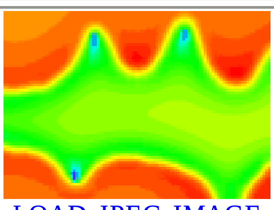
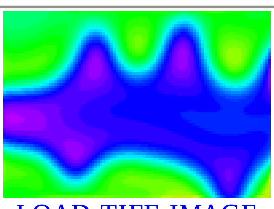
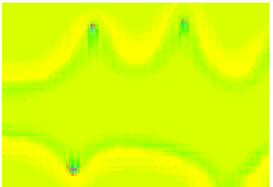
Click on the images to launch Noddy. A legend is provided at the end of this page.

Block model showing topography dissecting a three layer stratigraphy.



LOAD JPEG IMAGE

In order to use these history files you will also need to download the following file! topofile.top

	Barometric Survey	Draped Survey
Link		
Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this image the gravity field only reflects the general shape of the topography, and the position of the high density layer is not immediately obvious.	In this image the gravity field reflects the shape of the topography, and the sharp gradient (which follows the contours) marks the position of the high-density layer.
Magnetics	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this image the magnetic field only reflects the general shape of the topography, although there is a strong asymmetry between the North and South facing slopes of the valley, and the exact position of the high susceptibility layer is unclear.	In this image the magnetic field reflects the shape of the topography, and the position of the high susceptibility layer is marked by a low contour-following low on the South-facing slope, and a contour-following high on the North-facing slope.
Magnetics	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this image the magnetic field only reflects the general shape of the topography, although there is a strong asymmetry between the North and South facing slopes of the valley, and the exact position of the high susceptibility layer is unclear.	In this image the magnetic field reflects the shape of the topography, and the position of the high susceptibility layer is marked by a low contour-following low on the South-facing slope, and a contour-following high on the North-facing slope.
Magnetics at Pole	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this image the magnetic field only reflects the general shape of the topography, and since this image is calculated at the South Pole, the North- and South-facing slopes behave in the same way. The exact position of the high susceptibility layer is unclear.	In this image the magnetic field reflects the shape of the topography, and the position of the high susceptibility layer is marked by a sharp transition in intensity values.
Magnetics at Pole 1VD	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	In this image the magnetic field only reflects the general shape of the topography, and since this image is calculated at the South Pole, the North- and South-facing slopes behave in the same way. The exact position of the high susceptibility layer is roughly marked by the sharp transition in intensity values.	In this image the magnetic field reflects the shape of the topography, and the position of the high susceptibility layer is marked by a contour-following dipole anomaly.

Key		Survey Specifications		Scales
green	κ = 0 ρ = 0	inclination	-50° or -90°	max min
green layer	$\kappa = 1.1 \times 10^{-3}$	intensity	50,000 or 70,000 gamma	max min
purple	$\kappa = 10^{-2}$ ρ = 3	flying height	400 m	
purple layer	κ = 0			
image width	10,000 m			

All models created using Noddy

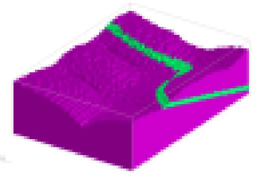
WWW conversion by Ian Brayshaw

4.2 Dipping stratigraphy

In this model an East-West trending valley dissects a simple tilted stratigraphy, so that the outcrop pattern curves around the topography (the model geometry is also that of a dipping dyke). The results are compared for a barometric survey, where the survey locations are at a constant height above sea level (in this case 400 m above the top of the block), and a draped survey where the locations maintain a constant height above the local land surface (in this case 400 m above the land surface).

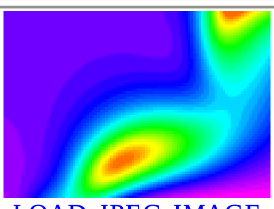
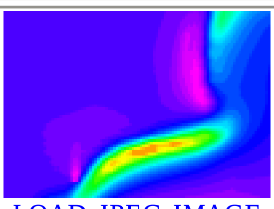
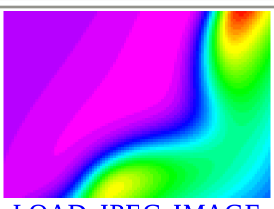
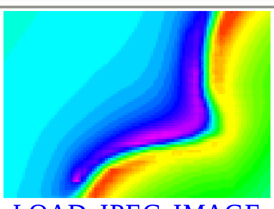
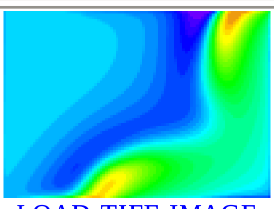
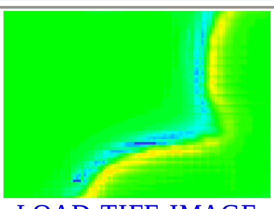
Click on the images to launch Noddy. A legend is provided at the end of this page.

Block model showing topography dissecting a dipping three layer stratigraphy



LOAD JPEG IMAGE

In order to use these history files you will also need to download the following file! topofile.top

	Barometric Survey	Draped Survey
Link		
Gravity	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	In this image the distance to the top of the body controls the local strength of the anomaly, with the hill outcrops dominating the survey.	With a draped survey the anomaly strength actually peaks at the base of the valley.
Magnetics	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	As with the gravity image, the magnetic survey mainly reflects the variable distance between the outcrop and sensor.	In this model the geometry of the body is more clearly defined, however there is a distinct asymmetry between North- and South-facing slopes, with the high susceptibility layer significantly weaker on the South-facing slope.
Magnetics	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	As with the gravity image, the magnetic survey mainly reflects the variable distance between the outcrop and sensor.	In this model the geometry of the body is more clearly defined, however there is a distinct asymmetry between North- and South-facing slopes, with the high susceptibility layer significantly weaker on the South-facing slope.
Magnetics at Pole	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	As with the -50° inclination model, the magnetic survey mainly reflects the variable distance between the outcrop and sensor.	In this model the geometry of the body is still more clearly defined, and the anomaly strength is more uniform along strike. The local fluctuations in anomaly strength along the length of the body reflect the discretisation of the land surface into cubes.
Magnetics at Pole 1VD	 LOAD TIFF IMAGE	 LOAD TIFF IMAGE
	As with the pole image, the magnetic survey mainly reflects the variable distance between the outcrop and sensor.	In this model the geometry of the body is more clearly defined as a linear dipole anomaly. The local fluctuations in anomaly strength along the length of the body reflect the discretisation of the land surface into cubes. (The look up table of this image has been clipped to show more detail.)

Key		Survey Specifications		Scales
green	$\kappa = 0$ $\rho = 3$	inclination	-50° or -90°	max min
green layer	$\kappa = 10^{-2}$	intensity	50,000 or 70,000 gamma	max min
purple	$\kappa = 10^{-2}$ $\rho = 0$	flying height	400 m	
purple layer	$\kappa = 0$			
image width	10,000 m			

All models created using Noddy

WWW conversion by Ian Brayshaw

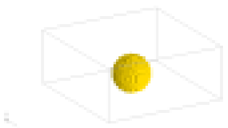
5.1 A remanently magnetised sphere

In this model we compare a normally magnetised sphere in an inclined field with the same sphere with an added remanent component. The remanence vector has a fixed inclination, but is calculated using various declinations.

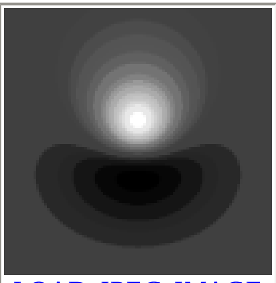
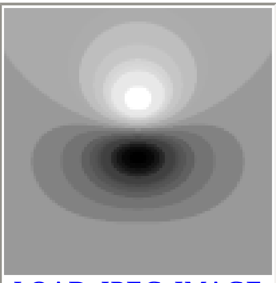
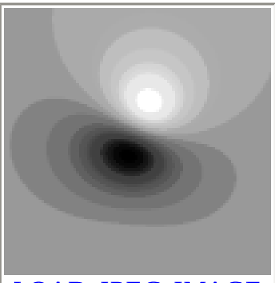
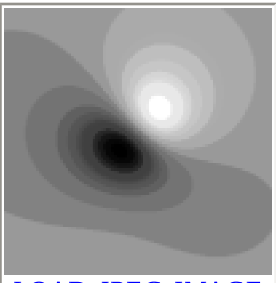
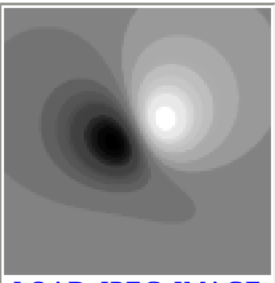
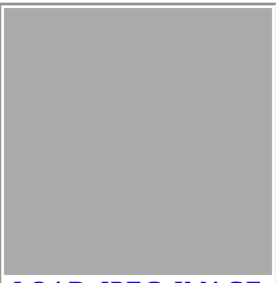
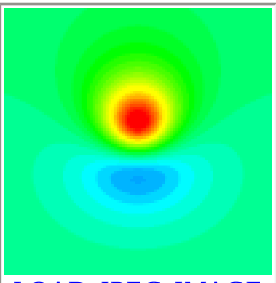
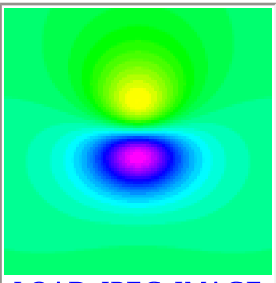
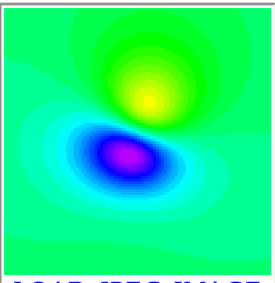
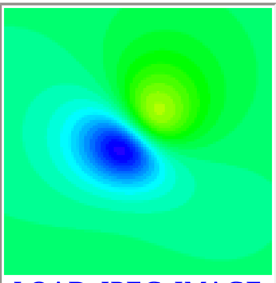
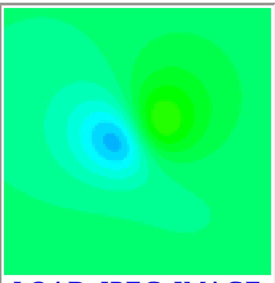
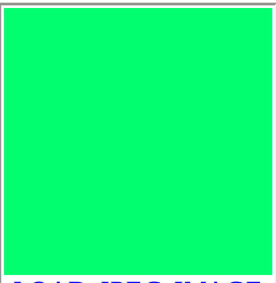
The grey scale images have look up tables clipped to maximum and minimum values so that the shapes of the anomalies are highlighted. The colour images have a single look up table for all anomalies, so that the intensity of the anomalies may be compared.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Block Diagram



LOAD JPEG IMAGE

	Normally magnetised sphere with remanent component declination					
Link	No remanent component	Declination of 000°	Declination of 045°	Declination of 090°	Declination of 135°	Declination of 180°
Grey Scale	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Pseudo Colour	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Comment						*In this model the remanent component exactly cancels out the induced component of the magnetisation.*

Key		Survey Specifications		Scales
sphere	$\kappa = 10^{-2}$	inclination	-50°	max 35,000 — min -25,000
sphere remanence intensity	5×10^{4}	intensity	50,000 gamma	
sphere remanence declination	0° to 180°	flying height	200 m	
background	$\kappa = 0$			
image width	10,000 m			

All models created using Noddy

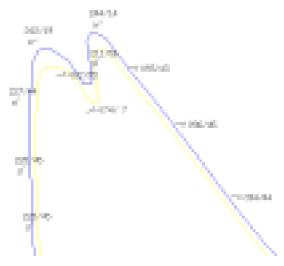
WWW conversion by Ian Brayshaw

5.2 Remanence and folding

This set of models shows three possible interactions of folding with a remanent component to magnetisation. The first row of models have no remanent component, the second row has a remanently magnetised layer with remanence imposed after folding, and the third row has a remanent layer with vectors deflected by the folding. While the overall fold geometry is apparent in all three models, because the total magnetic moment of the layer still in general contrasts strongly with the background, the folded remanence models show marked variation in field intensity for different fold limbs.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Map of remanence vectors



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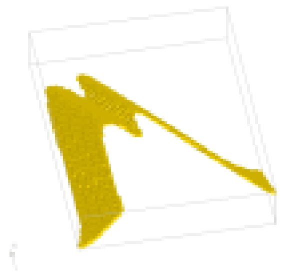
Map showing dip and dip direction values for remanence vector at selected positions.

Block diagram of folded layer



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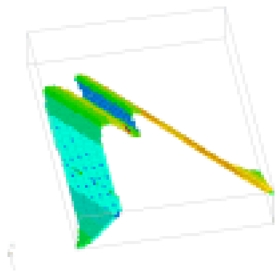
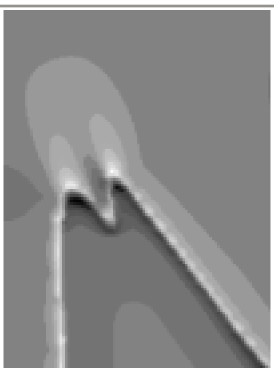
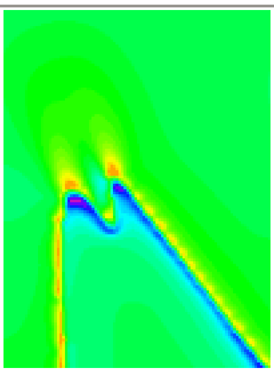
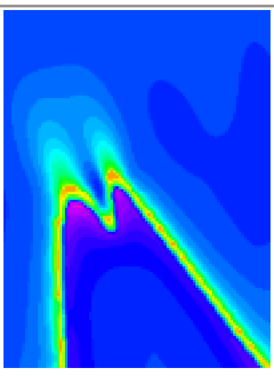
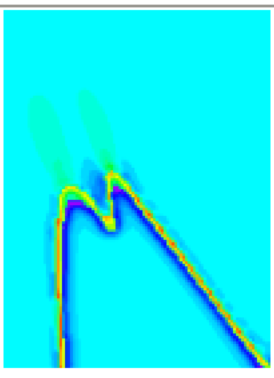
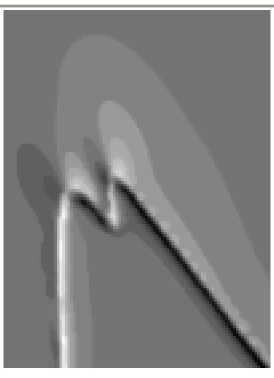
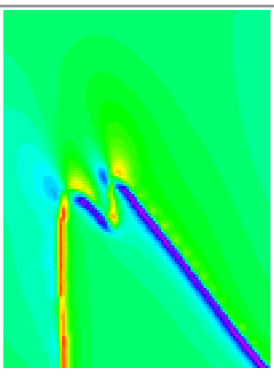
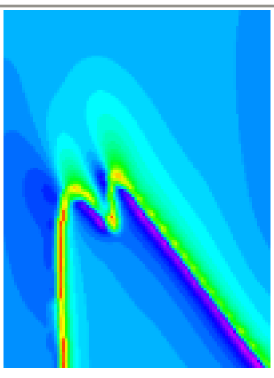
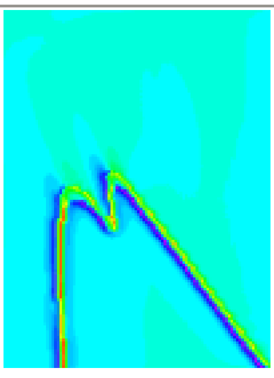
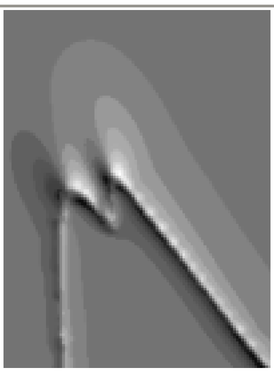
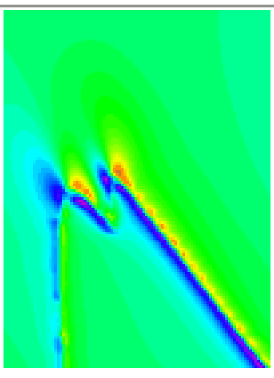
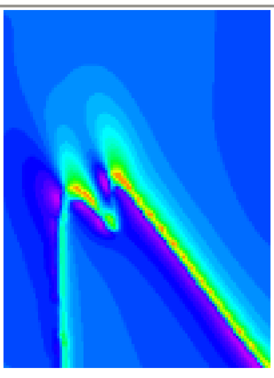
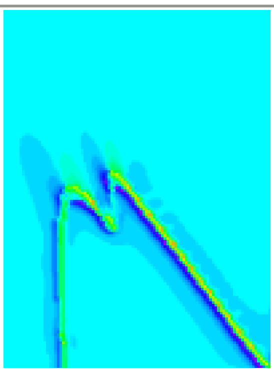
In this model the remanence is non-existant or uniform in orientation.

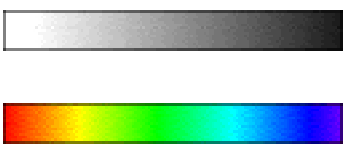
Block diagram of folded layer



LOAD JPEG IMAGE

In this model the remanence orientation varies according to position on the fold. Colours vary with the declination of the remanence.

Link	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
No remanence	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Post-folding remanence	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Remanence uniformly set to: inclination 0 declination090 intensity 1000	Remanence uniformly set to: inclination 0 declination090 intensity 1000		
Pre-folding remanence	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Remanence set to: inclination variable declinationvariable intensity 1000	Remanence set to: inclination variable declinationvariable intensity 1000		

Key	Survey Specifications	Scales
layer $\kappa = 10^{-2}$ background $\kappa = 10^{-4}$ image width 10,000 m	inclination -50° or -90° intensity 50,000 or 70,000 gamma flying height 80 m	max  min max min

All models created using Noddy

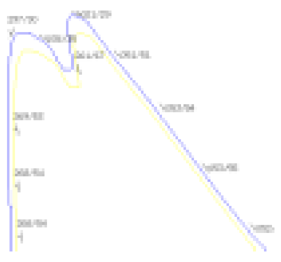
WWW conversion by Ian Brayshaw

5.3 Anisotropy and folding

This set of models shows three possible interactions of folding with a layer which possesses anisotropic susceptibility. The first row of models have isotropic susceptibility, the second row has uniform anisotropic susceptibility, and the third row has an anisotropy which is deflected by the folding. While the overall fold geometry is apparent in all three models, because the total magnetic moment of the layer still in general contrasts strongly with the background, the folded anisotropy models show marked variation in field intensity for different limbs.

Click on the images to launch Noddy. A legend is provided at the end of this page.

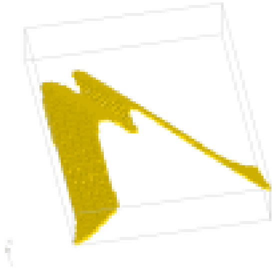
Map of anisotropy orientations



LOAD JPEG IMAGE

Map showing dip and dip direction values for planar anisotropy at selected positions.

Block diagram of folded layer



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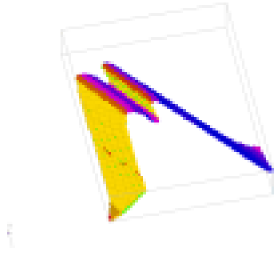
In this model the anisotropy is non-existant of uniform in orientation.

Block diagram of folded layer



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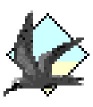
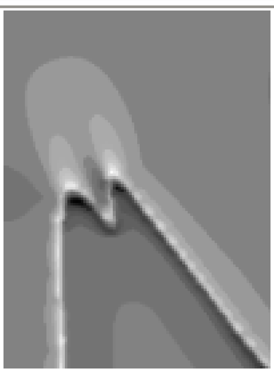
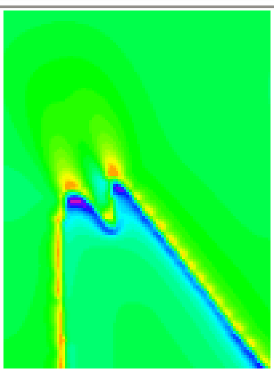
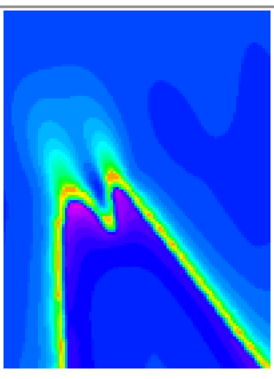
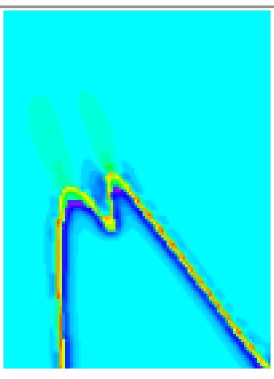
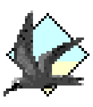
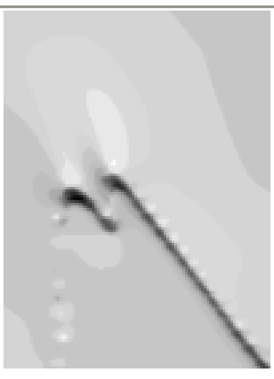
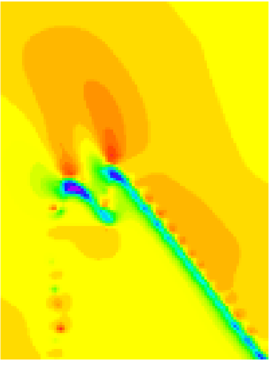
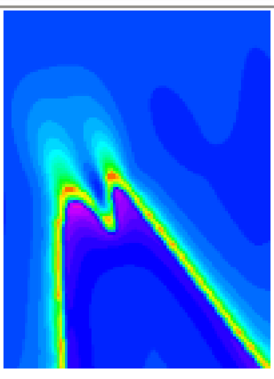
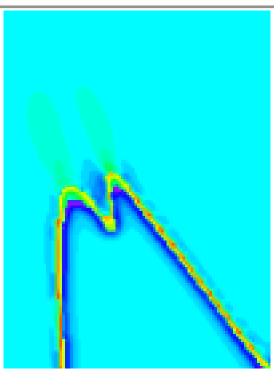
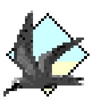
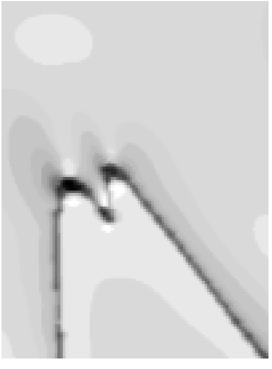
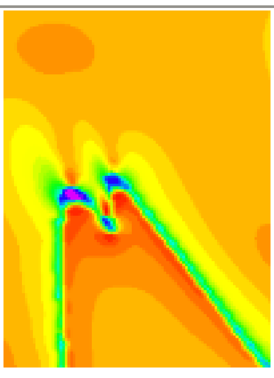
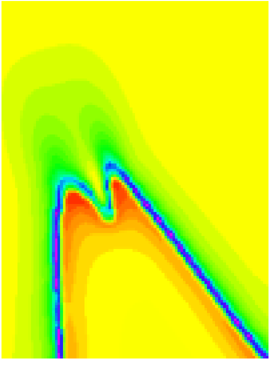
In this model the orientation of the anisotropy varies according to position on the fold. Colours vary with the declination of the anisotropy.

Link	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
No anisotropy 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
Post-folding anisotropy 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Susceptibility values uniformly set to: $\kappa X 10^{-2}$ $\kappa Y 10^{-2}$ $\kappa Z 10^{-6}$	Susceptibility values uniformly set to: $\kappa X 10^{-2}$ $\kappa Y 10^{-2}$ $\kappa Z 10^{-6}$ Notice how the west limb drops out in this image.	This image appears identical to the "no anisotropy" image at the pole since the anisotropy plane is normal to the direction of the Earth's field.	
Pre-folding anisotropy 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Anisotropy orientation variable, prior to deformation set to: $\kappa X 10^{-2}$ $\kappa Y 10^{-2}$ $\kappa Z 10^{-6}$	Anisotropy orientation variable, prior to deformation set to: $\kappa X 10^{-2}$ $\kappa Y 10^{-2}$ $\kappa Z 10^{-6}$		

Key	Survey Specifications	Scales
layer $\kappa = 10^{-2}$ background κ = 0 (isotropic) image width 10,000 m	inclination -50° or -90° intensity 50,000 or 70,000 gamma flying height 80 m	max min max min

All models created using Noddy

WWW conversion by Ian Brayshaw

5.4 Concentrically zoned plugs

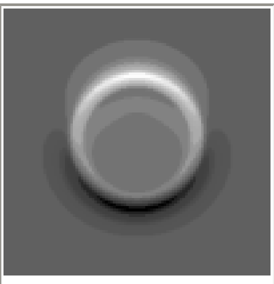
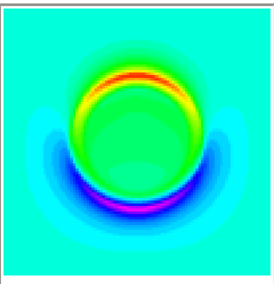
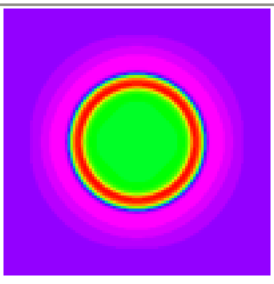
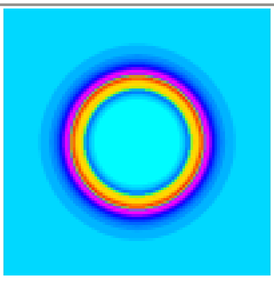
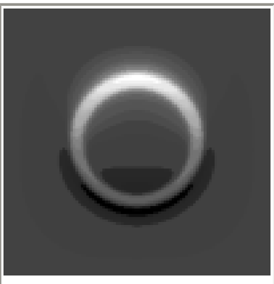
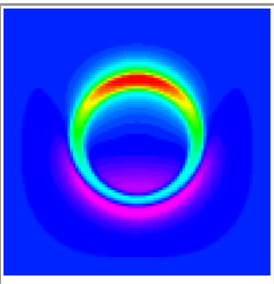
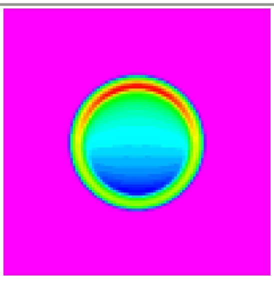
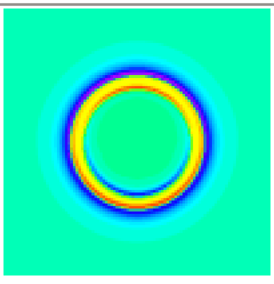
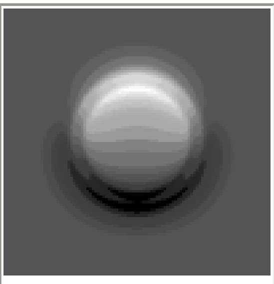
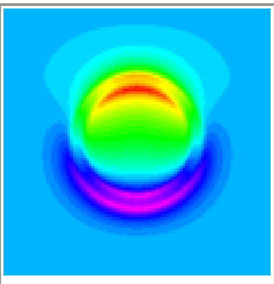
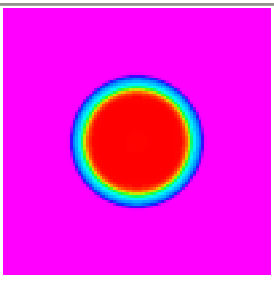
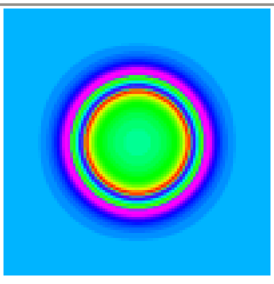
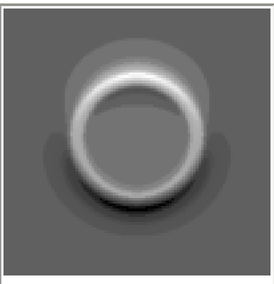
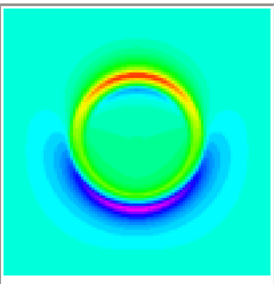
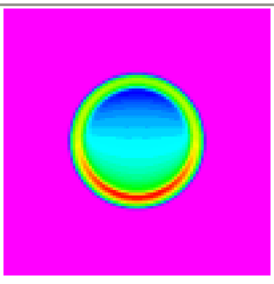
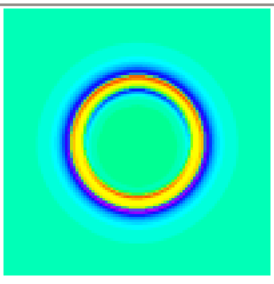
These four models show the magnetic anomaly patterns that may develop in a igneous intrusion due either to the production of an alteration halo, or from a change in the orientation of the thermo-remanent component of the natural remanent magnetisation as the body cools.

Click on the images to launch Noddy. A legend is provided at the end of this page.

Block Diagram

LOAD JPEG IMAGE

Concentric half-spheres with variable magnetic properties.

Link	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Alteration halo (magnetic susceptibility greater than igneous body)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Outer zone of plug defined by alteration zone enriched in high susceptibility minerals.			
Remanent zone (magnetisation vector same as current field)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Outer zone of plug defined by remanently magnetised minerals, perhaps due to change in grain size of magnetic minerals as body cooled. The remanent component has same orientation as current external field.			
Alteration halo (magentic susceptibility less than igneous body)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Outer zone of plug defined by alteration zone enriched in high susceptibility minerals, but has lower susceptibility than igneous body itself.			
Remanent zone (magnetisation vector opposite to current field)	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Outer zone of plug defined by remanently magnetised minerals, perhaps due to change in grain size of magnetic minerals as body cooled. The remanent component has opposite orientation to current external field.			

Key		Survey Parameters		Scales
plug	$\kappa = 10^{-2}$	Inclination	-50°	max [greyscale bar] min
background	m.s. = 0	Intensity	50,000 gamma	max [colour bar] min
image width	10,000 m	Flight height	80 m	

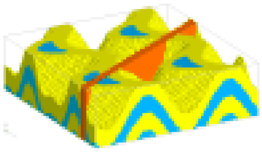
All models created using Noddy

WWW conversion by Ian Brayshaw

6.1 Depletion alteration halo around a dyke

This model shows the results of emplacing a dyke in an area of refolded folds. The refolded fold patterns are similar to those seen in the type D model of section 3.7. The density and susceptibility values are modelled as depletion haloes where the rock properties are varied as a function of distance from the dyke, before returning to normal as the distance away increases.

Click on the images to launch Noddy. A legend is provided at the end of this page.



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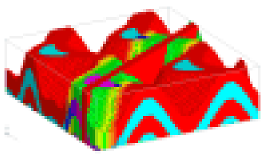
Block diagram of unaltered geology

Block diagram showing the geology of the model with dyke intrusion but no alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used simply to highlight the structures.



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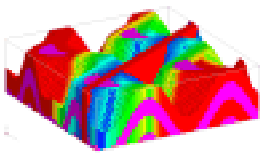
Block diagram showing density variations in altered geology

Block diagram showing the geology of the model with dyke intrusion and alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used to demonstrate density variations, using a rainbow look up table.



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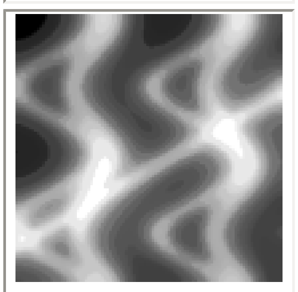
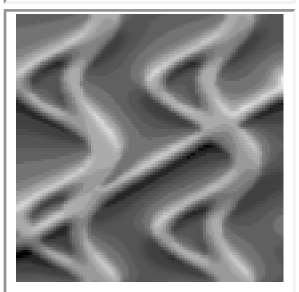
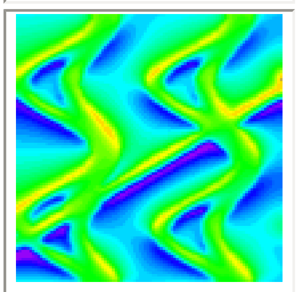
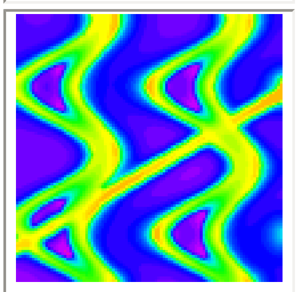
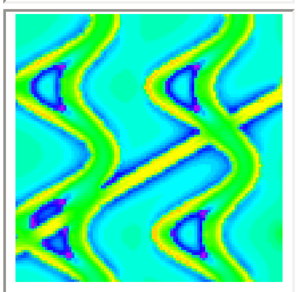
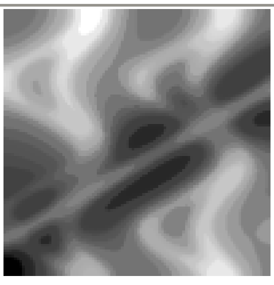
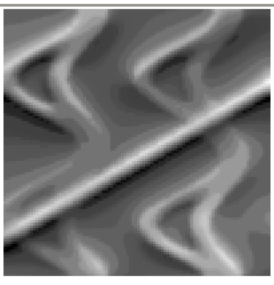
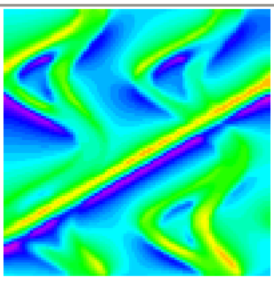
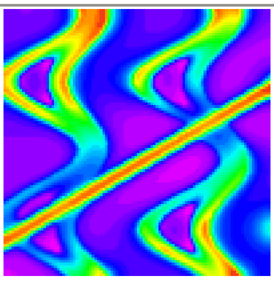
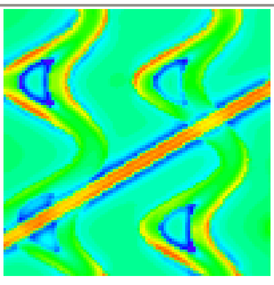
Block diagram showing magnetic susceptibility variations in altered geology

Block diagram showing the geology of the model with dyke intrusion but no alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used to demonstrate magnetic susceptibility variations, using a rainbow look up table.

Link	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
No alteration	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Note the constructive interference between the dyke and the background layers that produces a local high where the dyke cuts the layers.				Note the appearance of a variation in intensities along the dyke.
Alteration	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Note the destructive nature of the alteration halo.	Note the destructive nature of the alteration halo.	Note the destructive nature of the alteration halo.	Note the destructive nature of the alteration halo.	Note the appearance of a variation in intensities along the dyke.

Key		Survey Specifications		Scales
yellow	$\kappa = 10^{-2}$ $\rho = 3.5$	inclination	-50° or -90°	max — min (greyscale)
blue	$\kappa = 10^{-2}$ $\rho = 2.5$	intensities	50,000 or 70,000 gamma	max — min (rainbow)
dyke	$\kappa = 10^{-2}$ $\rho = 3.5$	flying height	80 m	
image width	10,000 m			

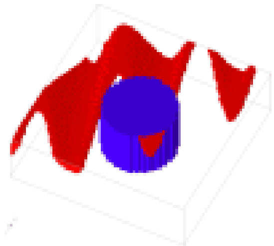
All models created using Noddy

WWW conversion by Ian Brayshaw

6.2 Enrichment alteration halo around a plug

This model shows the results of emplacing a plug in an area of tilted folds. The density and susceptibility values are modelled as enrichment haloes where the rock properties are varied as a function of distance from the plug, before returning to normal as the distance away increases.

Click on the images to launch Noddy. A legend is provided at the end of this page.



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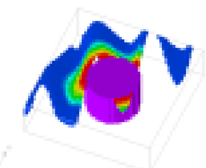
Block diagram of unaltered geology

Block diagram showing the geology of the model with plug intrusion but no alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used simply to highlight the structures.



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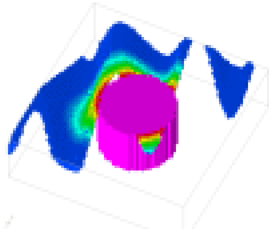
Block diagram showing density variations in altered geology

Block diagram showing the geology of the model with plug intrusion and alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used to demonstrate density variations, using a rainbow look up table.



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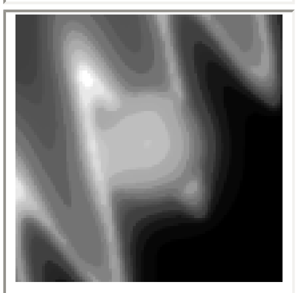
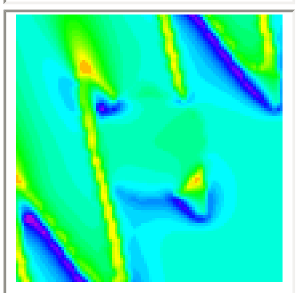
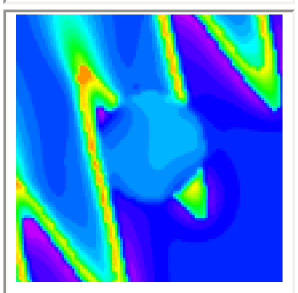
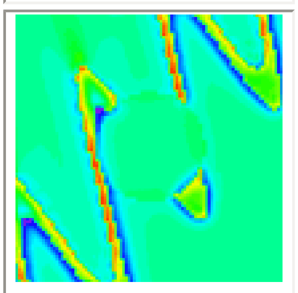
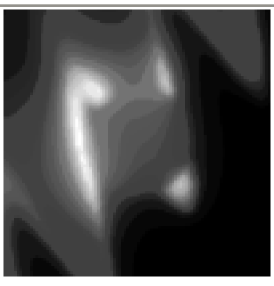
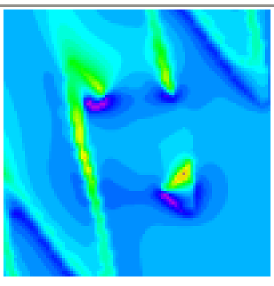
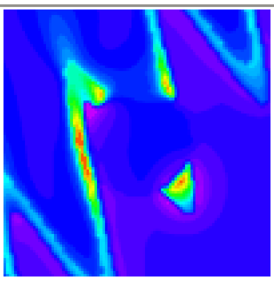
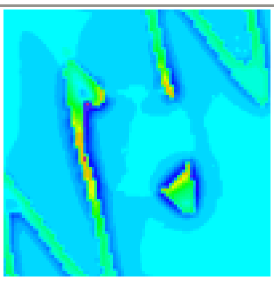
Block diagram showing magnetic susceptibility variations in altered geology

Block diagram showing the geology of the model with plug intrusion but no alteration halo. The top layer has been removed to show the internal structure of the model. Colours are used to demonstrate magnetic susceptibility variations, using a rainbow look up table.

Link	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
No alteration 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Note the relatively uniform intensity values (except at the north plunging hinge) in the folded layer.	Note the relatively uniform intensity values (except at the north plunging hinge) in the folded layer.		Note the relatively uniform intensity values in the folded layer.	Note the relatively uniform intensity values (except at the north plunging hinge) in the folded layer.
Alteration 	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE	 LOAD JPEG IMAGE
	Note the strong localisation of the high intensity field in the parts of the folded layer adjacent to the plug.	Note the strong localisation of the high intensity field in the parts of the folded layer adjacent to the plug.	Note the relatively uniform intensity values (except at the north plunging hinge) in the folded layer.	Note the strong localisation of the high intensity field in the parts of the folded layer adjacent to the plug.	Note the strong localisation of the high intensity field in the parts of the folded layer adjacent to the plug.

Key			Survey Specifications		Scales
red	ρ = 2.9	$\kappa = 10^{-3}$	inclination	-50° or -90°	max [grey scale] min
background	ρ = 2.4	$\kappa = 5\times10^{-5}$	intensities	50,000 or 70,000 gamma	max [rainbow scale] min
plug	ρ = 2.5	$\kappa = 1.7\times10^{-4}$	flying height	80 m	
image width 10,000 m					

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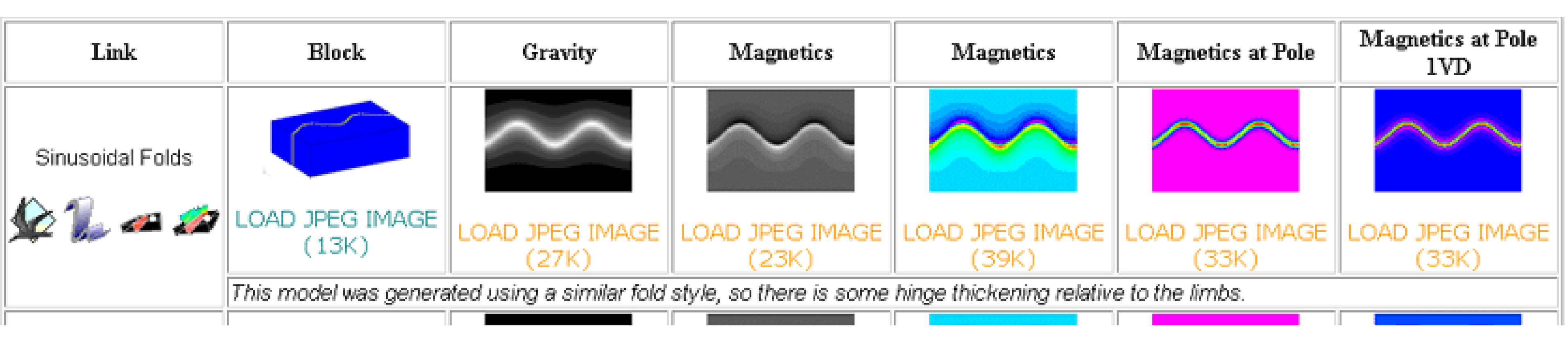
Page Structure

Each page of the atlas consists of a table made up of a number of rows and columns of images, generally one row per geological model, with each column showing one type of representation:



Each cell in the table provides an active link to at least one file that may be loaded into a helper application (see next section for details). The table below explains what links are avaiable for each column type:

Link	Block	Gravity	Magnetics	Magnetics	Magnetics at Pole	Magnetics at Pole 1VD
Loads *Noddy* with history file Loads *FracViewer* animation with block model Loads Geology Model as VRML file Loads Wavelet Transform Model as VRML file	LOAD JPEG IMAGE of geological model into browser	Load gravity data into *Noddy* - Load gravity image as jpeg file	Load magnetics data into *Noddy* - Load magnetics image as jpeg file	Load magnetics data into *Noddy* - Load magnetics image as jpeg file	Load magnetics at pole data into *Noddy* - Load magnetics image as jpeg file	Load magnetics at pole first vertical derivative data into *Noddy* - Load magnetics image as jpeg file

Table showing the effects of clicking on an image from each column

Dynamic Links to *Noddy*

To get your computer to load the appropriate files into *Noddy* dynamically you obviously need those this programs (see links at the bottom of this page), and you also need to set your browsers helper applications settings for various file types as shown in the table below. These settings can be set as you load in a file type for the first time.

File Suffix	File Type	Helper Application	Mime Type
his	Noddy History File	**Noddy**	**x-application/his**
mag	Noddy magentics image	**Noddy**	**x-application/mag**
grv	Noddy gravity image	**Noddy**	**x-application/grv**
avi	Animation of wavelet transform model	**FracView**	**video/avi**
jpeg	Noddy geophysics image in jpeg format	**xv (*for example)***	**image/jpeg**
wrz	"Gzipped" VRML model of wavelet transform model	3D Exploration **(*for example*)**	**x-world/x-vrml**

UNIX On the UNIX platform you will also need to inform the program where to look for the licence and UID files by adding the following to your *.cshrc* file (changing the path as appropriate):

setenv NODDY_HOME /usr/local/noddy
setenv UIDPATH /usr/local/noddy/%U

PC On the PC platform you will also need to inform the program where to look for the licence file by adding the following to your *autoexec.bat* file (changing the path as appropriate):

set NODDY_HOME=c:\winprgs\noddy
path=c:\winprgs\noddy

File Naming Conventions

The jpeg and gif files for each section are contained in a number of directories divided up according to calculation and display type, so that for example, pseudocolour and gray scale look up table displays of the same data are stored separately.

jpeg image file names are of the form model name+*image type*.jpeg (and similarly for gifs) where *image type* is generally one of the following:

gl	geology image
gg	gravity image , gray scale look up table raster image
mg	magnetic image calculated at an inclination of -50°, gray scale look up table raster image
mr	magnetic image calculated at an inclination of -50°, rainbow look up table raster image
mc	magnetic image calculated at an inclination of -50°, rainbow look up table colour contour image
mpr	magnetic image calculated at the South Pole, rainbow look up table raster image
mpc	magnetic image calculated at the South Pole, rainbow look up table colour contour image
mp1vdr	magnetic image calculated at the South Pole, 1st vertical derivative, rainbow look up table raster image
mp1vdc	magnetic image calculated at the South Pole, 1st vertical derivative, rainbow look up colour contour image

The *Noddy* Modelling System

Clicking on this icon opens up Noddy with the appropriate history file, and clicking on the geophysics images loads up the appropriate geophysical data into Noddy. The Noddy modelling system has been developed jointly by Monash and the CSIRO within the Australian Geodynamics Cooperative Research Centre (with major funding through AMIRA). It is a kinematic forward-modelling system which builds up a three-dimensional geometry through the imposition of a sequence of deformation events on a initial stratigraphy, and then calculates the gravity and magnetic responses for this structure. Noddy is based on two types of algorithms, those that deal with forward modelling the geology, and those that deal with forward modelling the potential-field response. For the latest demo version, visit the Encom Web Site

Geological Modelling

The geological modelling is achieved by superimposing a series of deformations, described as parameterised displacement equations acting on an initial stratigraphy.

The choice of deformation "events" includes folding, faulting, unconformities, shear zones, dykes, plugs, homogeneous strains, tilts, and imported geometries: voxel (or *Volume Element*) models and some triangulated forms, and these events may be combined in any order in any number. The starting stratigraphy for the modelling is not only geological, but also represents a geophysical rock property stratigraphy, and this allows us to calculate sophisticated geophysical behaviour such as alteration zones around faults, where the susceptibilities are modified systematically as a function of distance away from the fault, and also remanence vectors which are deflected around fold hinges.

Geophysical Modelling

The geophysical modelling is accomplished by dividing the final geological structure into voxels, and using a modification of Hjelt's dipping prism equations to calculate the potential-field response of the 3D volume (Hjelt, S.E. 1972. Magnetostatic anomalies of dipping prisms. Geoexploration, 10, 239-246. and Hjelt, S.E. 1974. The gravity anomaly of a dipping prism. Geoexploration, 12, 29-39.). We have also implemented a Fourier domain calculation of potential-field response, based on the same voxel model of the geology, and the results presented here make use of the most suitable scheme for a particular model geometry. Both gravity and magnetic models are calculated as airborne surveys, typically at an altitude of 80 m.

Geophysical Parameters

The c.g.s. unit system is used in this atlas, and magnetic calculations are either performed at the South Pole with a field strength of 70,000 gamma (or nT) or at an inclination of -50° with a field strength of 50,000 gamma. The magnetic declination is always set to 0, and North is up in all geophysical images. The magnetic images show the true anomalous component of the total field, and the gravity images show the vertical component of the field. In the key ***k*** is used as the symbol for magnetic susceptibility, and **ρ** for density .

Geophysical Image Display

The gravity and magnetic images in this atlas are displayed as either grayscale or pseudo-colour raster images, or pseudo-colour contour plots. In all cases the look up table is linear, and is in general clipped to the maximum and minimum range for the particular data set, which maximises the clarity of anomaly shapes. Where absolute anomaly intensities need to be viewed, profiles across the data or an absolute look up tables are applied, and these cases are noted in the text.

VRML Viewers

Clicking on these icons opens up a window with a VRML (Virtual Reality Meta Language)model in it. There are many different VRML Viewers available, and the availability of any one piece of software is not very stable, however *at the time of production of this site* 3D Exploration (PC only); Cortona VRML Browser Plugin (most Platforms) or VRML Viewer (PC Only) can be used. In order to reduce download times, all the VRML models are compressed using a package called gzip. (Most unzip utilities will be able to use uncompress this format). The Cortona Browser plugin is happy with this format.

AVI Viewers

Clicking on this icon opens up a window with a AVI format movie in it. There are many different AVI Viewers available, and the availability of any one piece of software is not very stable, however *at the time of production of this site* Quicktime (PC & MAC only) or MediaPlayer (PC Only) can be used.

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All models created using Noddy

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Contributing Organisations

AMIRA (The Australian Minerals Industry Research Association)

Monash University

Fractal Graphics

AGCRC (The Australian Geodynamics Cooperative Research Centre)

Université Paul Sabatier

Encom Technology