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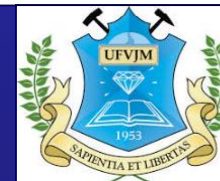
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**Tectonics and Metallogenesis
of the NE South America**

2 DAY CONFERENCE

**Paramaribo, Suriname
19-20th February 2019**

GOLD IN BRAZIL



Brazil

Gold producer for many centuries, leading in 18th and 19th.

1982-1999 → 10 gold mines >20 t Au and seven smaller (3-8 t Au).

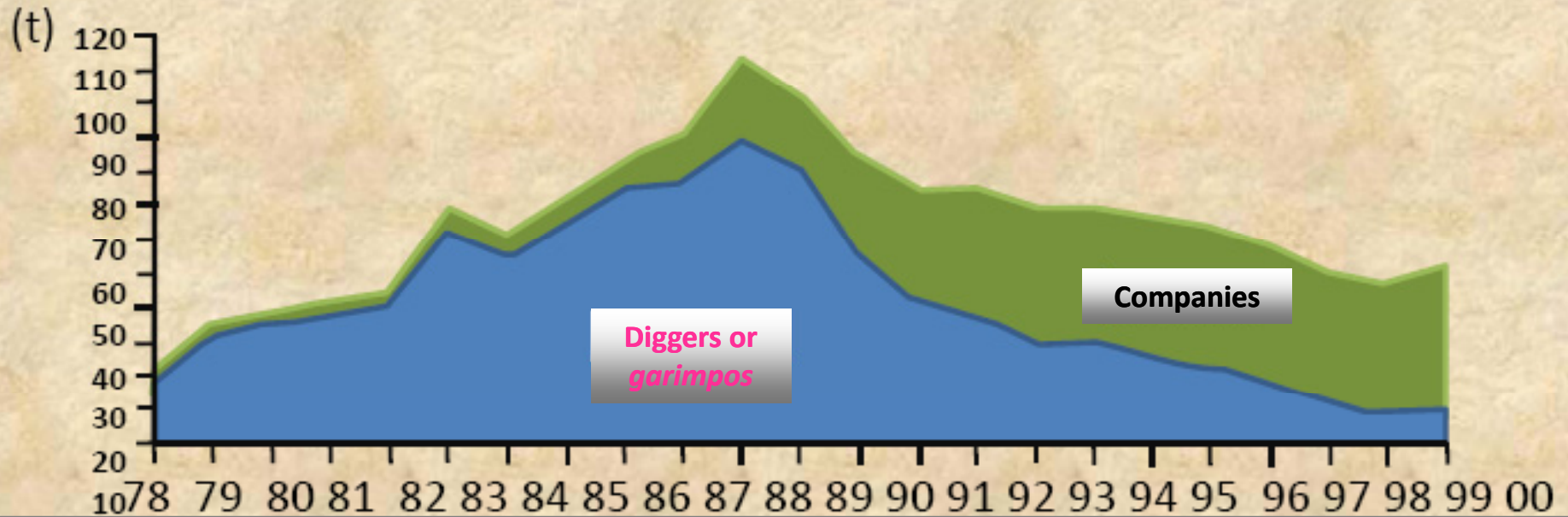
1983-1990 → eight active mines (1st boom).

1992 → mining companies produced ~ 40 t Au. Thorman et al., 2001

Mid-2000s 2nd boom. Production mainly due to new mines: Chapada (Goiás-GO), Cuiabá, Turmalina (Minas Gerais-MG) and Mamão (Pará-PA).

2001-2007 → annual production 38 to 47 t Au (DNPM, Brasil). Since then new deposits in production as Caeté (MG; 2010); Aurizona (Maranhão) and Tucano (Amapá-AP), both 2011; C1 (Santa Luz BA, 2013).

Gold historical Brazilian production



Gold production between 1978 and 2000

DNPM, F.Crocco (2009)

Garimpeiro (diggers) production surpassed by industry only in 1991.
Mineral Exploration fundamentally guided by existing Mineral Occurrences.

Brazilian production, 2015 → ~ 79,6 t Au – 68 t primary – 11% worldwide (DNPM).

Garimpos (diggers) → ~ 11,6 t Au – Mato Grosso (47,1%) & Pará (40,19%).

Tectonic Setting

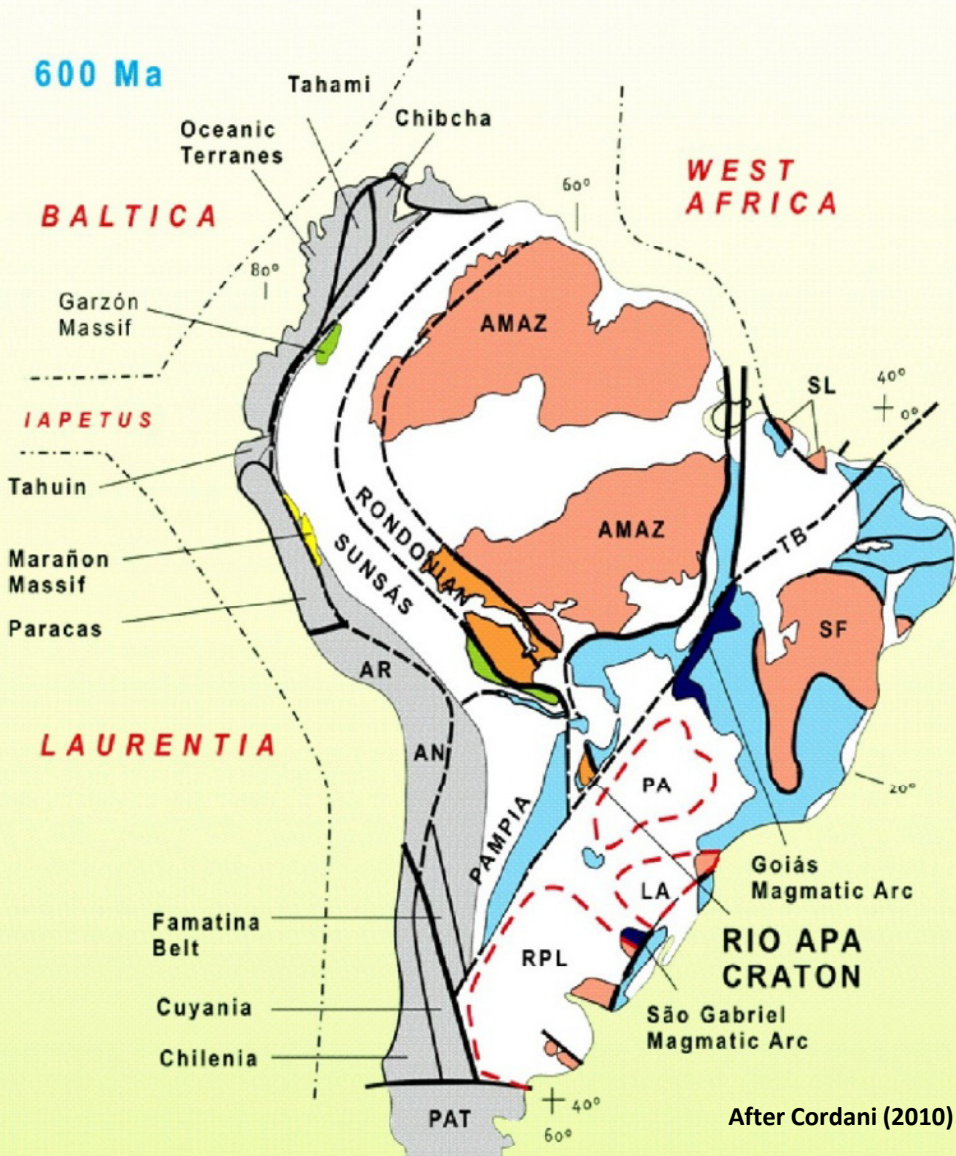
Cratons

AMAZ = Amazonas

SF = São Francisco

SL = São Luis

RPL = Rio de la Plata



After Cordani (2010)



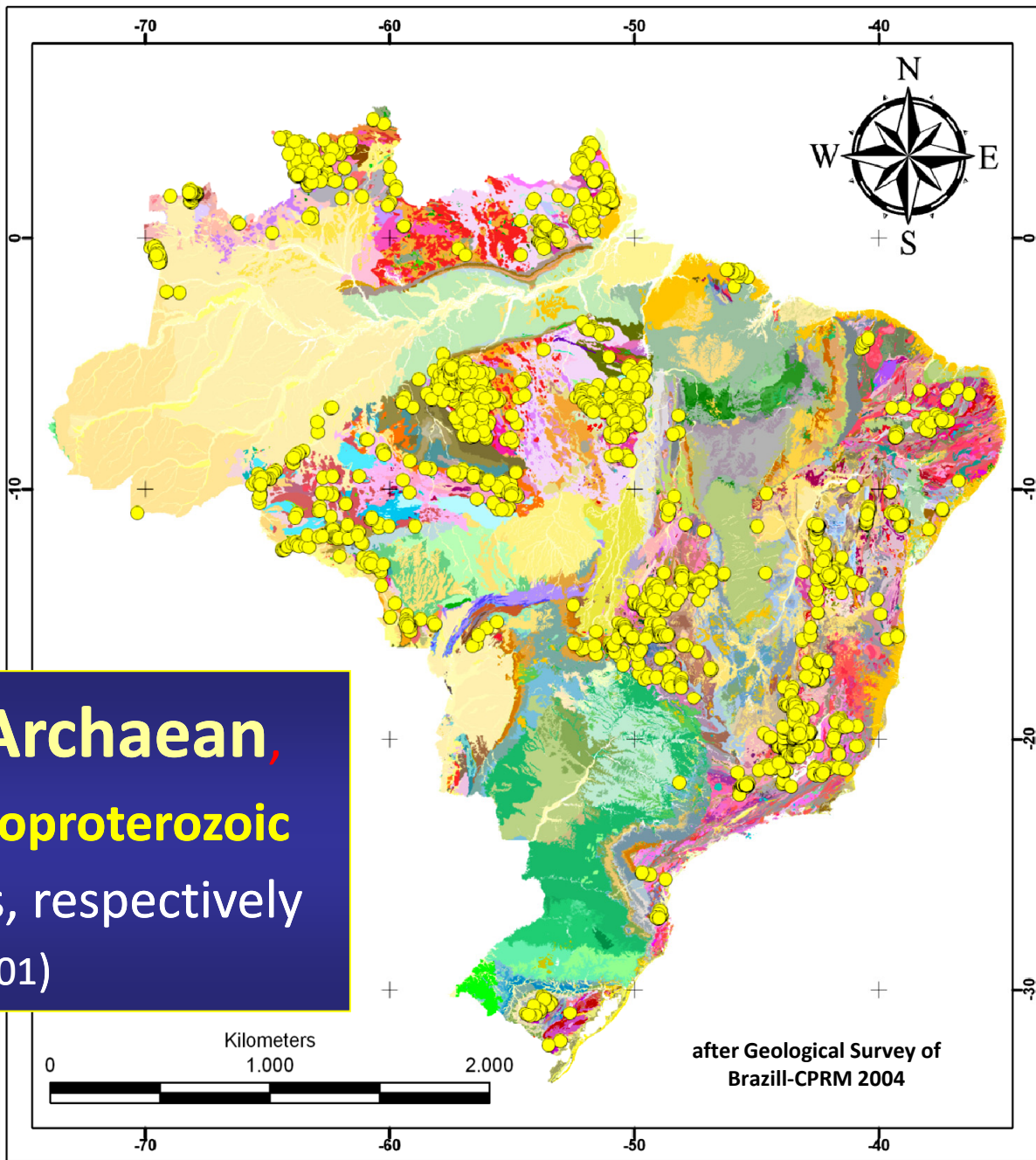
Hasui *et al.* 2010
after CPRM 2004

Geological Map of Brazil and Au Occurrences

Known **gold** occurrences & mines of Brazil (~3,300)

Majority in Amazonas & São Francisco cratons.

66% of **gold** from **Archaean**,
19% and **15%** from **Palaeoproterozoic**
and **Neoproterozoic** rocks, respectively
(Thorman et al., 2001)



Archaean nuclei and fragments

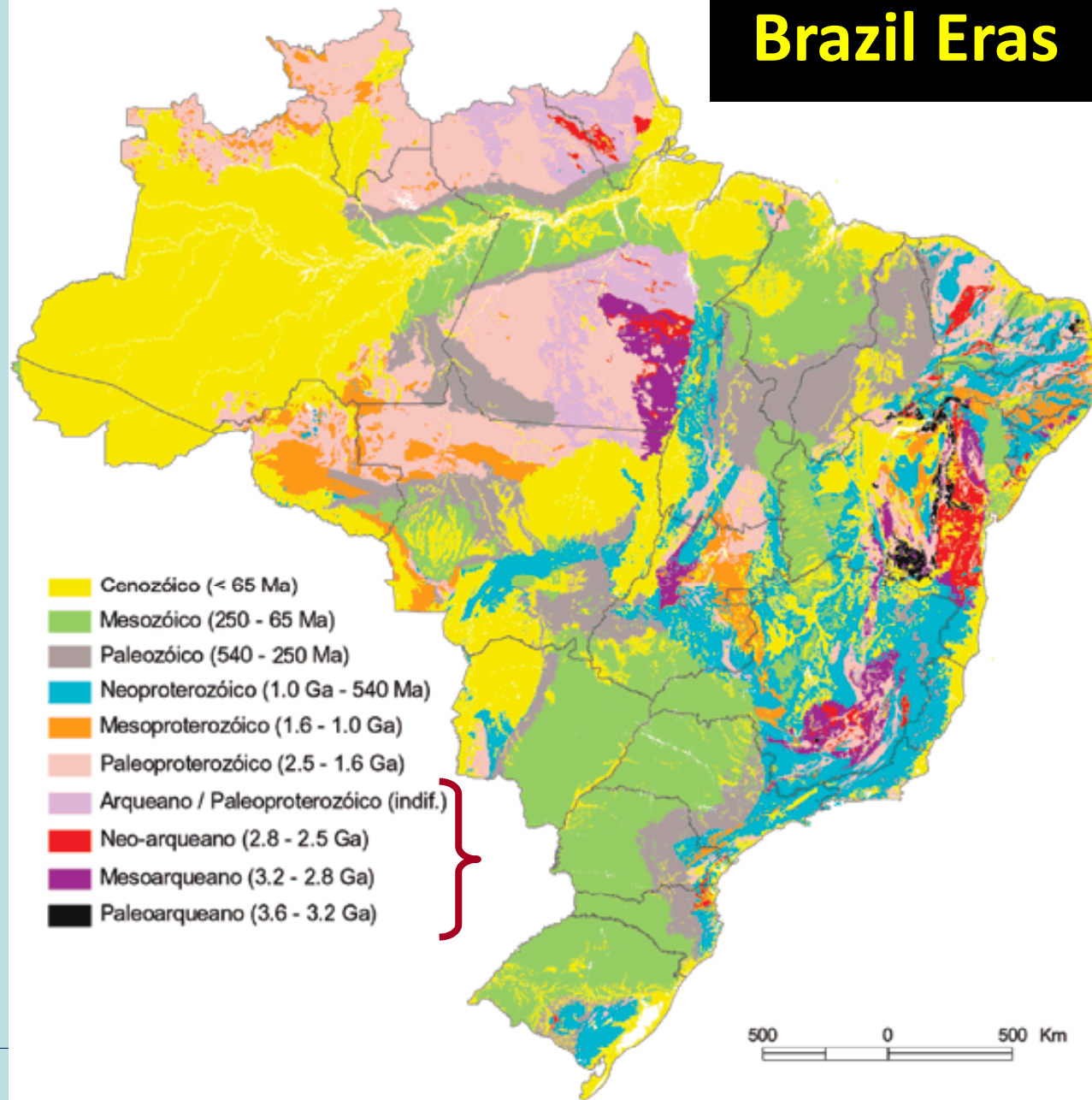
Preserved in cratonic & denuded orogenic terranes, covering **<170 000 km², 5.4%** of Brazil's Precambrian surface.

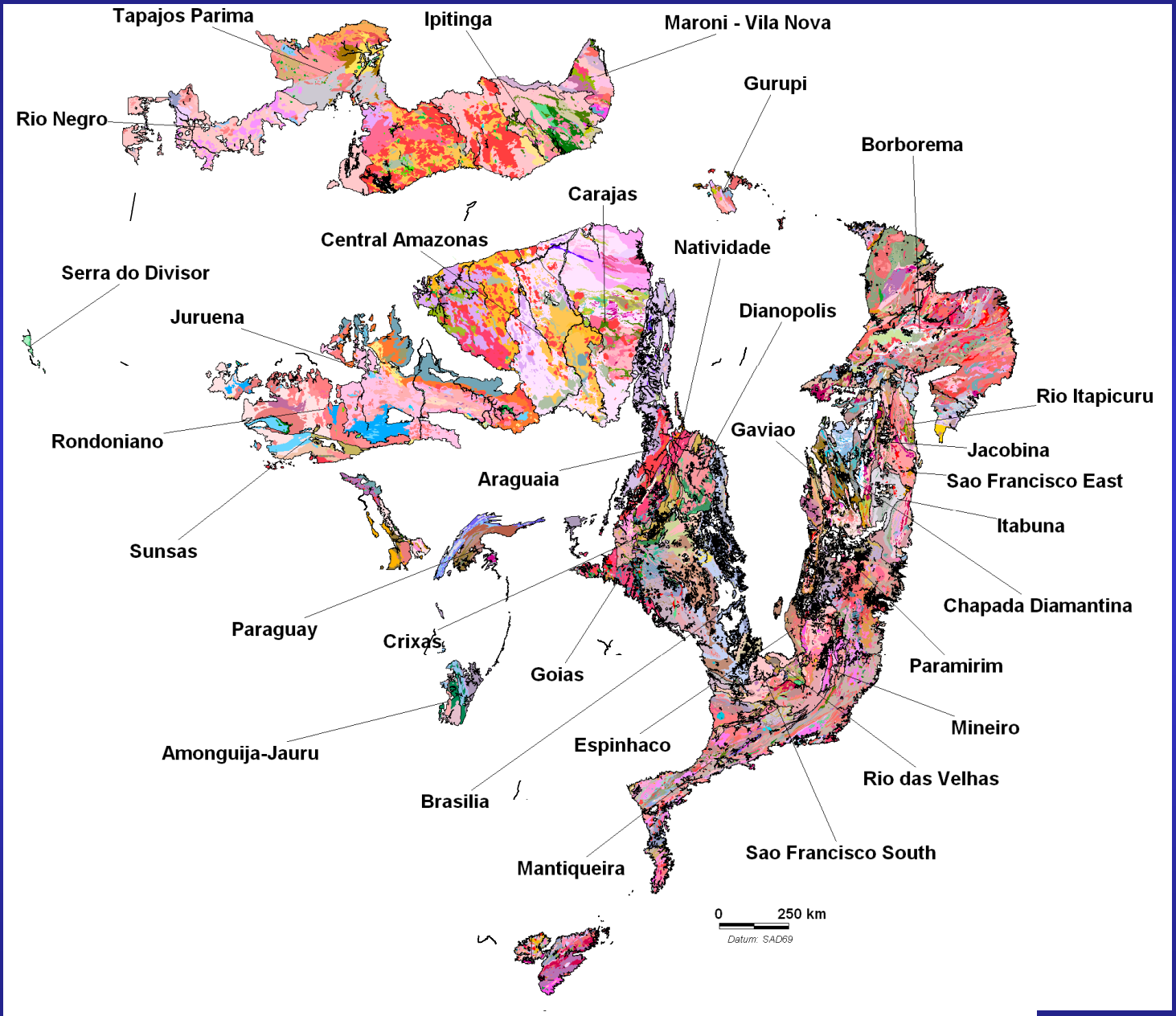
27 differentiated discrete & neighbouring terranes

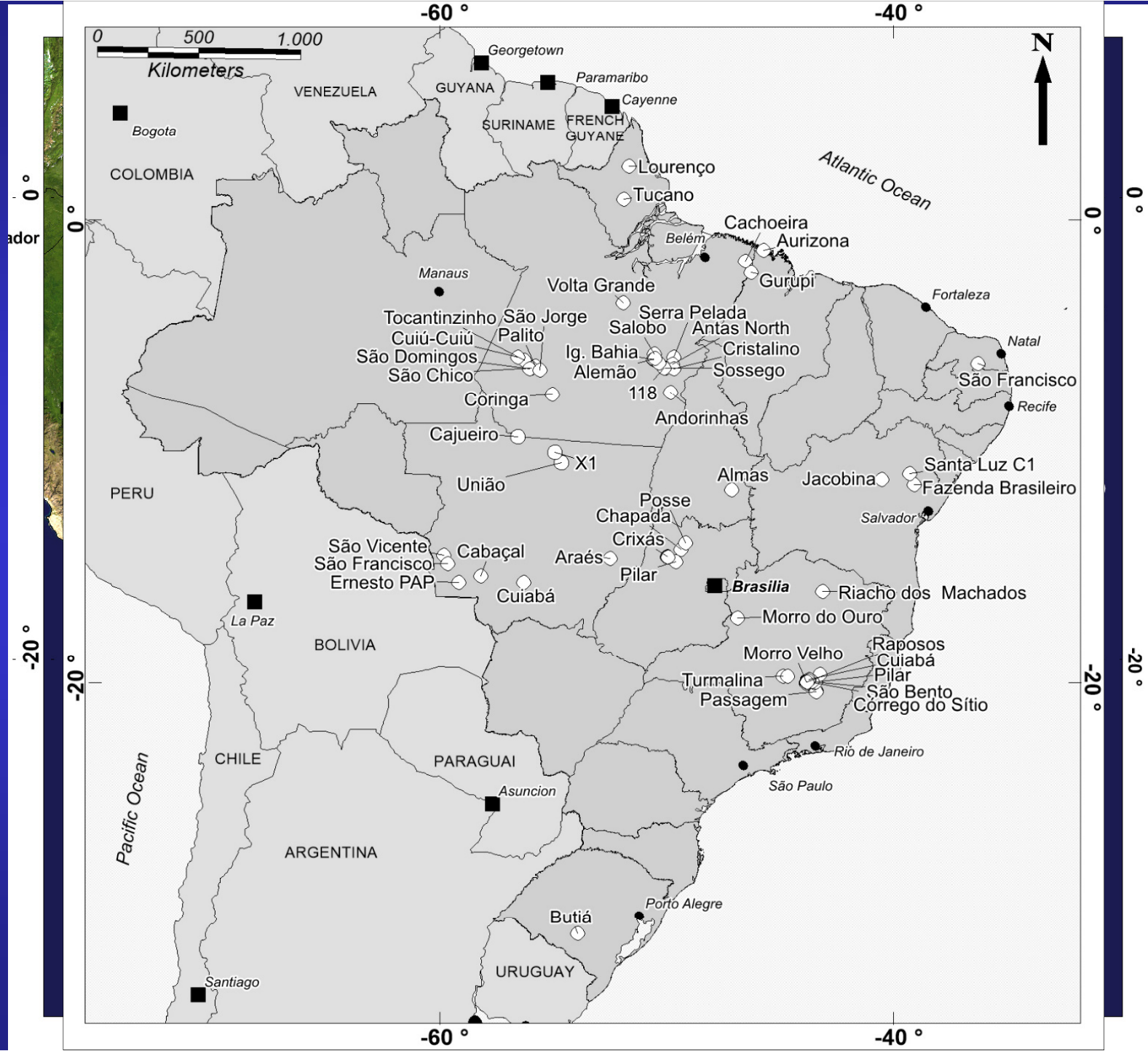
4 undifferentiated complexes

3.5% of Brazil's surface is undifferentiated Archaean-Palaeoproterozoic terrane

Brazil Eras







Gold in Brazil

Brazil, tons of Au → production/reserves/resources
62 deposits (mines) and districts

Lobato et al. (2016)

Main deposit types

- ▶ **Orogenic**
- ▶ **Iron-oxide copper gold (IOCG)**
- ▶ **Hydrothermal magmatic**
(epithermal, porphyry, intrusion related)
- ▶ **Paleoplacers**

Deposit Name	Province or Region	Commodity	Tons (gold)	Moz (gold)
Salobo	Carajás province - PA	Cu-Au	426.38	18.06
Sossego	Carajás province - PA	Cu-Au	99.40	3.20
Cristalino	Carajás province - PA	Cu-Au	150.00	4.82
Igarapé Bahia	Carajás province - PA	Au-Cu	97.00	3.10
Breves	Carajás province - PA	Cu-Au	37.48	1.21
Alemão	Carajás province - PA	Cu-Au	133.73	4.30
Serra Pelada	Carajás province - PA	Au-Pd	56.24	1.81
118	Carajás province - PA	Cu-Au	51.00	1.64
Águas Claras	Carajás province - PA	Au-Cu	23.09	0.74
Antas North	Carajás province - PA	Cu-Au	3.74	0.12
Pedra Branca	Carajás province - PA	Cu-Au	15.48	0,50
Andorinhas	Rio Maria (GBs), south of Carajás – PA	Au	4.91	0,16
Volta Grande	Três Palmeiras greenstone belt - PA	Au	214.36	6.89
Tocantinzinho	Tapajós province - PA	Au	79.04	2.49
Palito	Tapajós province - PA	Au	18.64	0.56
São Chico	Tapajós province - PA	Au	30.21	0.97
Cuiú-Cuiú	Tapajós province - PA	Au	40.60	1.30
Coringa	Tapajós province - PA	Au	28.30	0.91
São Domingos	Tapajós province - PA	Au	4.20	0.14
São Jorge	Tapajós province - PA	Au	54.34	1.71
Castelo dos Sonhos	Tapajós province - PA	Au	8.71	0.28
São Francisco	Aguapeí mobile belt- MT	Au	10.42	0.34
São Vicente	Aguapeí mobile belt- MT	Au	5.57	0.18
Ernesto/Pau a Pique	Aguapeí mobile belt- MT	Au	9.99	0.32
Araés	Nova Xavantina - MT	Au	13.40	0.43
Cabaçal	Alto Jauru - MT	Au-Cu	4.34	0.14
Cajueiro	Juruena-Teles Pires - MT	Au	14.94	0.47
União-Ouro Paz	Juruena-Teles Pires - MT	Au	21.26	0.68
X1	Juruena-Teles Pires - MT	Au	11.44	0.37
Morro do Ouro	Brasília mobile belt - GO	Au	321.46	10.34
Mina Nova & Mina III (Crixás)	Crixás greenstone belt - GO	Au	92.98	2.99

Main **gold** districts and deposits, with ≥ 0.1 Moz contained **Au** (under revision)

Modified from Lobato et al. (2016)

Academia Brasileira de Ciências; book chapter: “*Recursos Minerais no Brasil - problemas e desafios*”

Deposit name	Province or region	Commodity	Tons (gold)	Moz (gold)
Premier	Greenstone belt Crixás - GO	Au	3.56	0.11
Posse	Chapada-Mara Rosa district - GO	Cu-Au	41.33	1.33
Chapada	Chapada-Mara Rosa distric - GO	Cu-Au	127.29	4.08
Pilar	Pilar de Goiás greenstone belt - GO	Au	42.10	1.36
Amapari-Tucano	Vila Nova greenstone belt - AP	Au	167.12	5.37
Lourenço	Distrito Aurífero Lourenço - AP	Au	19.96	0.64
Aurizona	Gurupi province - MA	Au	145.41	4.67
Gurupi	Gurupi province - MA	Au	96.41	3.21
Cachoeira	Gurupi province- PA	Au	38.24	1.23
São Francisco	Borborema province - RN	Au	75.46	2.43
Jacobina	Serra de Jacobina - BA	Au	64.51	2.07
C-Santa Luz	Rio Itapicuru greenstone belt - BA	Au	37.25	1.19
Fazenda Brasileiro	Itapicuru - BA	Au	4.49	3.15
Almas	SE Tocantins - TO	Au	27.31	0.88
Riacho dos Machados	Ouro Fino. Paramirim - MG	Au	47.38	1.52
Itabira	Quadrilátero Ferrífero province – MG	Au	0.71	0.02
Gongo Soco	Quadrilátero Ferrífero province - MG	Au	13.26	0.41
Passagem de Mariana	Quadrilátero Ferrífero province - MG	Au	35.08	1.09
Maquiné	Quadrilátero Ferrífero province - MG	Au	5.28	0.16
Raposos	Quadrilátero Ferrífero province - MG	Au	67.11	2.16
São Bento	Quadrilátero Ferrífero province - MG	Au	56.80	1.77
Lamego	Quadrilátero Ferrífero province - MG	Au	38.53	1.24
Córrego do Sítio	Quadrilátero Ferrífero province - MG	Au	168.62	5.42
Caeté (Pilar e Roça Grande)	Quadrilátero Ferrífero province - MG	Au	70.58	2.31
Bicalho	Quadrilátero Ferrífero province - MG	Au	8.78	0.29
Faria	Quadrilátero Ferrífero province- MG	Au	8.97	0.28
Morro Velho	Quadrilátero Ferrífero province - MG	Au	332.02	10.71
Cuiabá	Quadrilátero Ferrífero province - MG	Au	174.80	5.62
Turmalina	Onça Pitangui region (NW QF) - MG	Au	35.41	1.14
São Sebastião	Onça Pitangui region (NW QF) - MG	Au	19.86	0.64
Butiá (Lavras do Sul)	Lavras do Sul - RS	Au	15.99	0.52

Main **gold** districts and deposits, with ≥ 0.1 Moz contained **Au** (under revision)

Modified from Lobato et al. (2016)

Academia Brasileira de Ciências; book chapter: “Recursos Minerais no Brasil - problemas e desafios”

Brazil, tons of Au → production/reserves/resources

62 deposits (mines) and districts

Pie chart

62 gold districts and deposits

≥ 0.1 Moz contained Au

IOCGs: Salobo, Sossego, Cristalino, Igarapé-Bahia, Alemão, 118

Orogenic gold: Volta Grande, Morro do Ouro, Crixás, Posse, Pilar, Tucano, Aurizona, Gurupi, São Francisco (?)

Orogenic gold: C1, Almas, Riacho dos Machados, Passagem, Raposos, São Bento, Lamego, Córrego do Sítio, Caeté, Morro Velho, Cuiabá

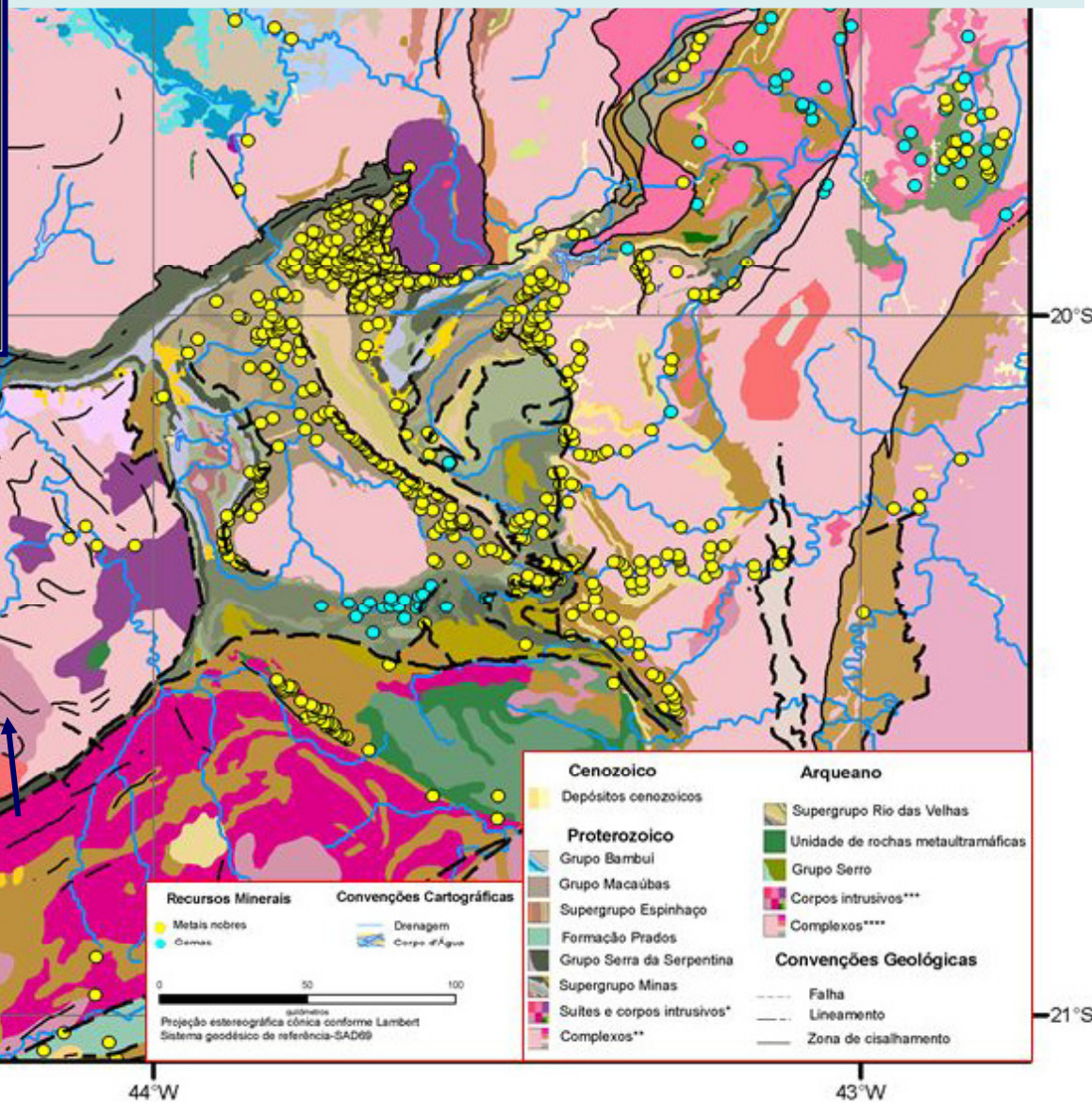
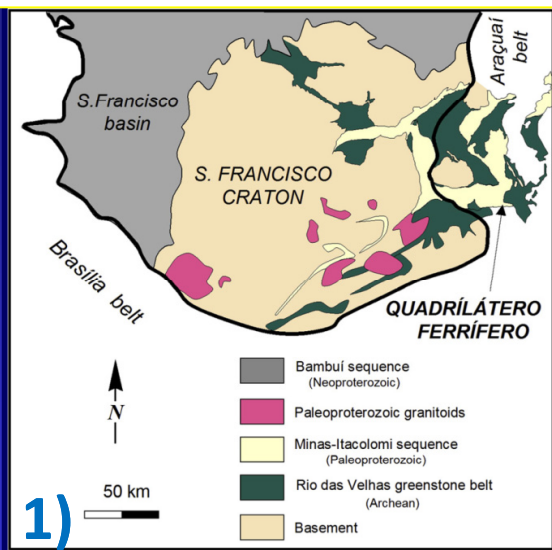


Others: Serra Pelada (replacement in sedimentary rocks); Tocantinzinho, Palito, Cuiu-Cuiu (porphyry); Chapada (metamorphosed porphyry); São Jorge (epithermal type); Jacobina (metaconglomerate hosted).

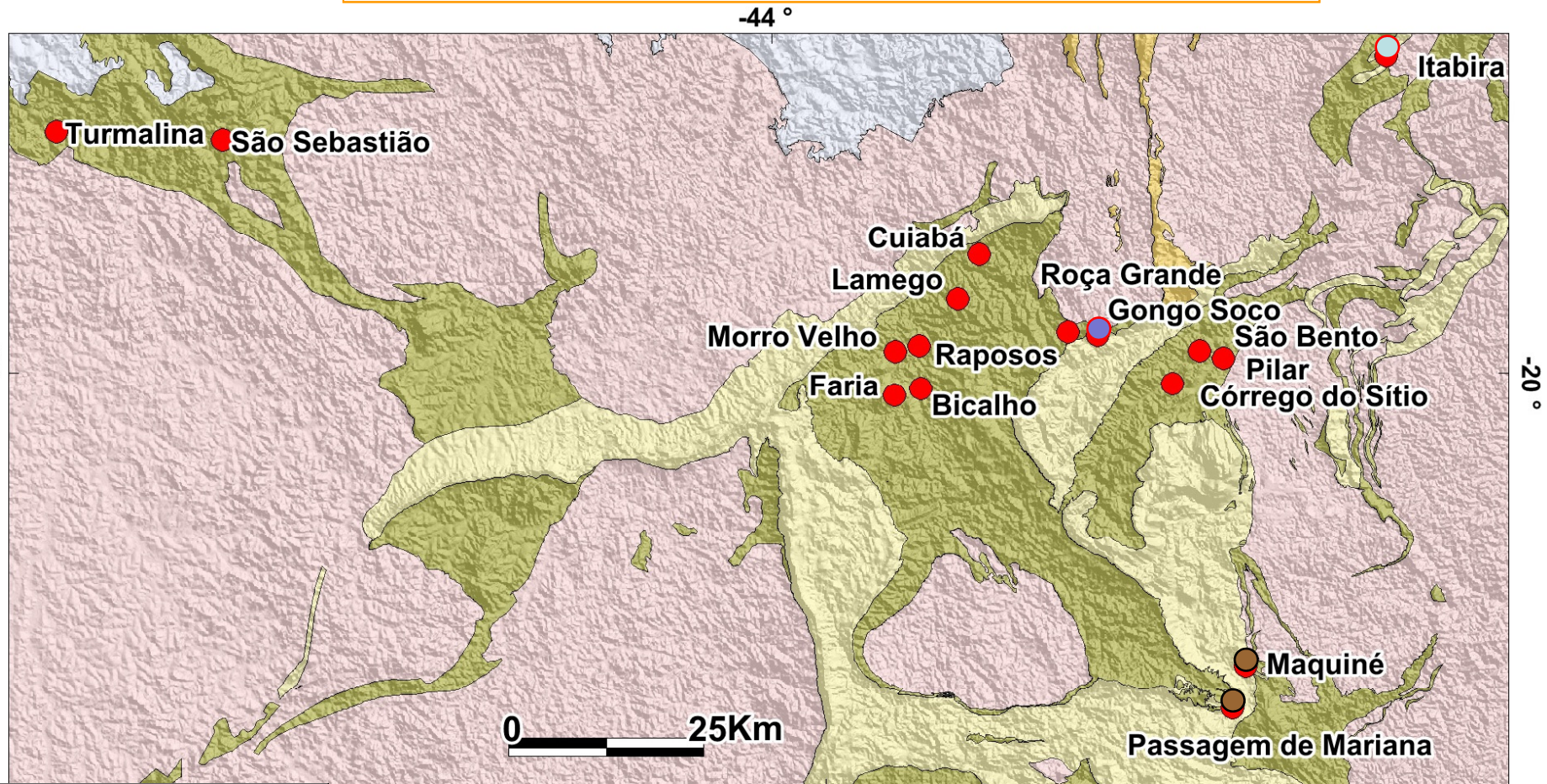
SOUTHERN SÃO FRANCISCO CRATON

Simplified geological maps where the Quadrilátero Ferrífero mining district:

1) is located in the context of the southern São Francisco craton (from Alkmim & Martins-Neto 2012); and **2)** shows location of main Palaeoproterozoic BIF-hosted **iron deposits**, and different types of **gold deposits** in Archaean and Palaeoproterozoic sequences (from Lobato et al. 2014).



Quadrilátero Ferrífero Archaean orogenic deposits



Simplified Legend



(I) Archaean Rio das Velhas Supergroup, greenstone belt (orogenic gold deposits) ●

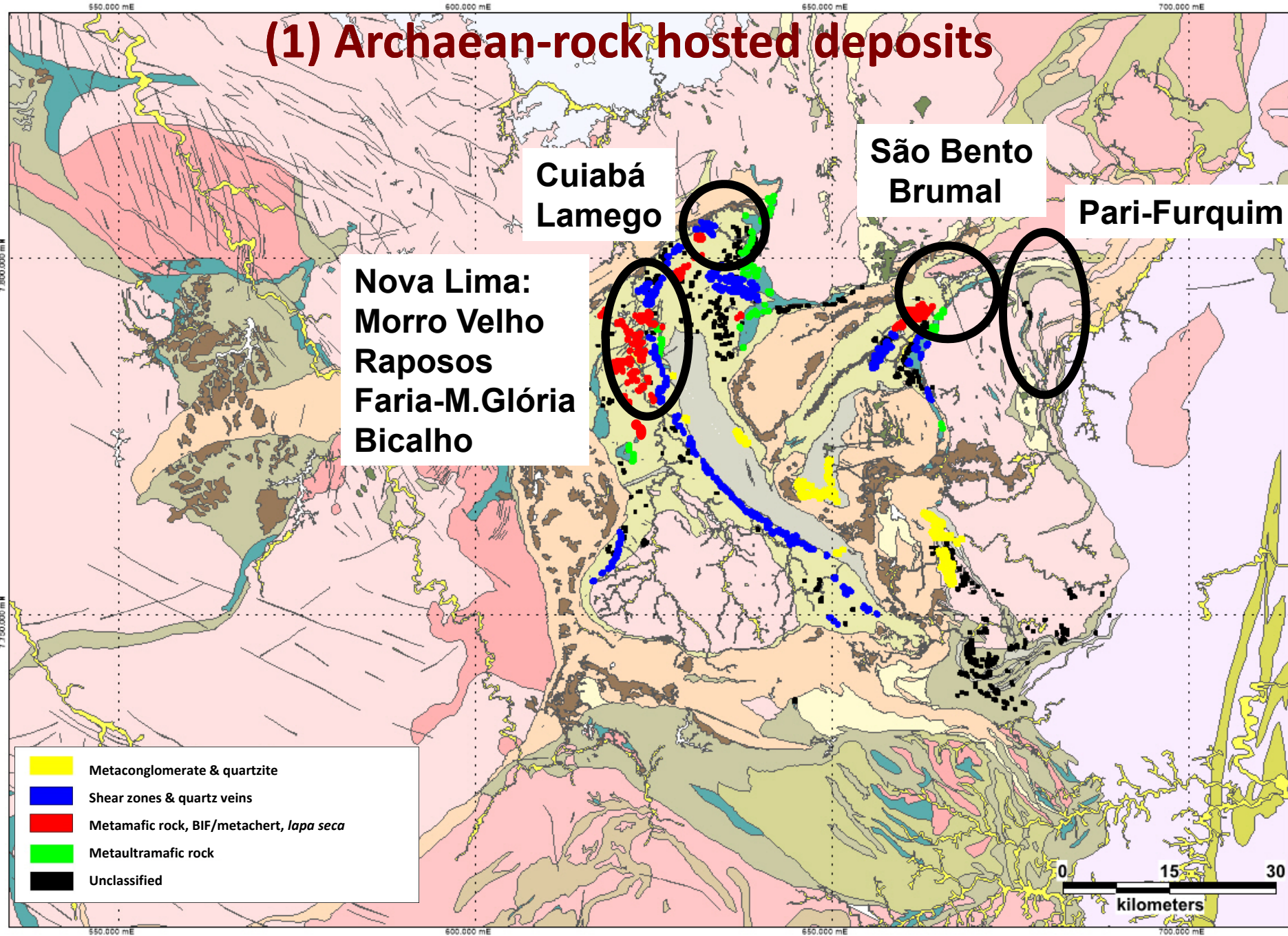
(II) Metasedimentary Palaeoproterozoic Minas Supergroup

1- orogenic gold in the contact with Nova Lima schists ●

2- basal Py-rich conglomerates

3- lodes of Pd-rich Au in friable iron ore (*jacutinga*) ○

(1) Archaean-rock hosted deposits



Quadrilátero Ferrífero Archaean orogenic deposits

World-class Cuiabá deposit

Replacement style, and massive/
banded pyrite ore hosted in BIF

2672 ± 14 Ma

Lobato et al. (2007)



Vein style hosted
in mafic rock



Córrego do Sítio lineament

2694 ± 34 Ma in associated dyke

Velasquez (2006)



Arsenopyrite-rich ore in turbidite host
and smoky quartz with free gold



Lamego gold deposit



2730 ± 42 Ma monazite
 516 Ma xenotime

Martins et al. (2016)



(1) Cuiabá



(1) Lamego

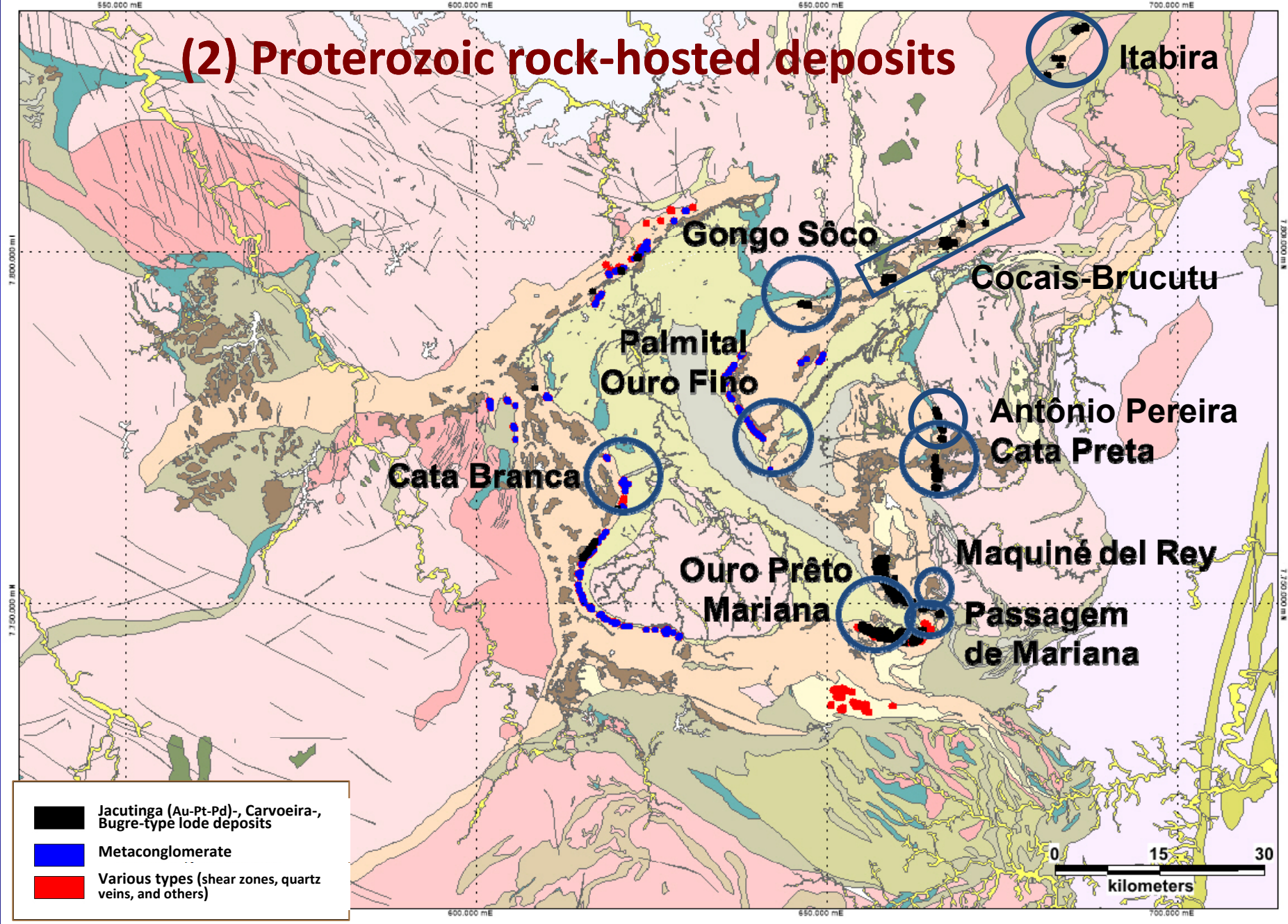


Quadrilátero Ferrífero Archaean orogenic deposits

(1) Lamego



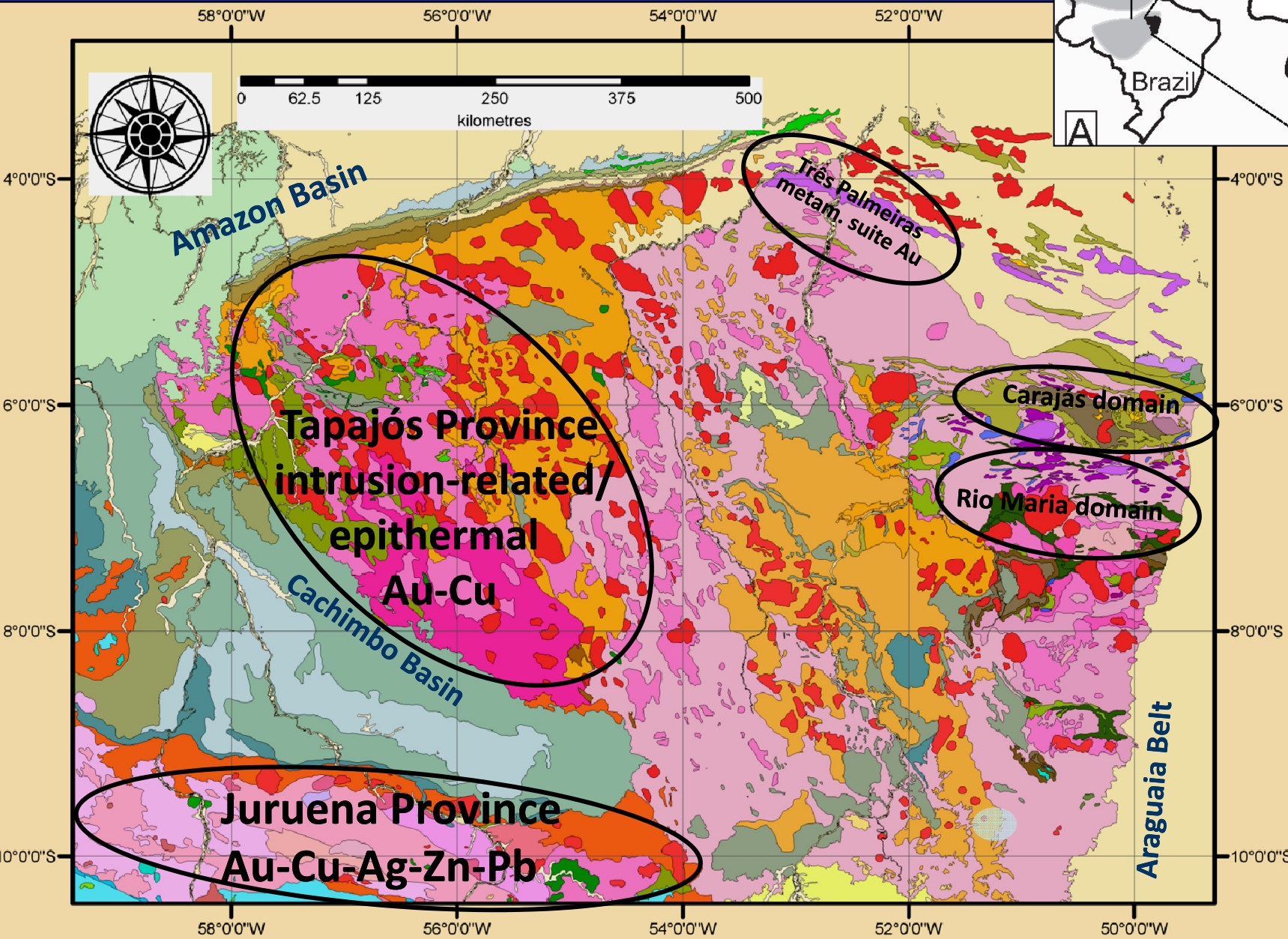
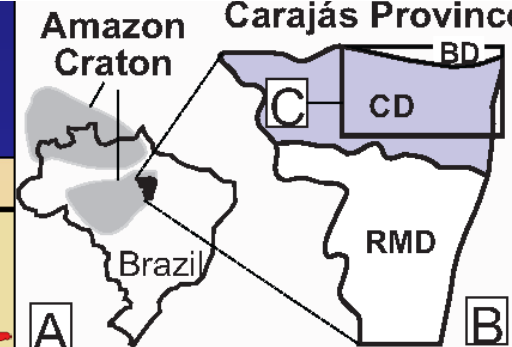
(2) Proterozoic rock-hosted deposits



AMAZON CRATON

Geological Survey of Brazil- CPRM

Bizzi et al. (2003)

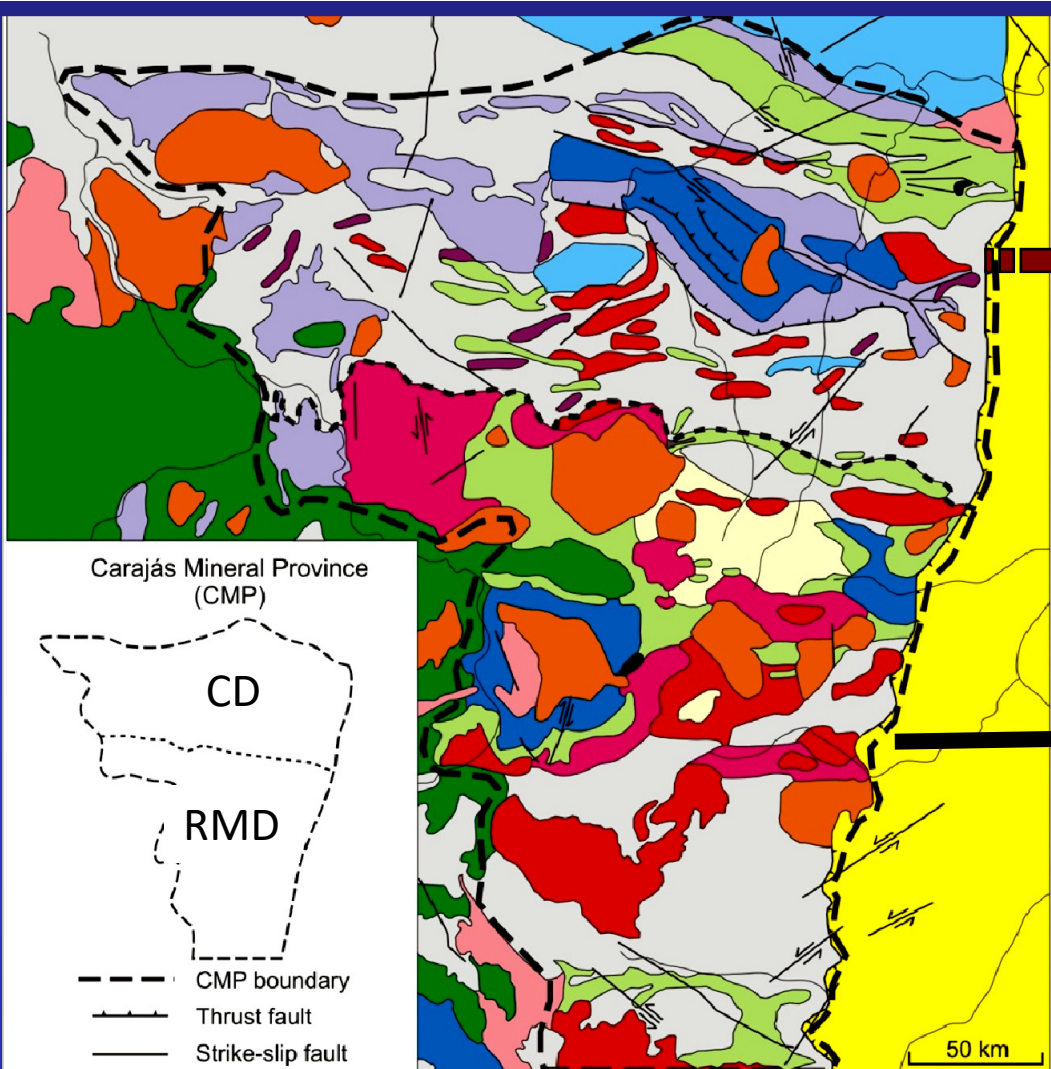


CD:

Carajás domain

RMD:

Rio Maria domain

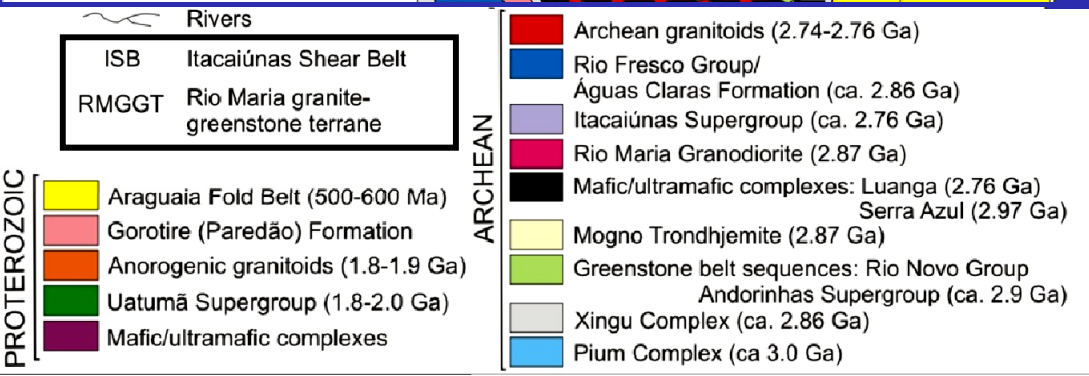


➤ Northern Carajás (Neo-Archaean) domain

➔ 2.76 to 2.68 Ga granitoids, metavolcano-sedimentary rocks & the Meso-Archaean igneous and metamorphic Pium & Xingu complexes

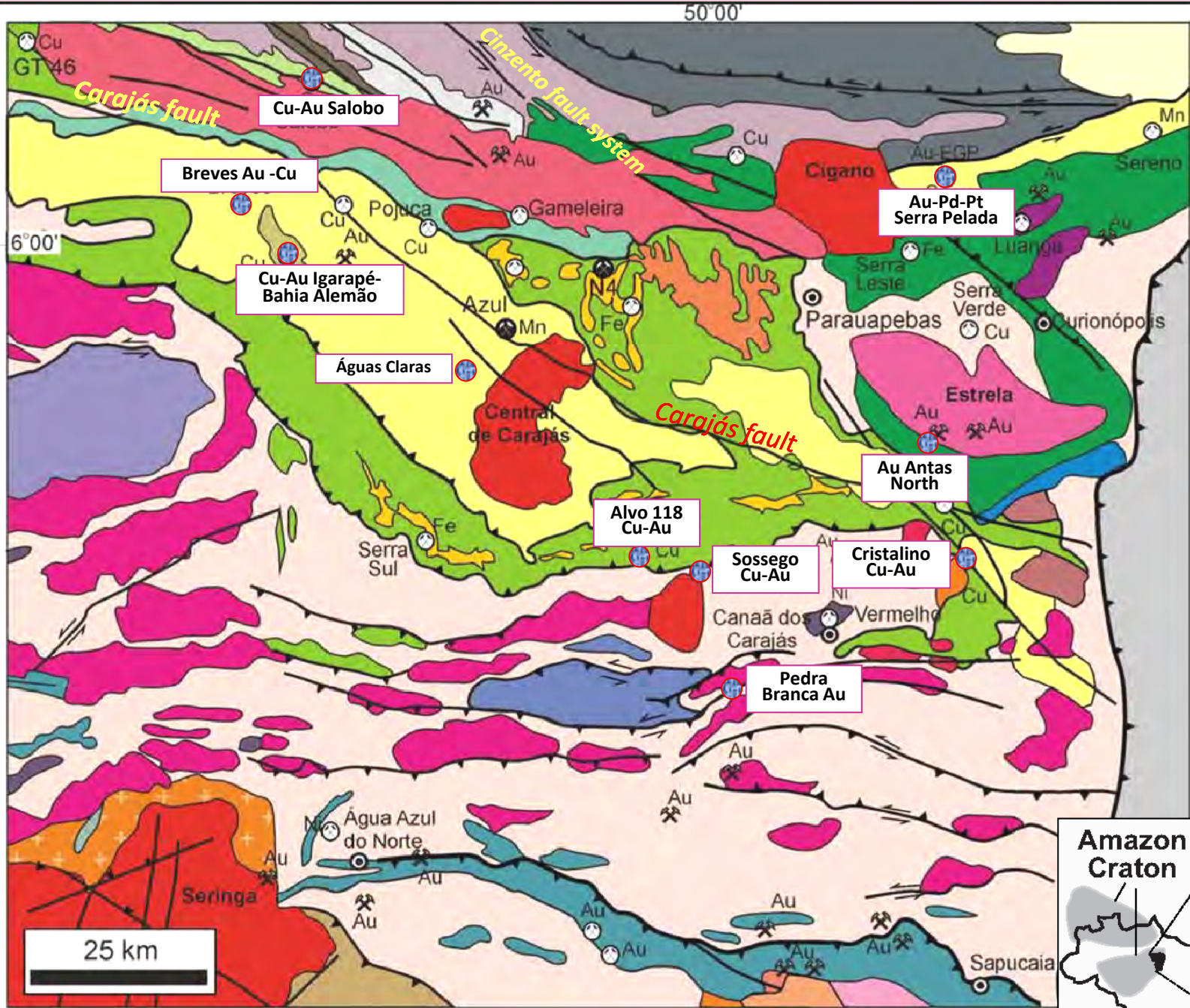
➤ Southern Rio Maria (Meso-Archaean) domain

➔ 3.05 to 2.85 Ga granite-greenstone rocks



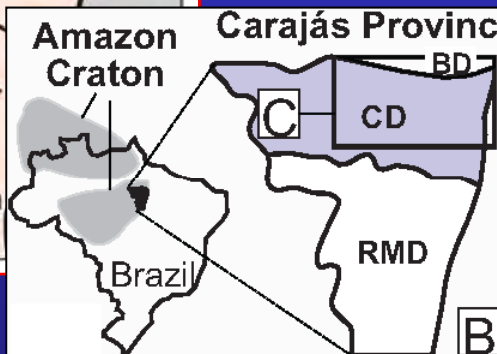
Carajás mineral province

(Villas & Santos 2001)



Geology of Carajás domain and surroundings (modified after Vasquez et al. 2008), in Monteiro et al. (2014). Main deposits > 0.2 Moz reserves/resources of Au are indicated

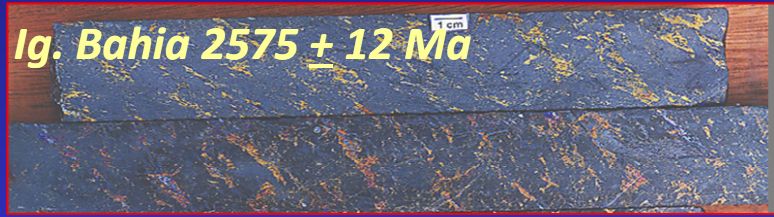
Carajás



Carajás - Archaean & Palaeoproterozoic IOCGs

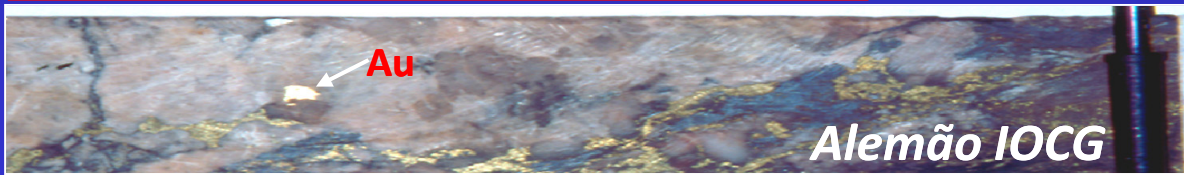
Alemão IOCG

Chalcopyrite ore in magnetite



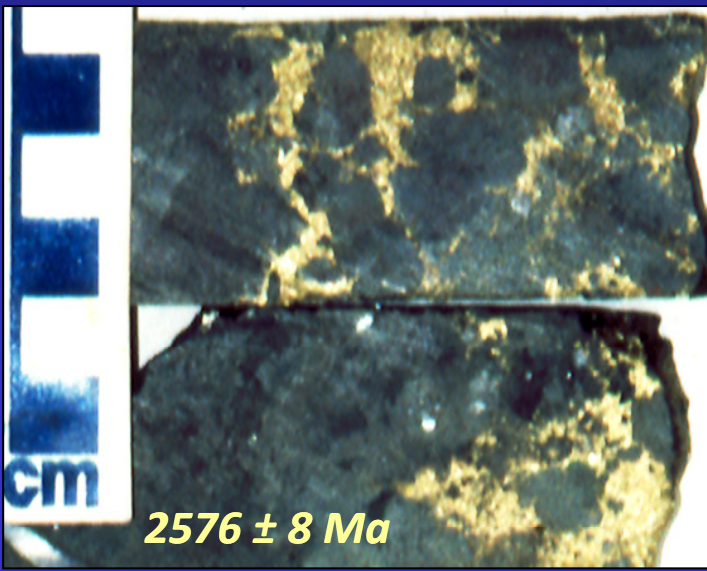
Ig. Bahia 2575 + 12 Ma

Feldspar-rich breccia. Chalcopyrite at the expense of magnetite. Free gold grain.



Alemão IOCG

Salobo IOCG



2576 ± 8 Ma

Brecciated mafic rock. Hornbl, Cpy, Magnet, Py, & Apatite.



Sequeirinho IOCG
2.71–2.68 Ga

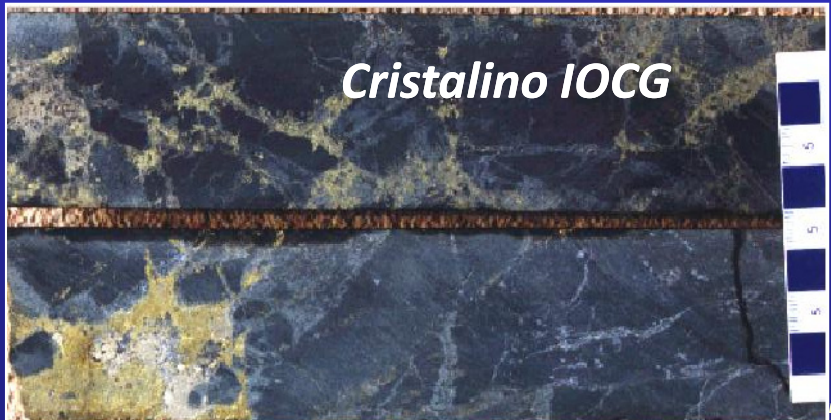
Sulphide breccias

BRECHA SULFETADA SEQUEIRINHO. CLASTO DE ACNOTILA E MAGNETITA CIMENTADOS POR CALCOPIRITA. SEQUEIRO.



Sossego IOCG
1.90–1.88 Ga

see review in Moreto et al. (2015)



Cristalino IOCG

Carajás - Palaeoproterozoic Au-bearing polymetallic systems

Serra Pelada Au-Pd-Pt



Gold nugget, 60 kg



1997



Garimpeiros gold rush

Águas Claras Cu(Au)



Breves Cu-Au-(W-Bi-Mo-Sn)

Chalcopyrite breccia in hydrothermally altered granite



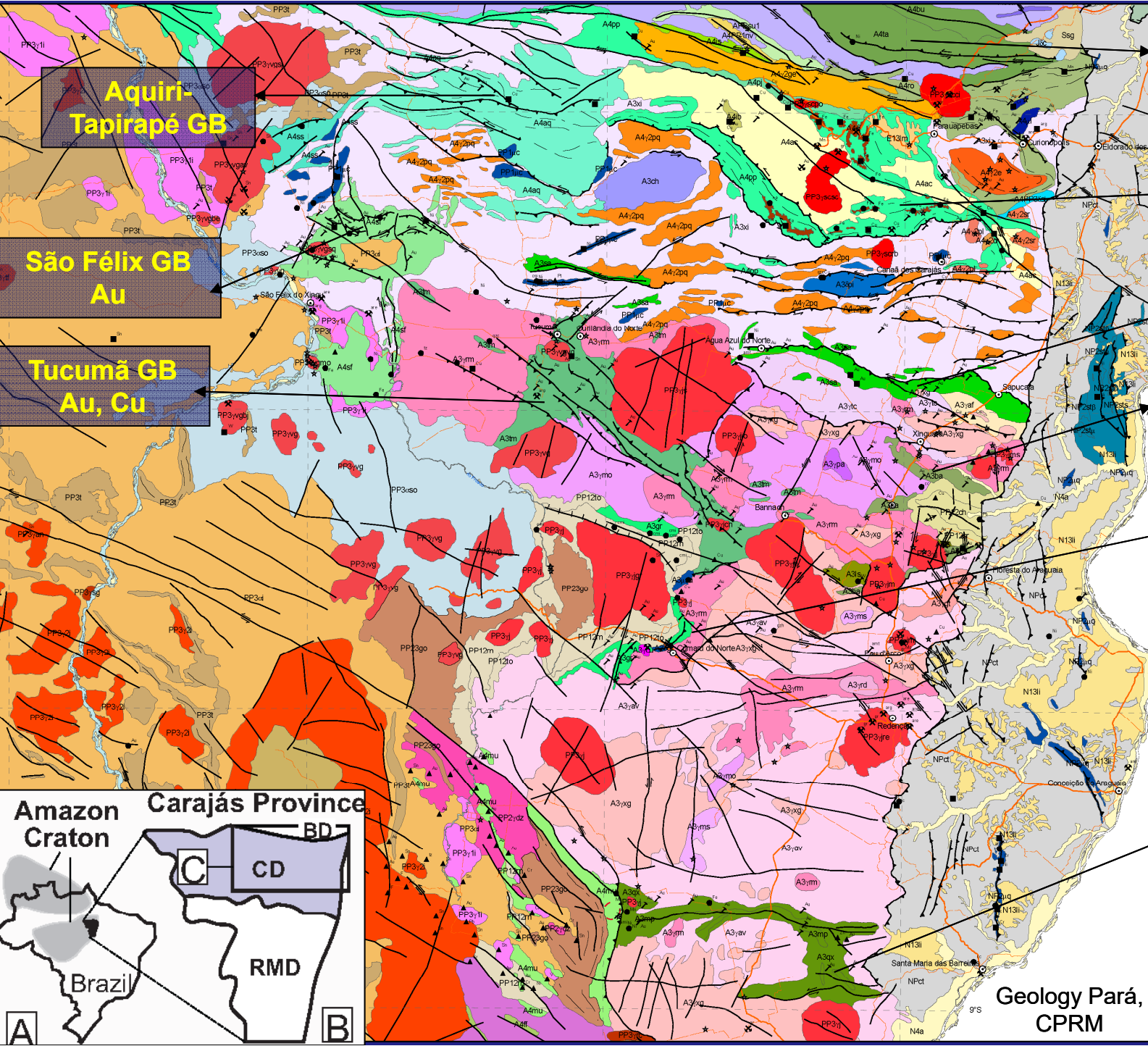
Fr149

Botelho et al. 2005



Carbon gold-rich ore

Berni et al. (2014)



Buritirama Sq.
Mn, Fe

Grão Pará GB
Fe, BM, Au, U,
Ni, PGE

Sapucaia GB Au

Rio Maria GB
Au, Fe

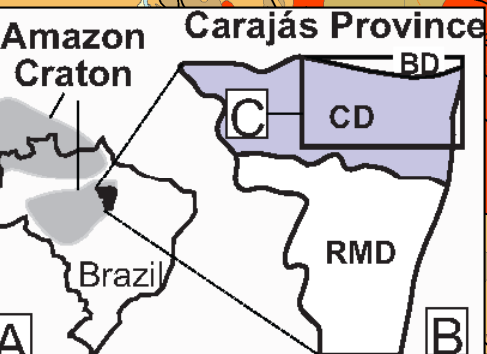
Gradaús GB
Au, BM

Inajá GB
Au, Fe

Aquiri-Tapirapé GB

São Félix GB
Au

Tucumã GB
Au, Cu



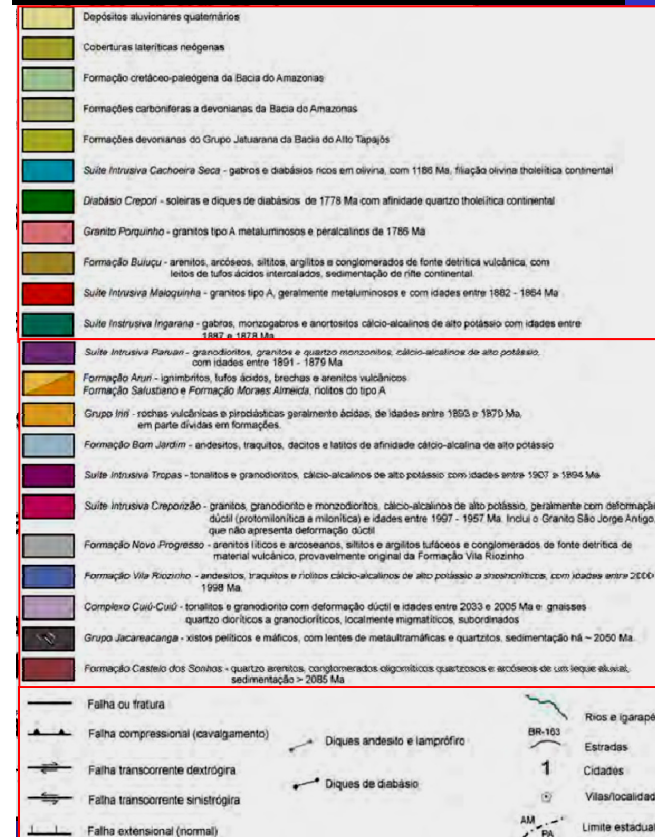
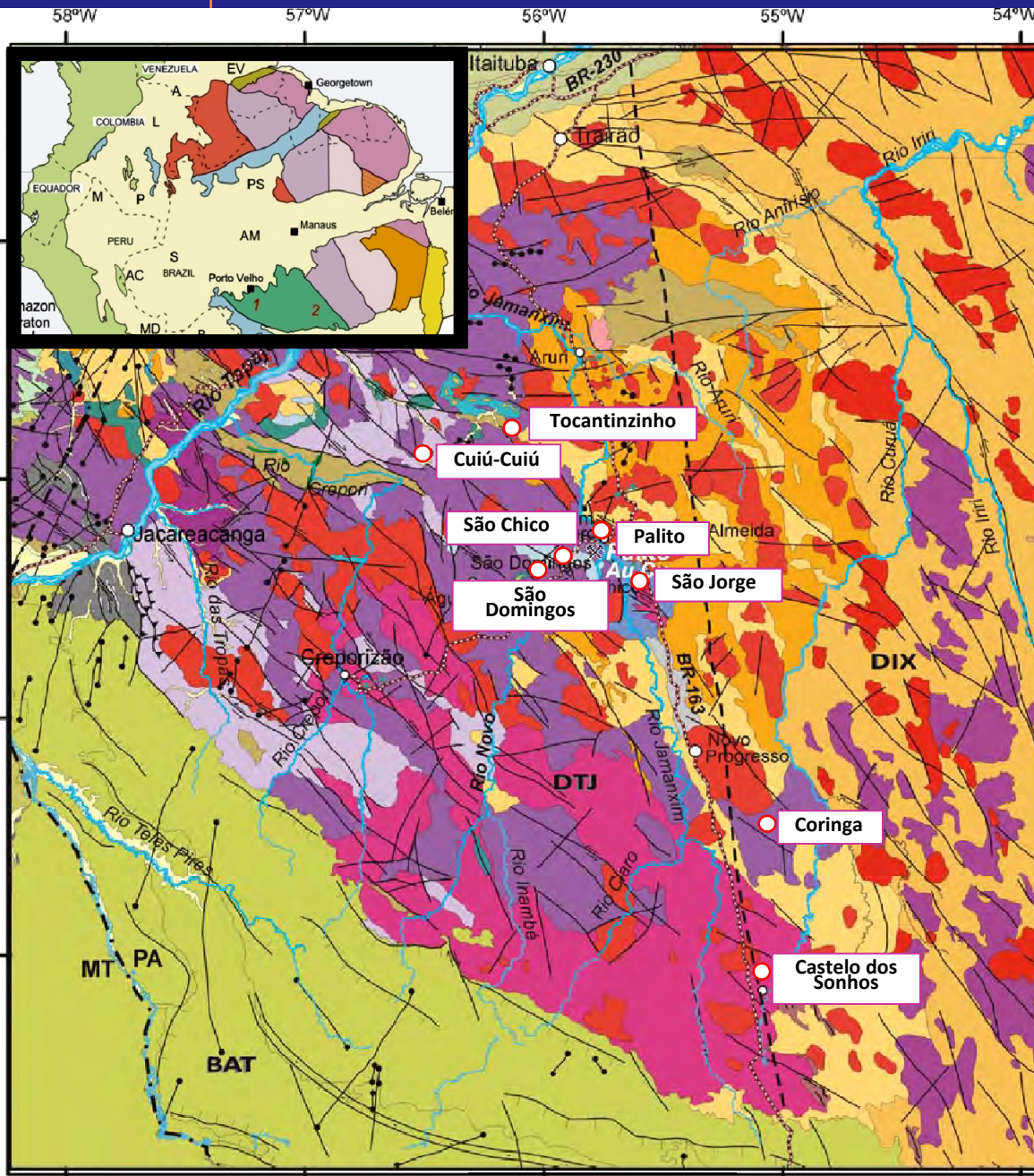
Tapajós – Palaeoproterozoic magmatic-hydrothermal systems

Tapajós

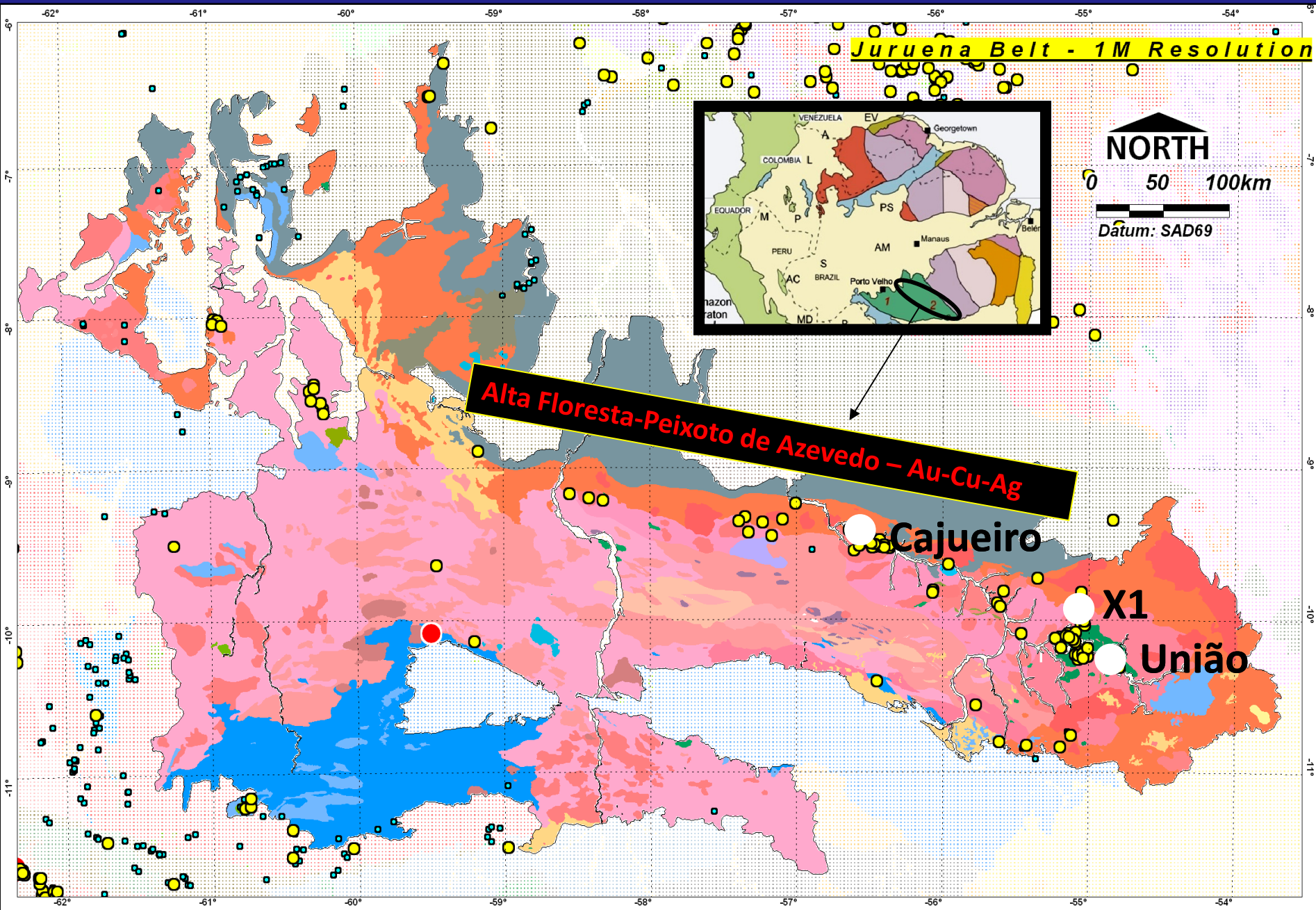
Geology Tapajós domain (modified from Vasquez et al. 2008), in Juliani et al. (2014).

Main deposits > 0.2 Moz reserves/resources of Au are indicated

Two main mineralisation epochs: 2.0 & 1.88 Ga

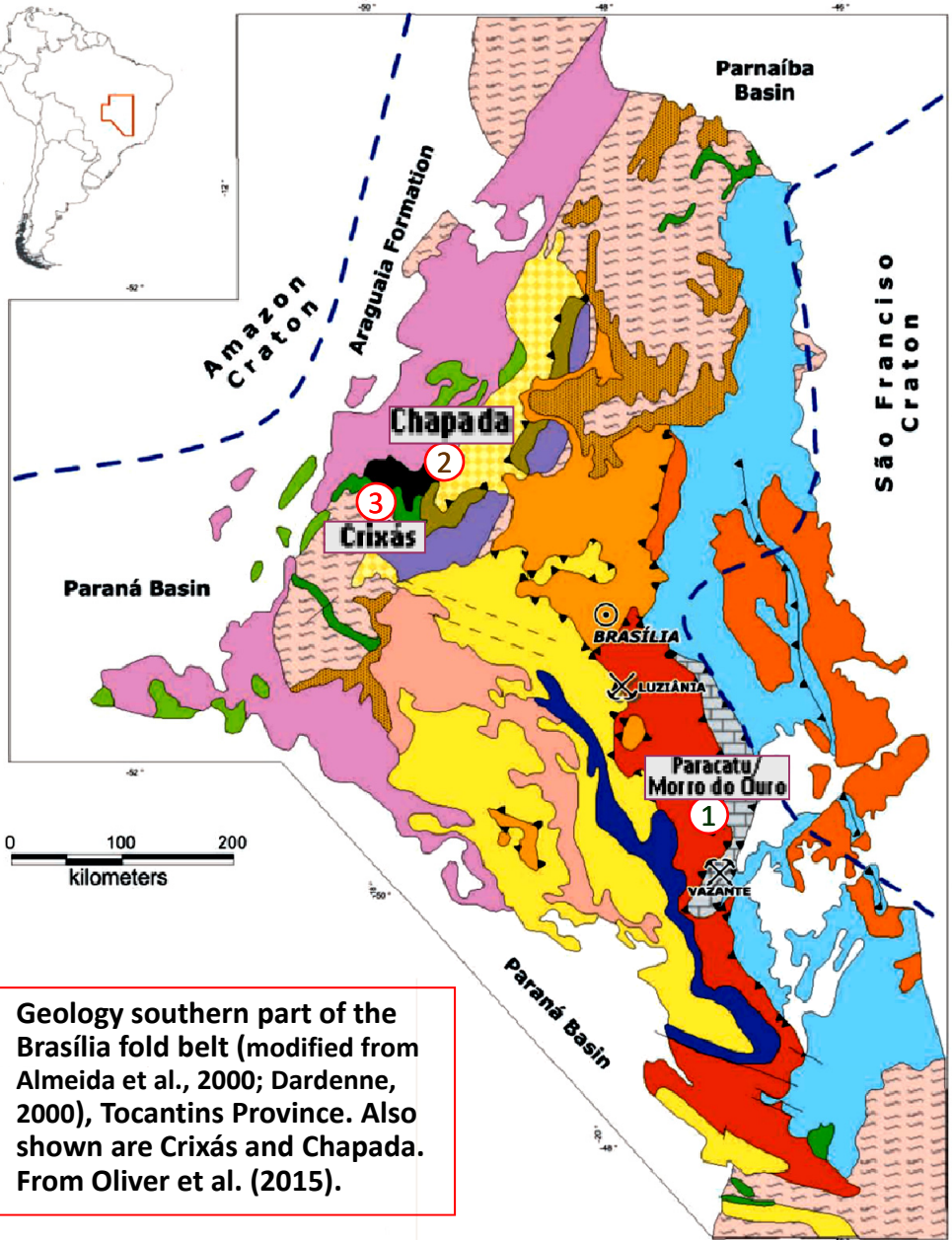


Juruena – magmatic-hydrothermal systems



BRASÍLIA BELT, TOCANTINS PROVINCE (W SÃO FRANCISCO CRATON)

Mara Rosa-Crixás gold province & Paracatu orogenic gold deposit



Geology southern part of the Brasília fold belt (modified from Almeida et al., 2000; Dardenne, 2000), Tocantins Province. Also shown are Crixás and Chapada. From Oliver et al. (2015).

<p>Phanerozoic</p> <ul style="list-style-type: none"> Paraná, Parnaíba and São Francisco Basins and Araguaia Formation <p>Neoproterozoic</p> <ul style="list-style-type: none"> Orthogneiss Volcano-sedimentary Sequence Três Marias Formation Paraopeba Subgroup Ibiá Group Araxá Group Felsic and Mafic Granulites and Orthogneiss <p>Paleoproterozoic</p> <ul style="list-style-type: none"> Volcano-sedimentary Sequence - Santa Terezinha <p>Archean</p> <ul style="list-style-type: none"> Granite-gneiss Terrains Greenstone Belt 	<p>Meso / Neoproterozoic</p> <ul style="list-style-type: none"> Paranoá Group Vazante Group Canastra Group <p>Paleo / Mesoproterozoic</p> <ul style="list-style-type: none"> Araí Group Serra da Mesa Group Mafic-ultramafic Complex Volcano-sedimentary Sequence - West Border
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1

Paracatu

2

Chapada

3

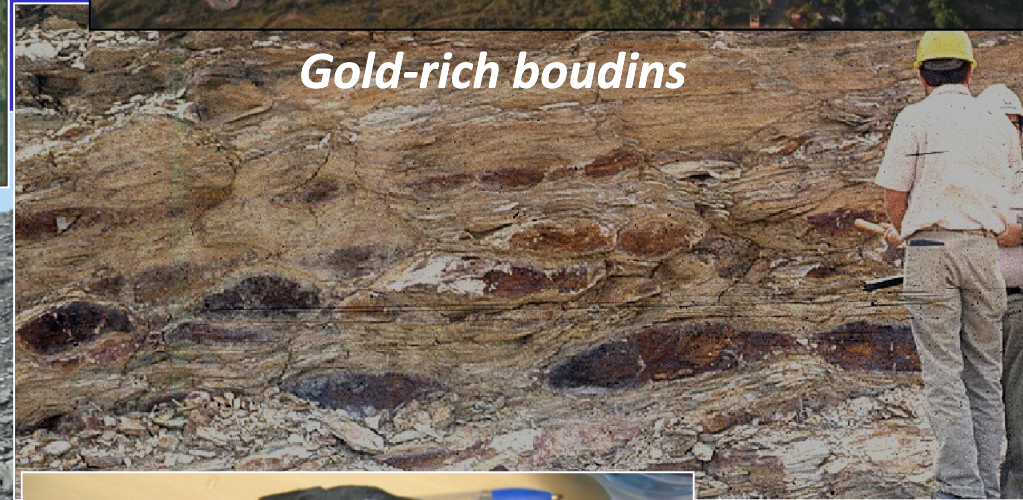
Crixás

Thrust Fault	Pirineus Syntaxis
Fault	Border of Craton
Mine	City

Morro do Ouro (orogenic) gold deposit – Neoproterozoic metasedimentary rocks



Brazil's largest operating gold mine !!!



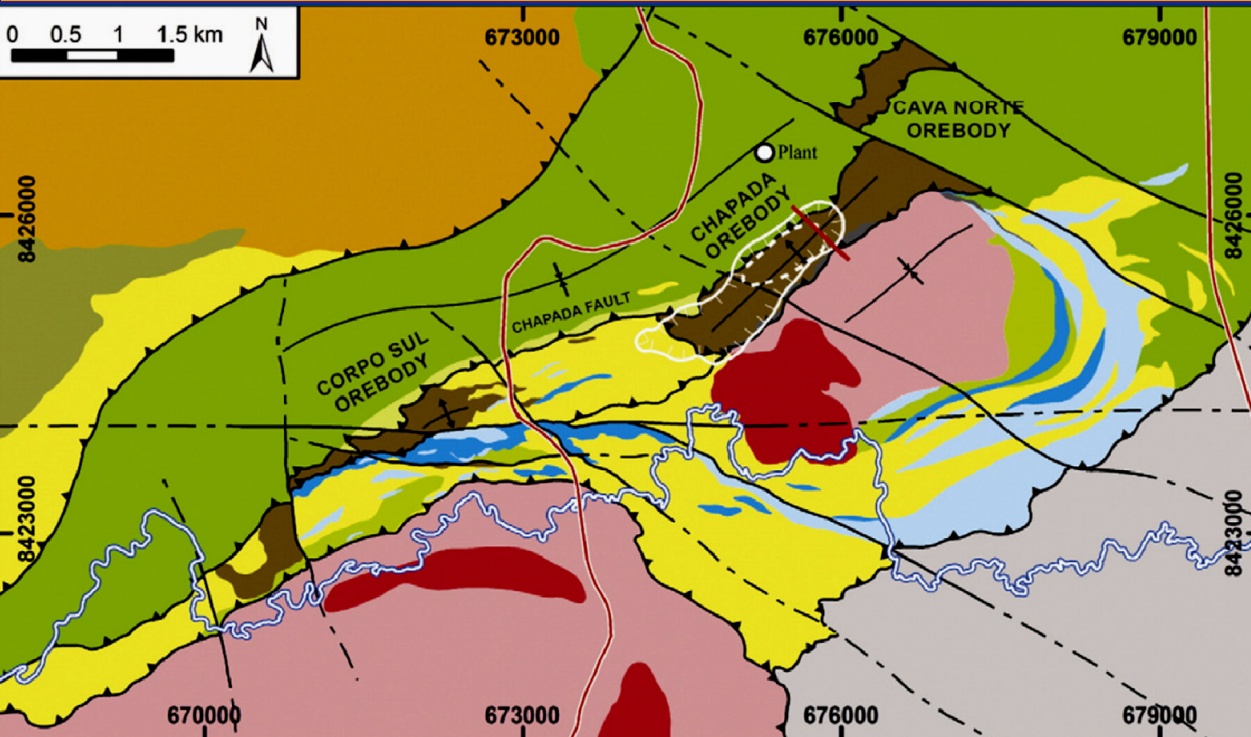
Gold-rich boudins



Carbonaceous phyllite



Chapada Cu-Au porphyry type deposit - Neoproterozoic



Late Neoproterozoic Intrusive Rocks

Metadiorite

Hydrothermal Tectonites

Amphibole schist

Hydrothermally Altered Rocks

- Quartzites and kyanite (advanced argillic alteration)
- Kyanite- and muscovite -rich schist (argillic alteration)
- Muscovite- and quartz -rich schist (phyllic alteration)
- Amphibole- and epidote -rich rocks (propylitic alteration)
- Biotite-rich schist (potassic alteration)

Early Neoproterozoic Intrusive Rocks

Unmineralized tonalitic to dioritic gneisses

Neoproterozoic Mara Rosa Sequence

- Metasedimentary rocks
- Garnet-amphibole-plagioclase gneiss
- Acid-intermediate metavolcaniclastic rocks
- Amphibolite

Paleoproterozoic Campinorte Sequence

Metavolcanosedimentary rocks

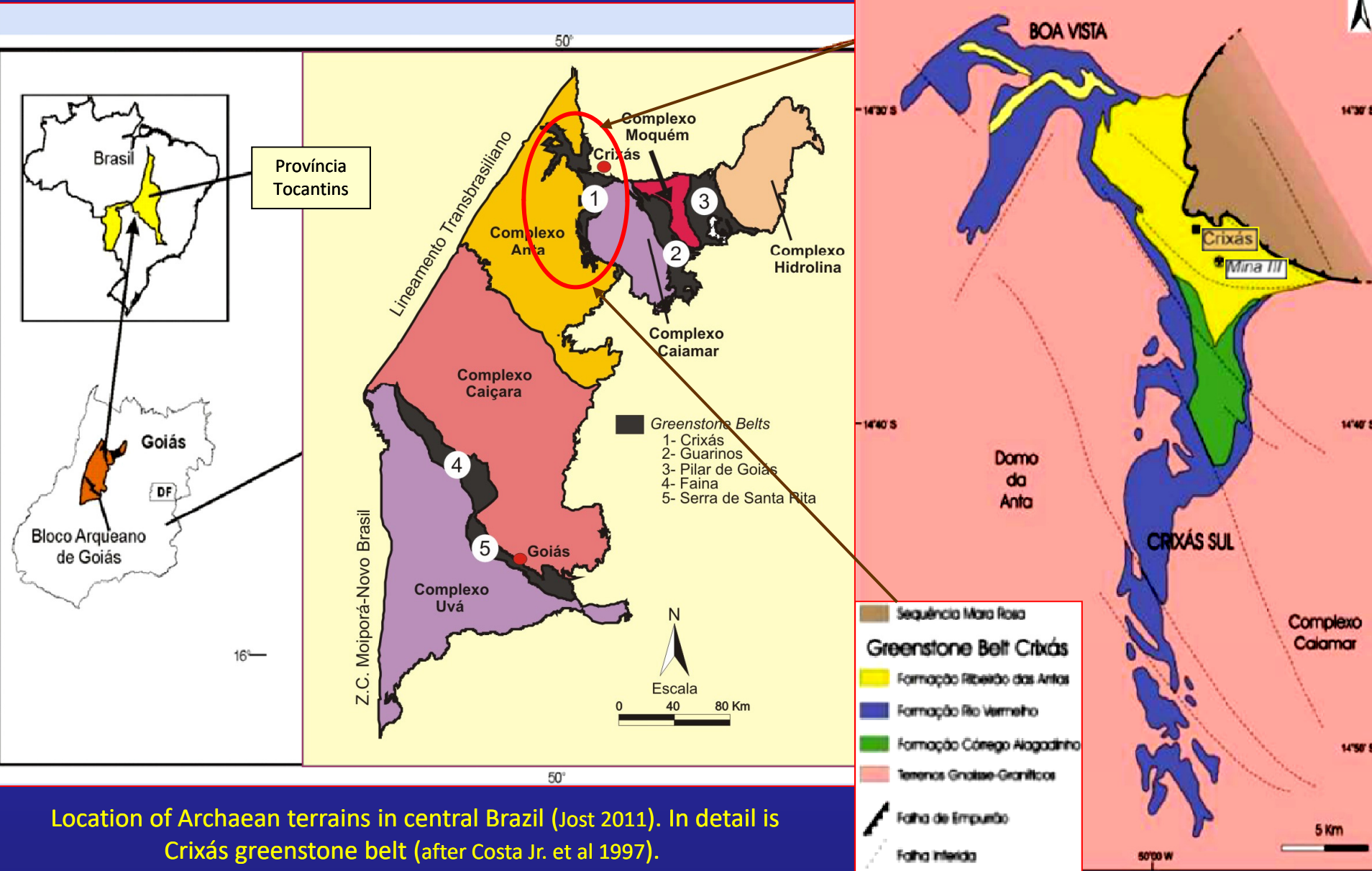
STRUCTURES and CARTOGRAPHIC CONVENTIONS

- Transcurrent Fault
- Rio dos Bois Thrust Fault
- Syncline
- Anticline
- Road
- Rio dos Bois
- PIT
- 345 level
- Section
- Drill Holes
- Chapada Fault
- Cu-Au ore zone

0 200 m

Geology of the Chapada Cu-Au deposit, with lithologic units, orebodies, major structures, and final contour area of open pit mine of ore body (from Oliveira et al. 2016).

Crixás Archaean-Palaeoproterozoic greenstone belts & surroundings (orogenic gold)

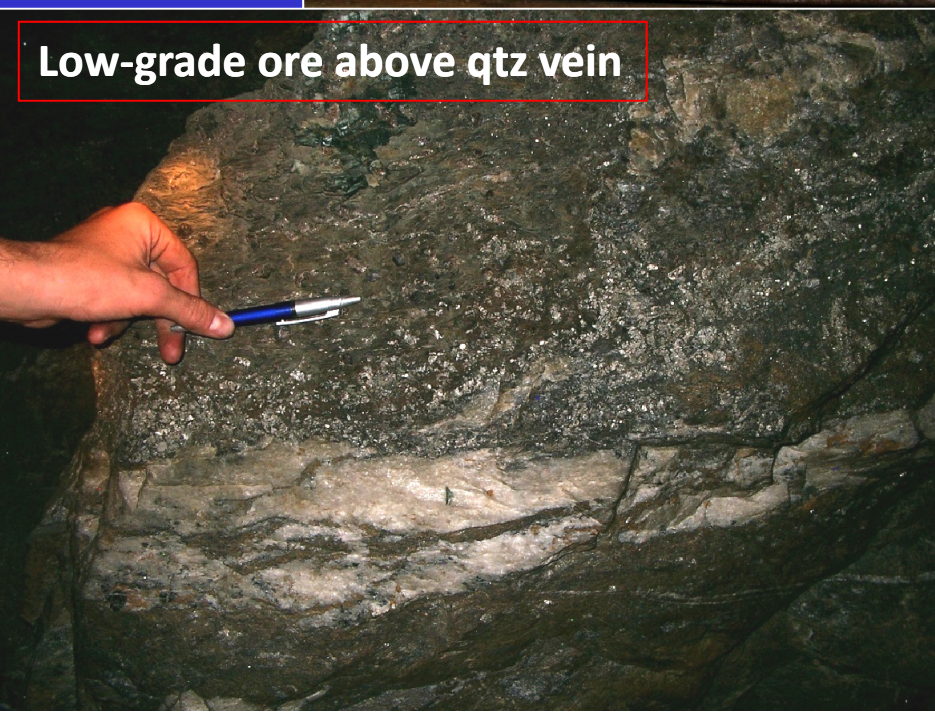


Location of Archaean terrains in central Brazil (Jost 2011). In detail is Crixás greenstone belt (after Costa Jr. et al 1997).

Crixás Archaean-Palaeoproterozoic greenstone belts & surroundings (orogenic gold)



Low-grade ore above qtz vein



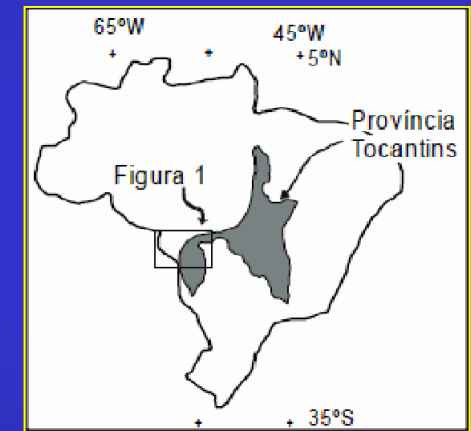
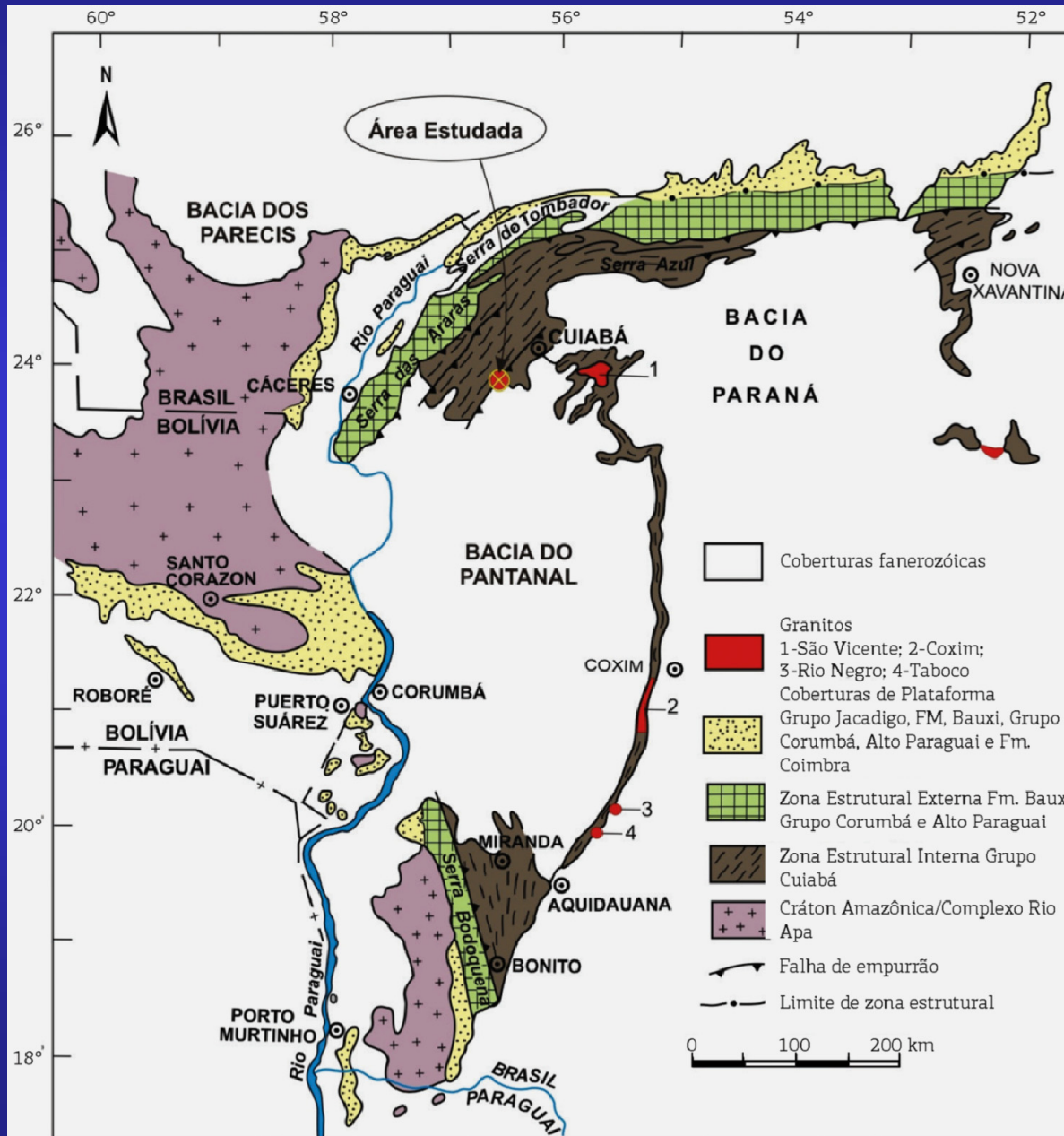
Pyrrhotite and arsenopyrite in ore zone



PARAGUAY BELT, TOCANTINS PROVINCE (SW SÃO FRANCISCO CRATON)

Orogenic gold, Baixada Cuiabana, MT

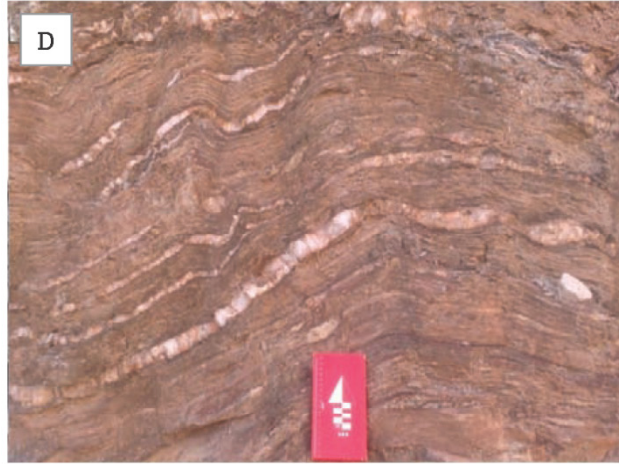
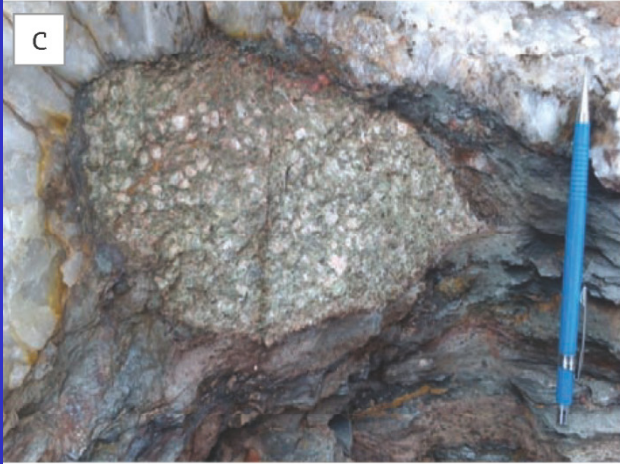
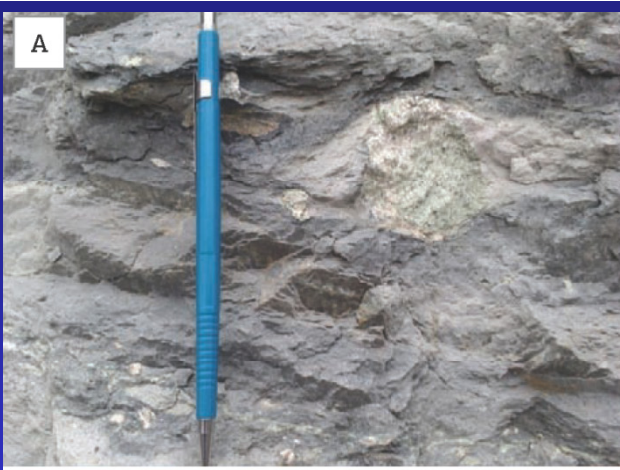
Neoproterozoic metasedimentary rocks



Regional geological map, showing the Cangas-Poconé lineament. Modified after Alvarenga & Trompette (1993). Reproduced from Costa et al. (2015)

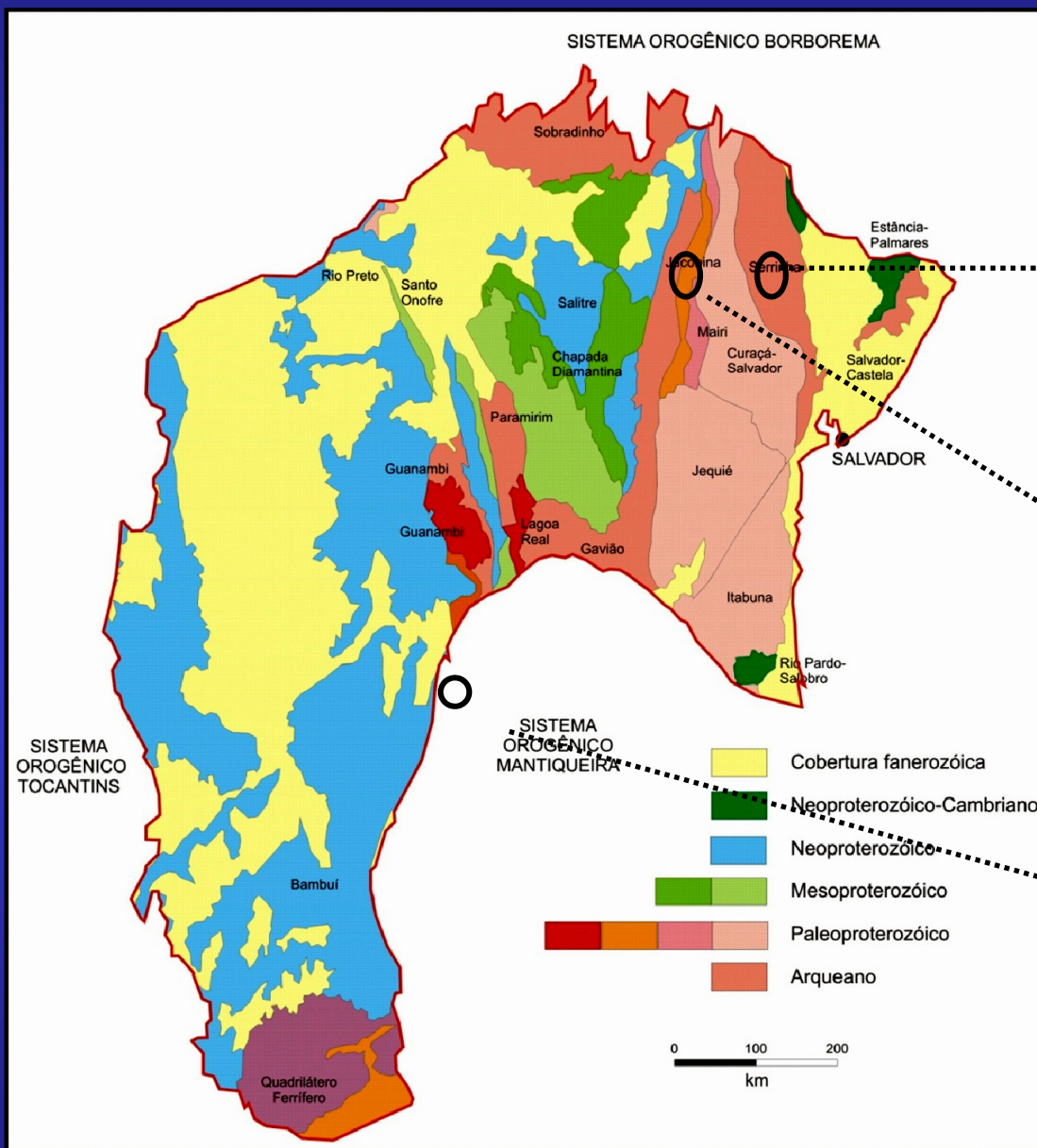
Orogenic gold, Baixada Cuiabana, MT

Neoproterozoic



(A) Grey phyllite; **(B)** Same showing slaty cleavage (Sn); **(C)** Phyllite with granite pebbles ; **(D)** Metarhythmite defined by alternating cm-thick bands of grey sericite phyllite and meta-sandstone; **(E)** Metarenite pebbles in grey phyllite; **(F)** Fine- to medium-grained, brownish metarenite (from Costa et al., 2015)

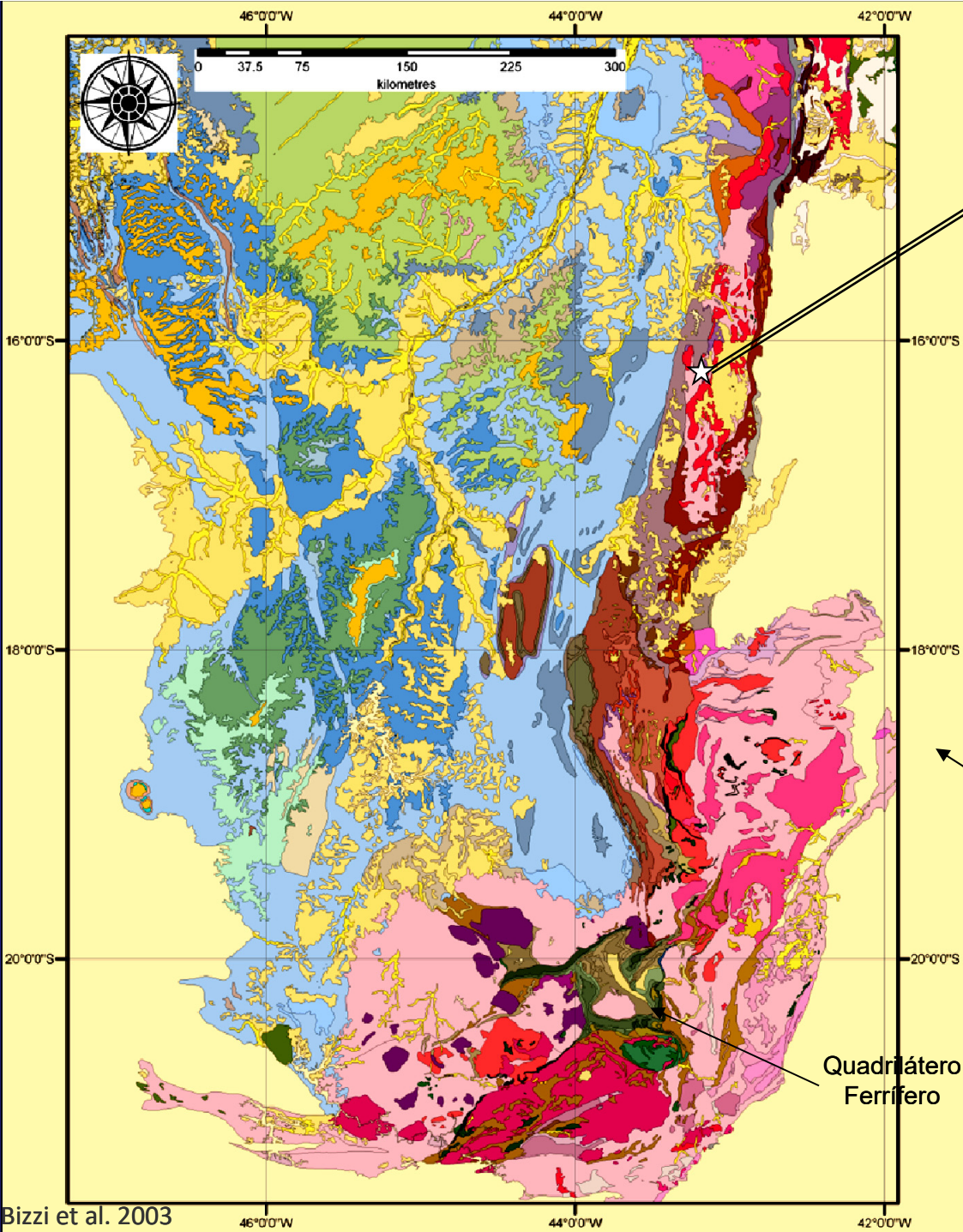
EASTERN SÃO FRANCISCO CRATON & ARAÇUAÍ BELT



Fazenda Brasileiro

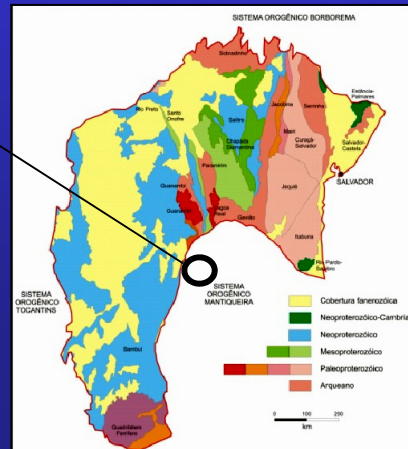
Jacobina

Riacho dos Machados



Riacho dos Machados

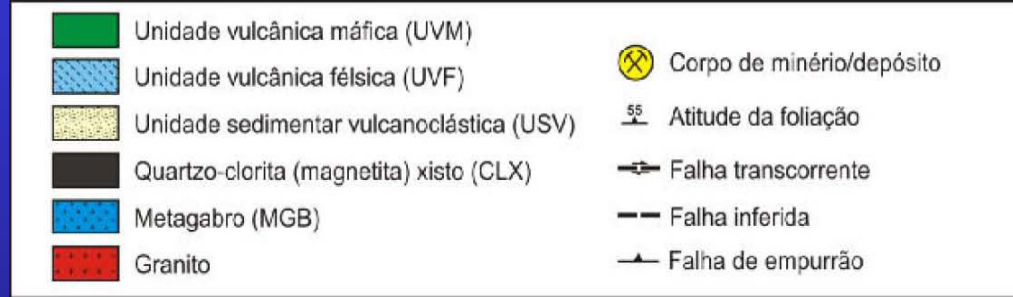
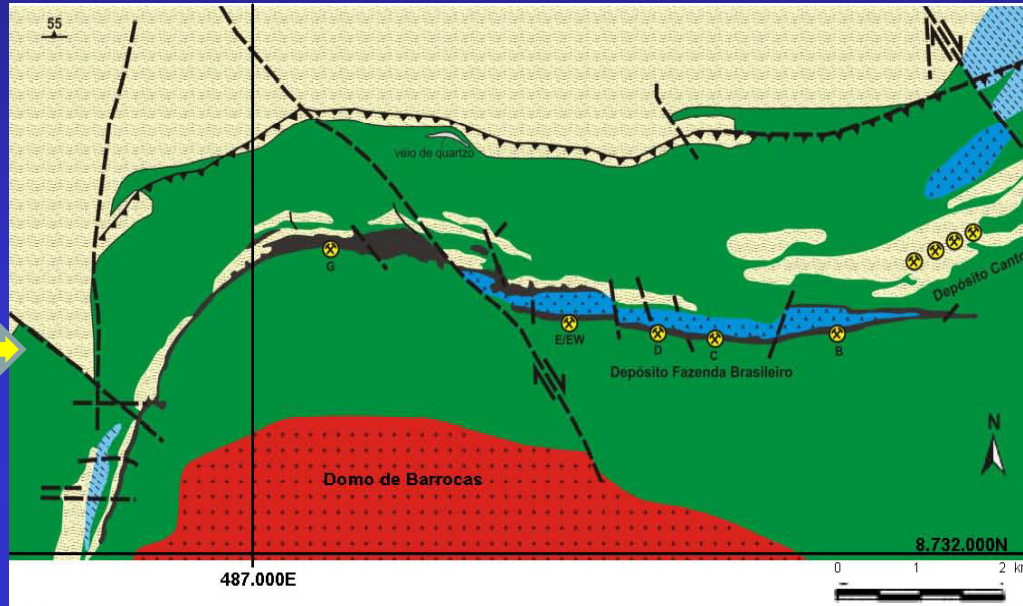
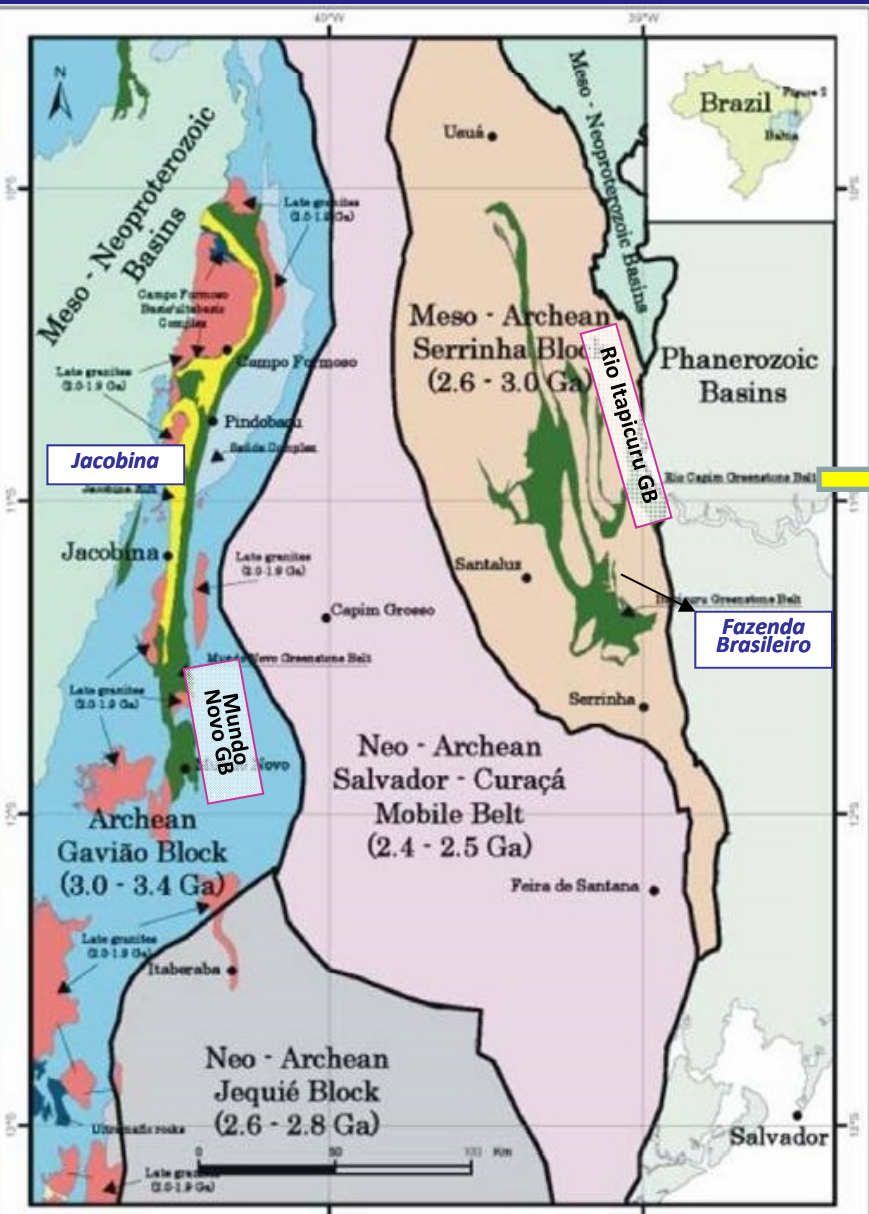
Palaeoproterozoic (??)
volcano-sedimentary belt in
São Francisco Craton
basement window (through
thin-skinned Araçuaí belt)



EASTERN SÃO FRANCISCO CRATON

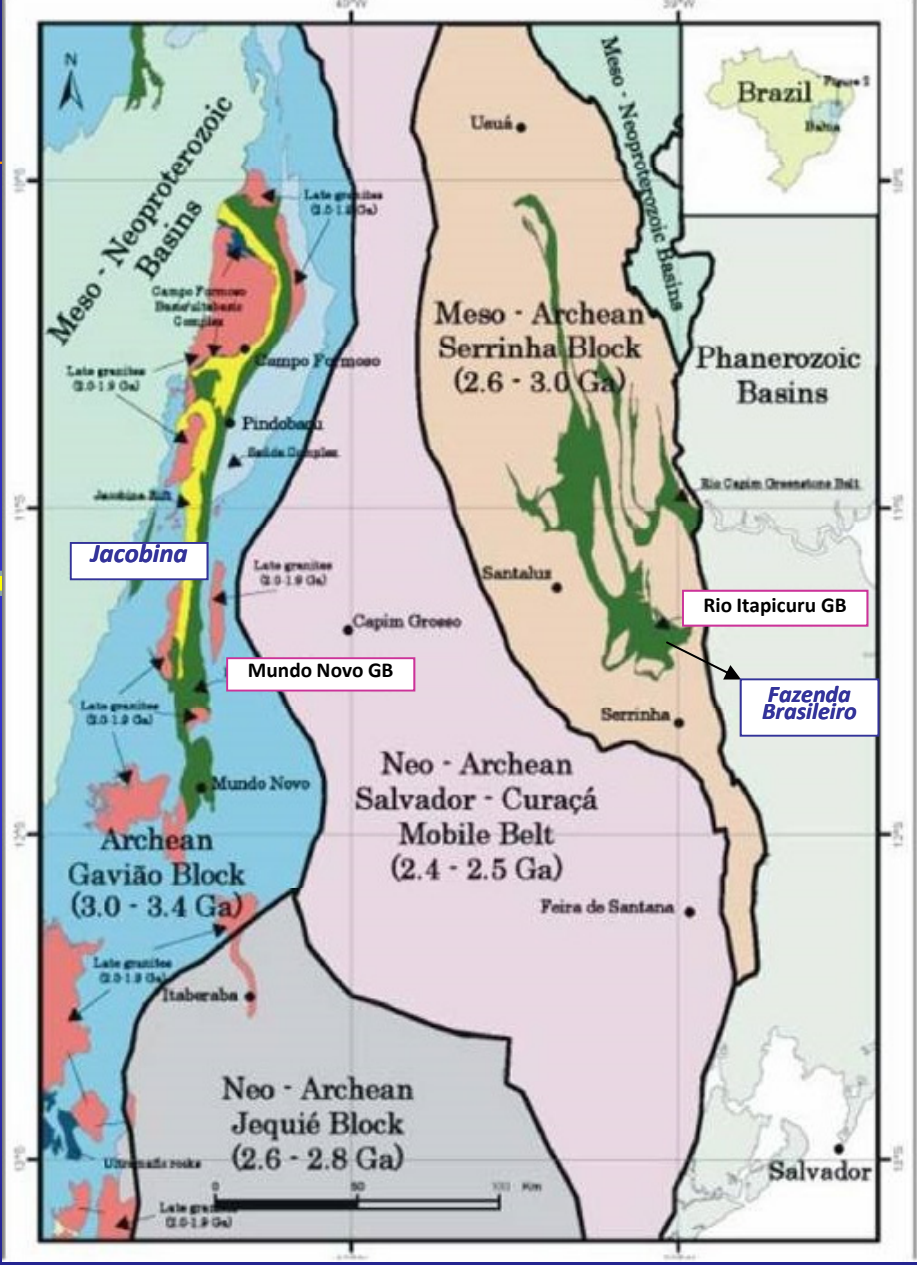
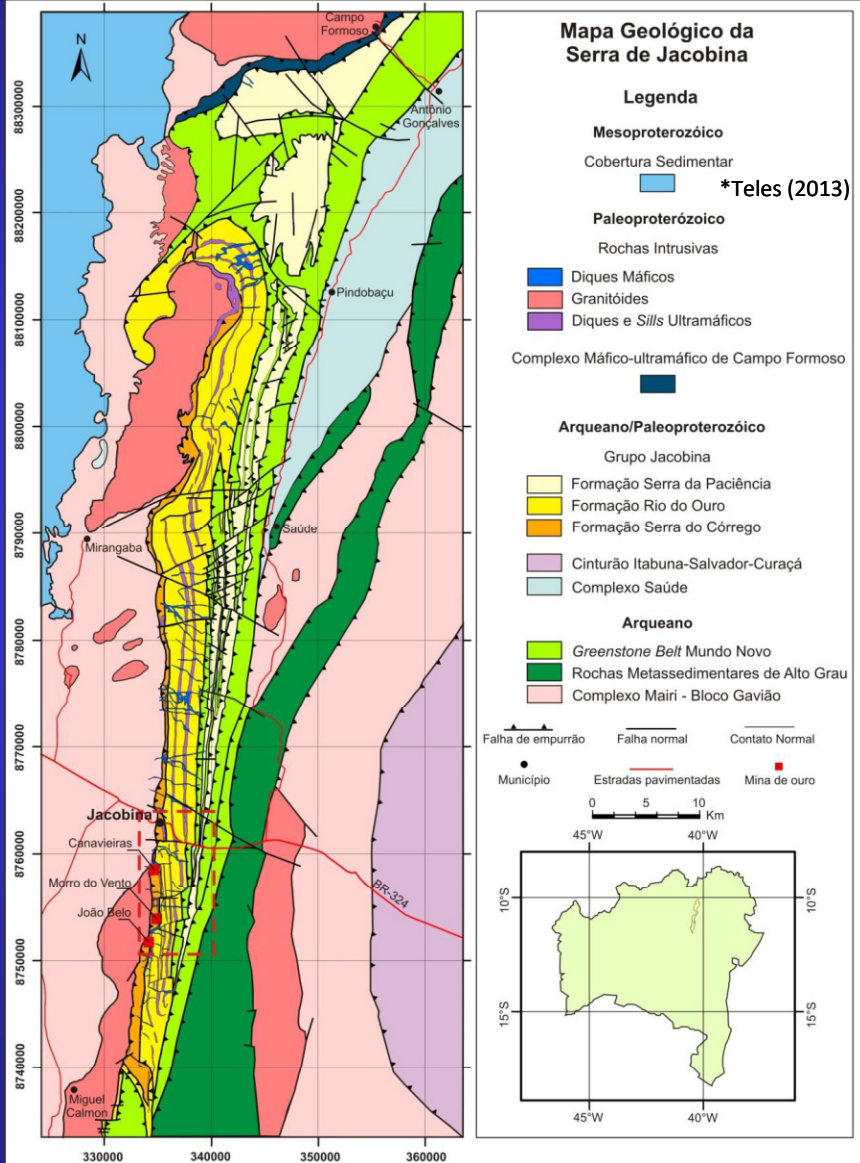
Palaeoproterozoic Rio Itapicuru GB orogenic gold & Palaeoproterozoic Jacobina (Archaean?*) pyrite metaconglomerates

*Teles (2013)



Main geotectonic basement units of the São Francisco craton in Bahia state. The Jacobina and Fazenda Brasileiro gold deposits are indicated (modified after Sampaio et al., 2001; Sabaté et al., 1990).

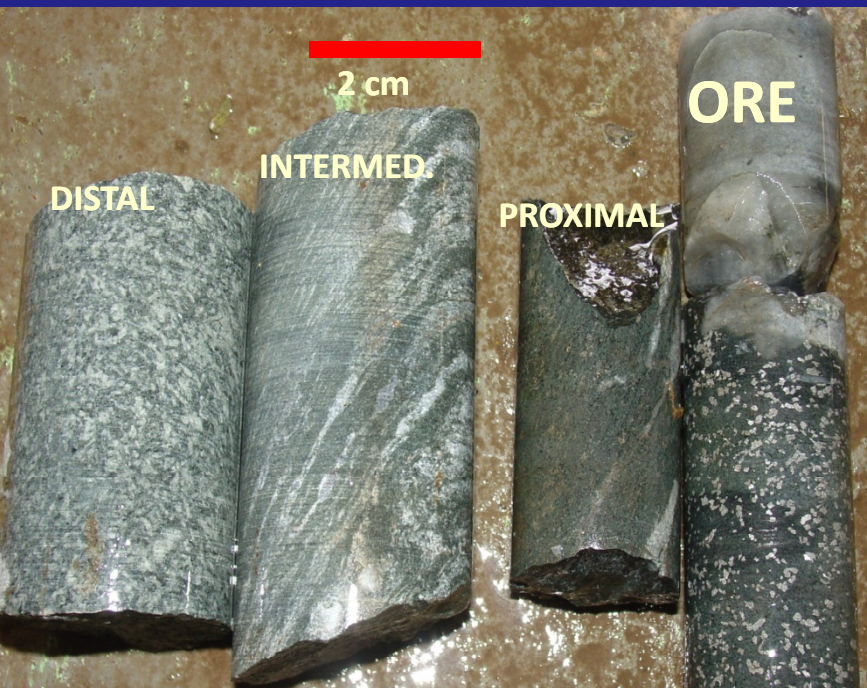
Palaeproterozoic Rio Itapicuru GB orogenic gold & Palaeproterozoic Jacobina (Archaean?*) pyrite metaconglomerates



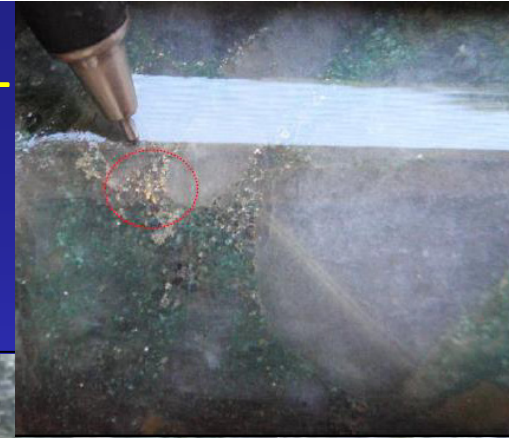
Main geotectonic basement units of the São Francisco craton in Bahia state. The Jacobina and Fazenda Brasileiro gold deposits are indicated (modified after Sampaio et al., 2001; Sabaté et al., 1990).

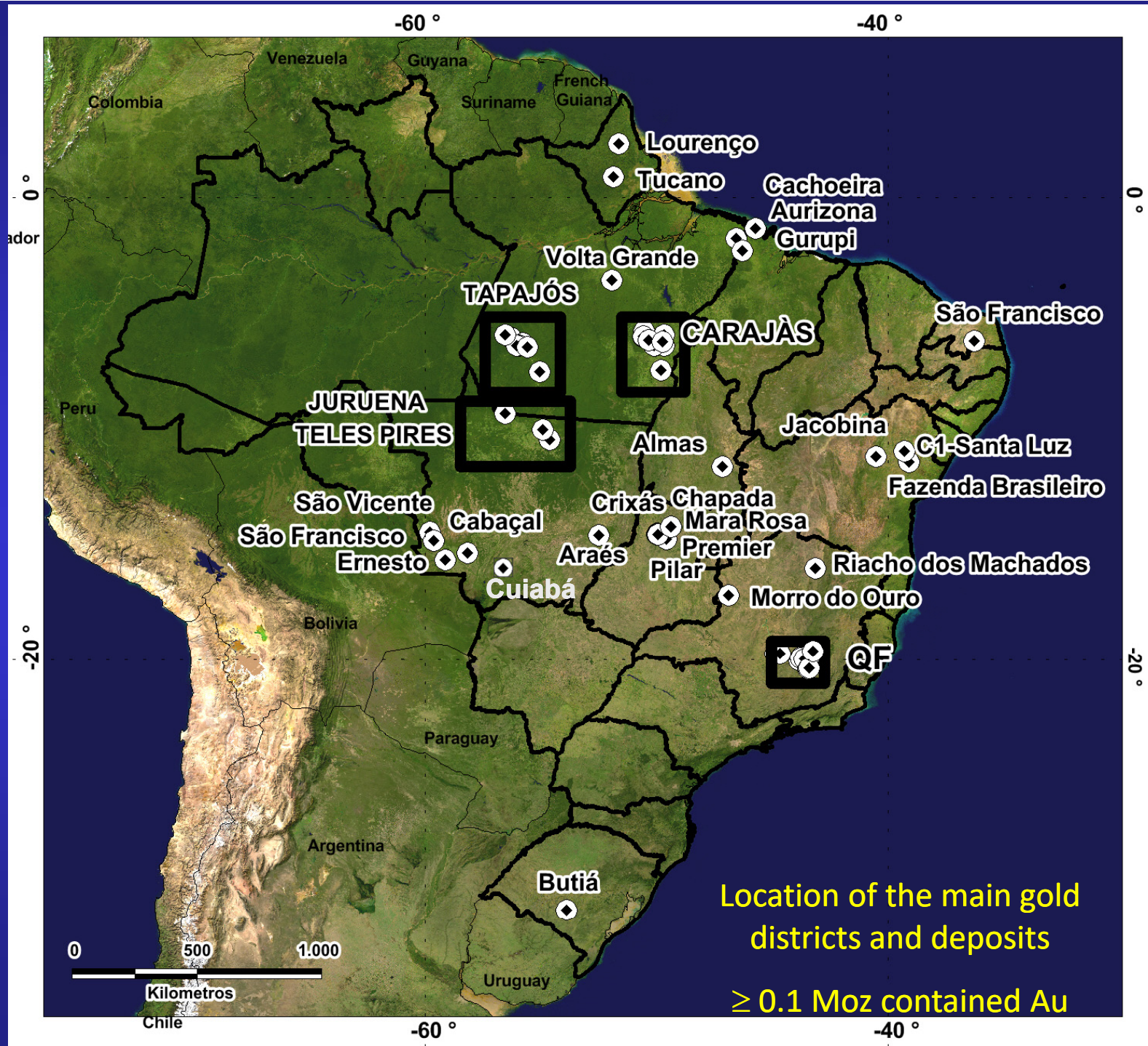
Geological map of the Serra de Jacobina (modified after Pearson et al., 2005), showing the main units (from Teles, 2013)

Fazenda Brasileiro orogenic gold deposit



Metaconglomerate-hosted Jacobina deposit



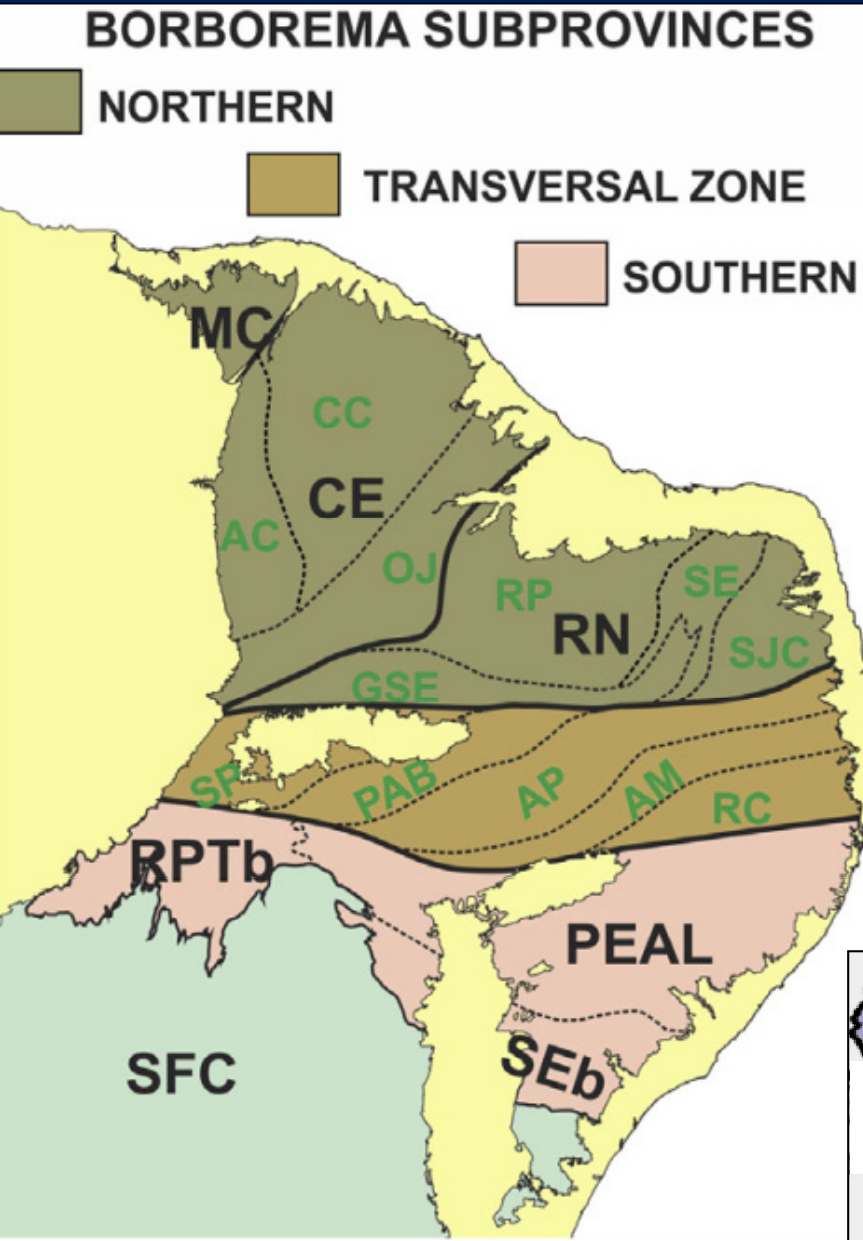


Types of Known Deposits

- Majority of significant deposits → **orogenic gold systems** mainly in mid-crustal levels
Very large (> 15 Moz) **sediment-hosted deposit**; e.g., Morro do Ouro
- Several significant **gold-rich IOCG** deposits
All in the Carajás Mineral Province
- **Magmatic-hydrothermal (porphyry, epithermal, intrusion-related?) deposits** in Carajás, Tapajós, Lavras do Sul (RS)
Many small; only one large deposit - Breves Carajás
- **Metamorphosed porphyry Cu-Au** systems in Goiás: Chapada

Perspectives - Underexplored Au systems

➤ Borborema Province



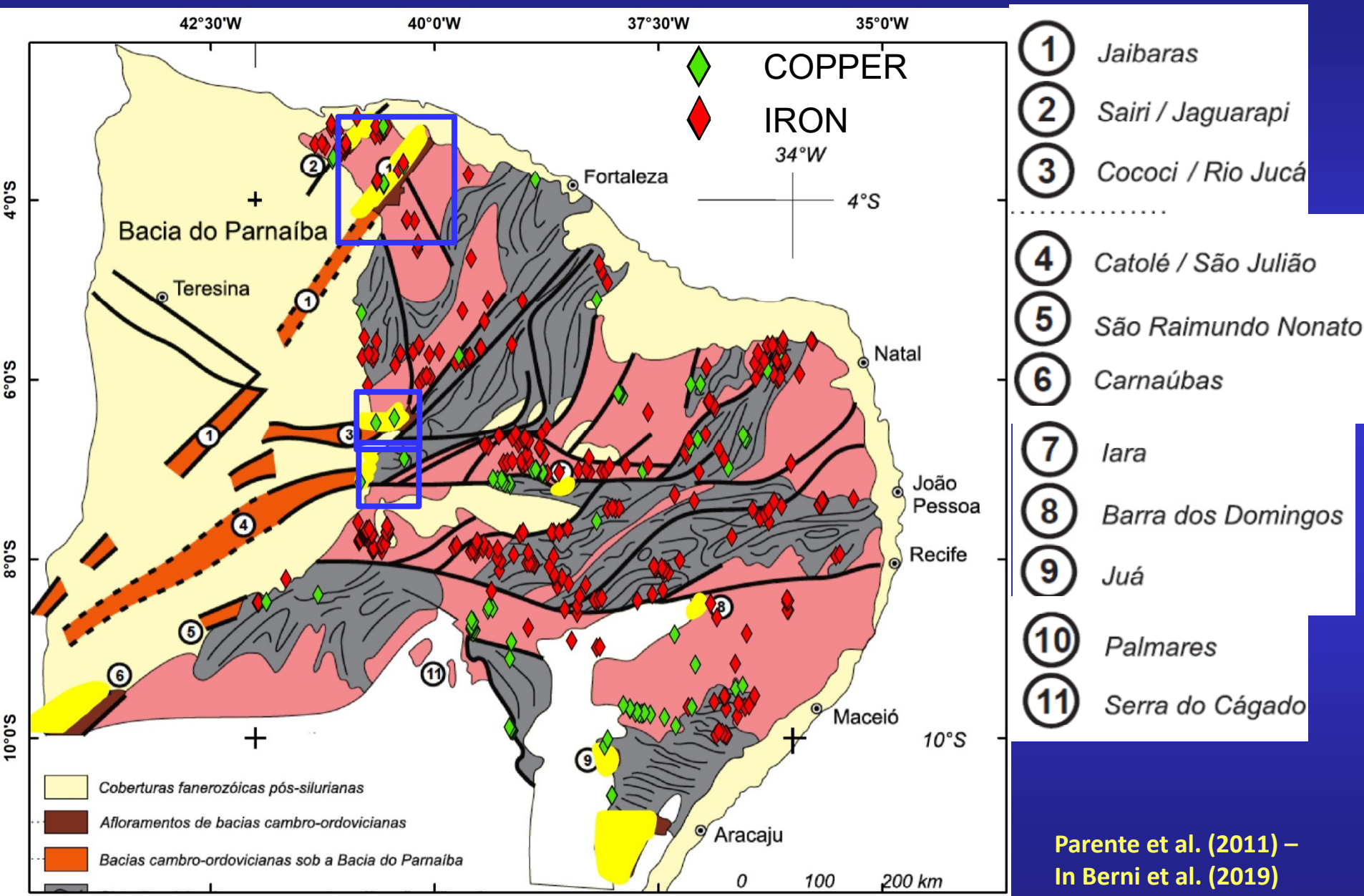
- Vast terrane covering 900 x 900 km
- At least 5 Archaean nuclei
- Numerous Palaeoproterozoic tectonic blocks
- Major Mesoproterozoic metamorphic belt
- Welded together by Neoproterozoic mobile belts, shear zones, fossil arcs, magmatic arcs, continental arc and a quintuple, ESE-vergent, imbricated thrust system
- Prolific occurrence record of Au, Cu, Fe, Ni, W, Sn, Mo and Ta, amongst other metallic and non-metallic minerals

Divided into: Northern, Transversal (or Central), and Southern sectors.

Major & secondary domains



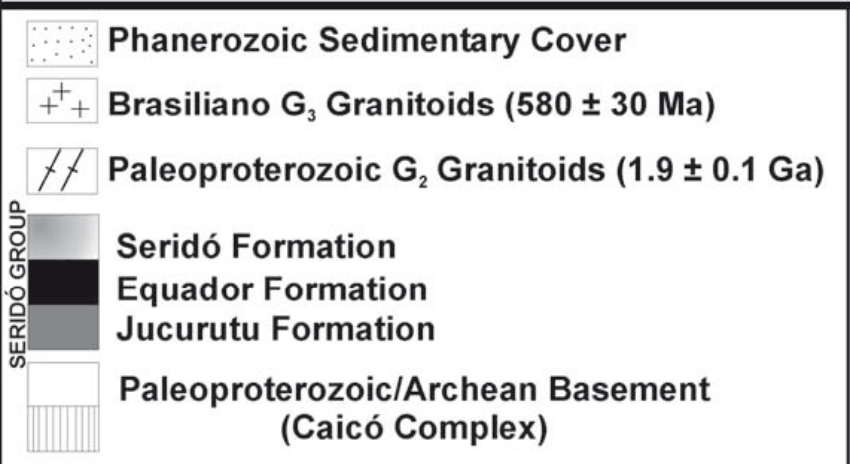
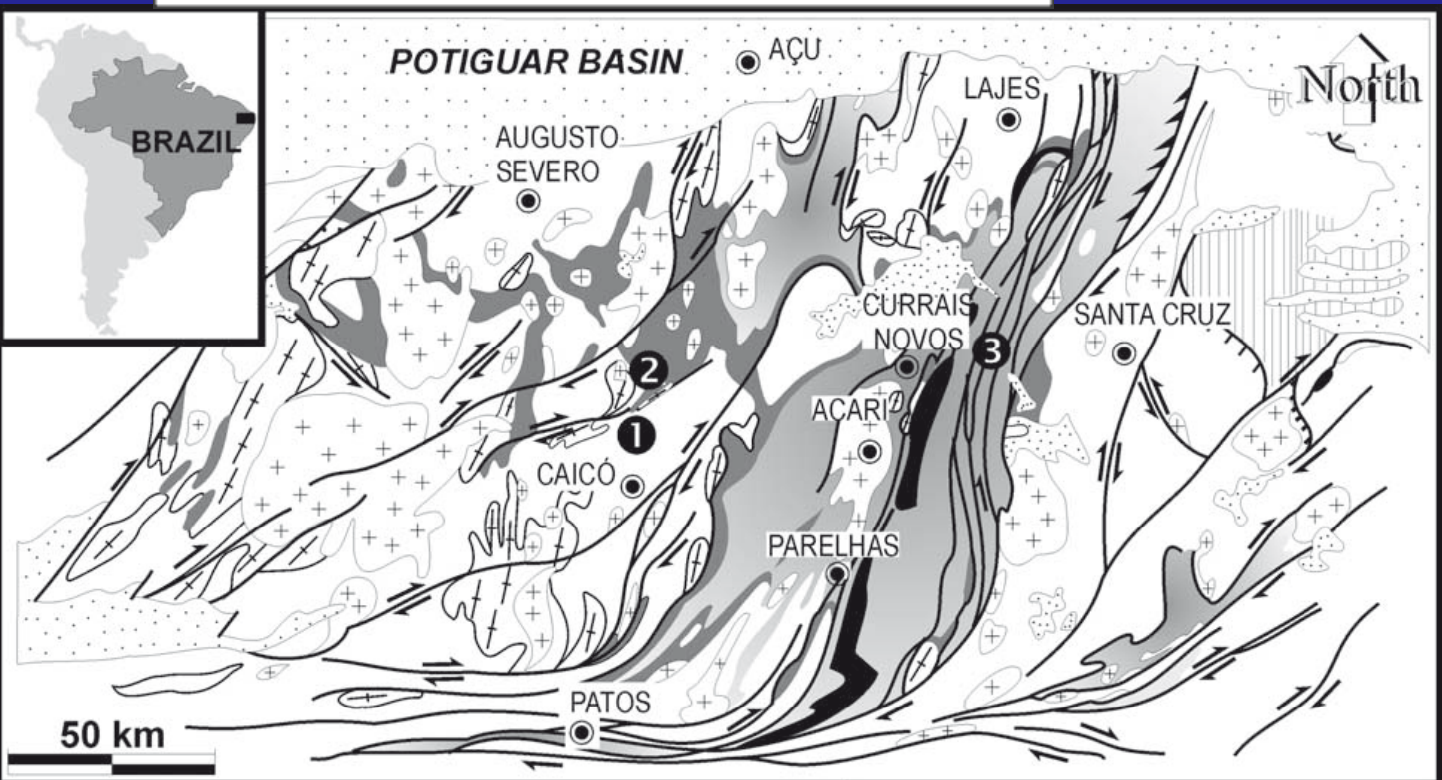
➤ Borborema Province (Cambro-Ordovician basins & some IOCG-like..)



Parente et al. (2011) –
In Berni et al. (2019)

➤ Borborema Province (RN)

Journal of South American Earth Sciences 15 (2002) 337–348



Crusader Borborema gold deposit

Araújo et al. (2002)

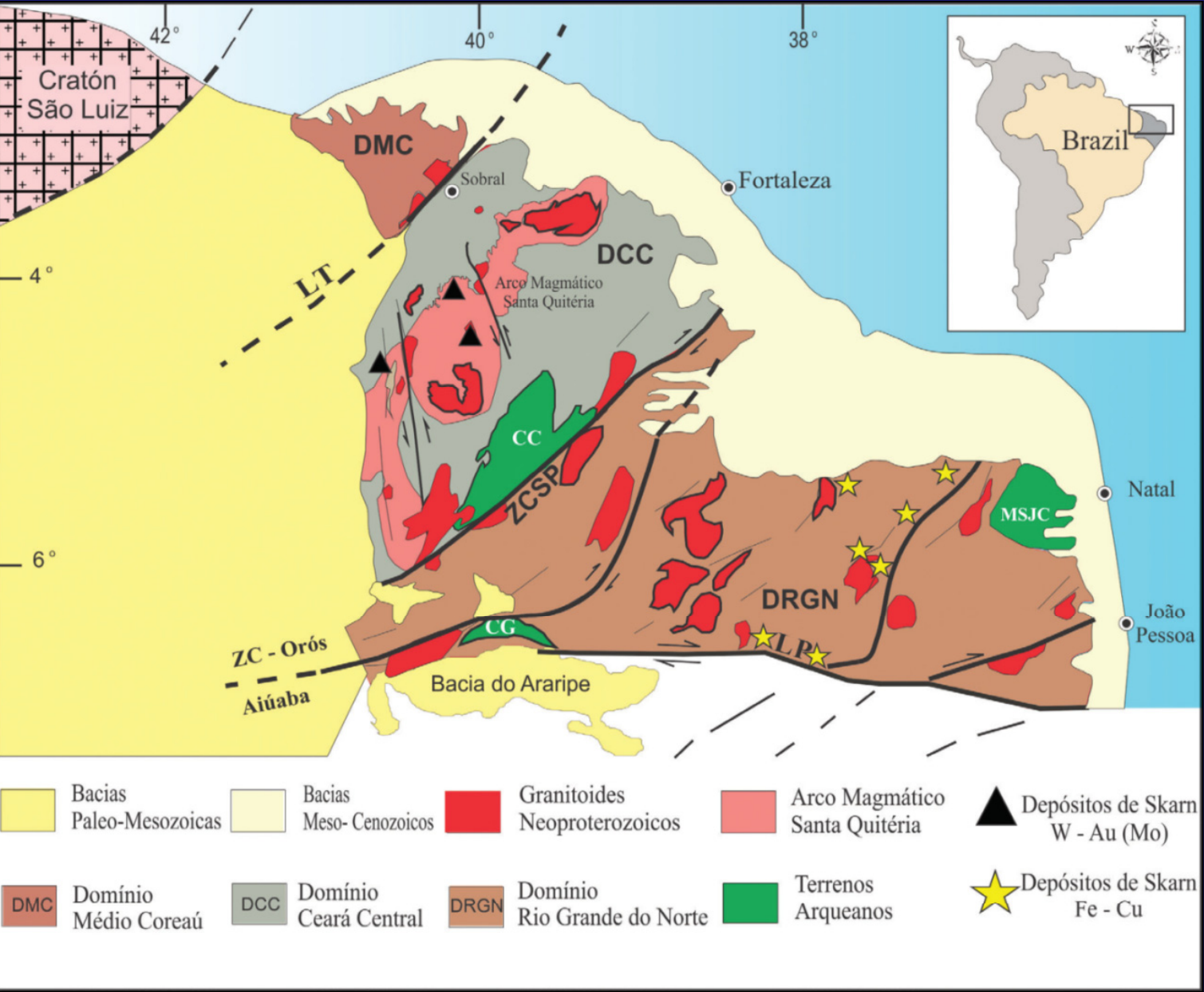
3

Shear-zone related, Neo-proterozoic high-metamorphic grade orogenic gold?

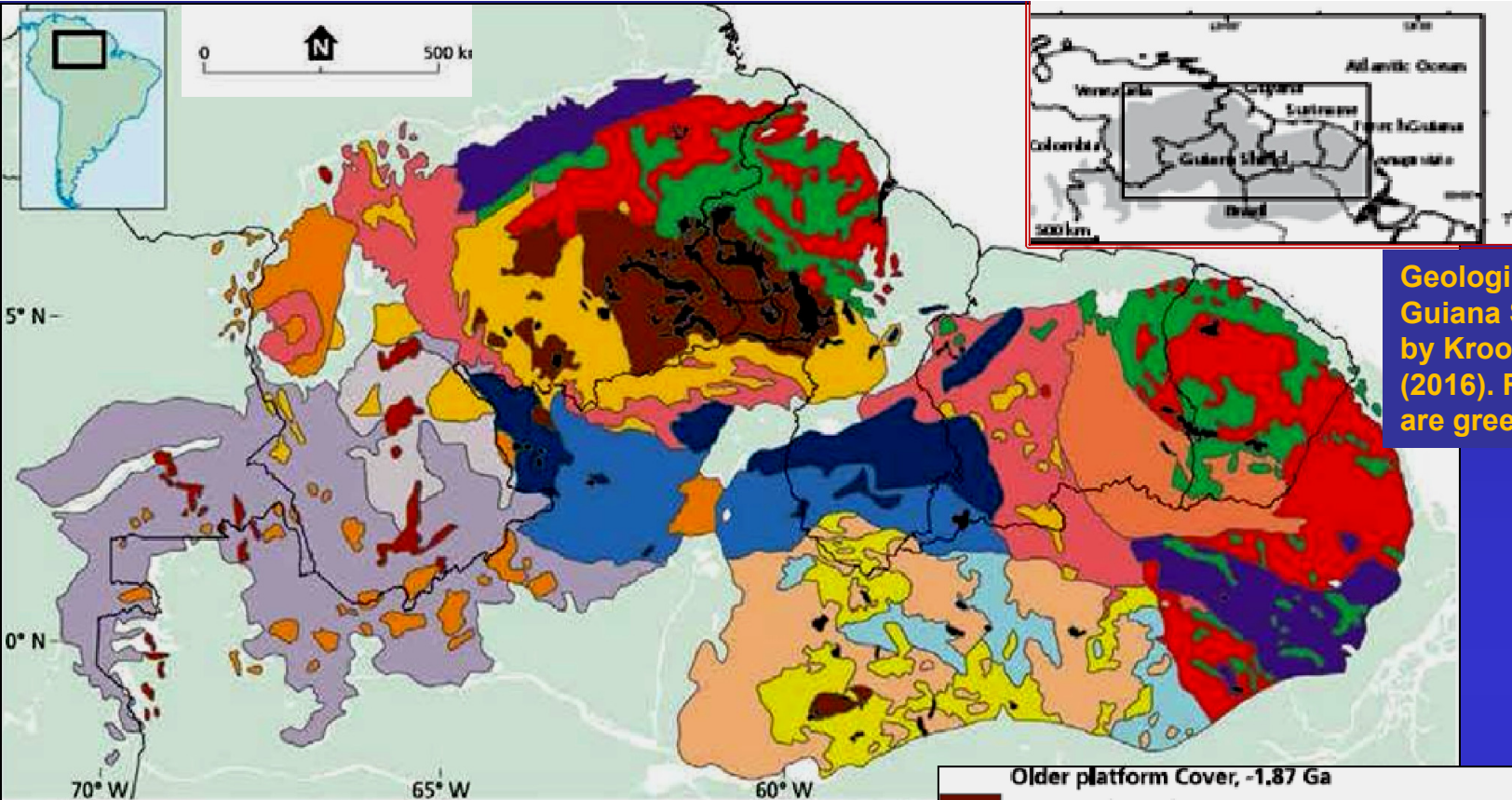
(Crusader Resources Borborema Gold Project) Faixa Seridó



➤ Borborema Province



Geological sketch of the Northern portion, Borborema province, with main regional shear zones. Fetter et al. (2003); de Parente et al. (2015).



Geological framework, Guiana Shield, compiled by Kroonenberg et al. (2016). Rhyacian rocks are green and red.

- Younger platform covers, 1.3-1.2 Ga**
- Tunuí, Taraira, Naquén, La Pedrera, Cinaruco, Neblina folded sandstones
- Mesoproterozoic intrusives, 1.59-1.51 Ga**
- Mucajai, Surucucus, Parguaza rapakivi, Mitú, Vaupés, Isana granites
- Rio Negro Belt, 1.86-1.72 Ga**
- Undifferentiated Rio Negro Basement, southern Venezuela
- High-grade Mitú, Minicia-Macabana-San Carlos-Cauaburí gneisses
- Younger felsic volcanic and granitoid belt, 1.89-1.81 Ga**
- Undifferentiated Tumucumaque basement
- Mapuera-Madeira granites and related intrusives
- Iricoumé-Jatapu felsic volcanics
- Mafic intrusives, 1.79 Ga and younger**
- Avanavero dolerite and other Proterozoic mafic and alkaline intrusives

- Older platform Cover, -1.87 Ga**
- Roraima (Super)Group sandstones, conglomerates, ash-fall tuffs
- Older felsic volcanic and granitoid belt 1.99-1.95 Ga**
- Wonotobo-Iwokrama-Pedra Pintada-Cuchivero granites
- Dalbana-Iwokrama-Surumu-Caicara felsic metavolcanics
- High-grade belts, 2.08-2.02 (-1.98) Ga**
- Uraricoera-Trairão-Urubu-Anauá-Southern Guyana Belt
- Bakhuis Granulite Belt, Cauarane-(Kanuku)-Coeroeni Belt
- Greenstone Belt, 2.26-2.09 Ga**
- Deep-level granites and gneisses
- TTG, diapiric tonalite-trondhjemite-granodiorite intrusions
- Vila Nova, Marowijne, Barama-Mazaruni, Pastora-Carichapo greenstones
- Archean nuclei > 2.5 Ga**
- Imataca, Amapa granulite belts

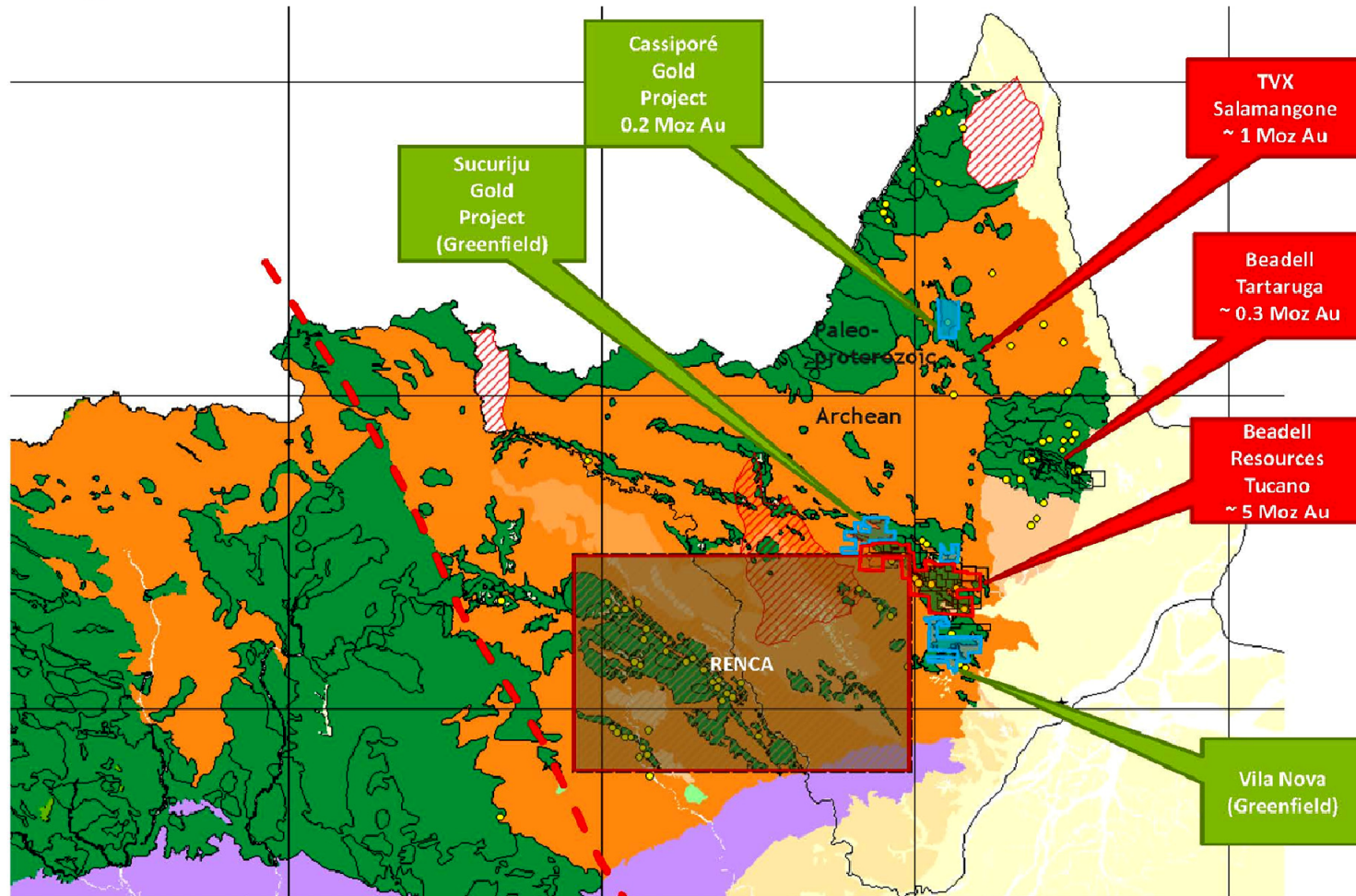


ppt Michael Davi, 2019

AMAPÁ METALS

Amapá State – Less than 7 Moz Au discovered so far

- ▶ Paleoproterozoic greenstone gold surrounded by Archean basement – Birimian equivalent rocks in Guiana Shield
- ▶ Maroni – Itacaiunas Transamazonic 2.1 – 1.9 Ga
- ▶ Tarkwa equivalent conglomerate late basin
- ▶ Synorogenic internal granites



Perspectives - Underexplored Au systems

- ***Modified? Paleoplacer Au system***, e.g., in the Jacobina area, and Quadrilátero Ferrífero
- ***Turbidite-hosted Au*** in the Quadrilátero Ferrífero Archaean
- ***Au-rich VHMS*** in tracts of GB to the west of the Quadrilátero Ferrífero
- ***Pd + Pt + Au (Jacutinga-type) system***, e.g., in Carajás, Quadrilátero Ferrífero, and Goiás
- ***Alkalic magmatic-hydrothermal Au systems***, e.g., Lavras do Sul

Thank you

- *Students*
- *UFMG, CET, UFC*
- *CNPq*
- *Capes*
- *AngloGold*
- *Jaguar*

- *and so many other colleagues that support us!*