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Introduction

Seismic studies carried out by Staatsolie around the Tambaredjo oil field revealed an uplifted structure near the main producing fields which is in line with the Bakhuis structure and was therefore considered to form the continuation of the Bakhuis horst (Fig.1&2)

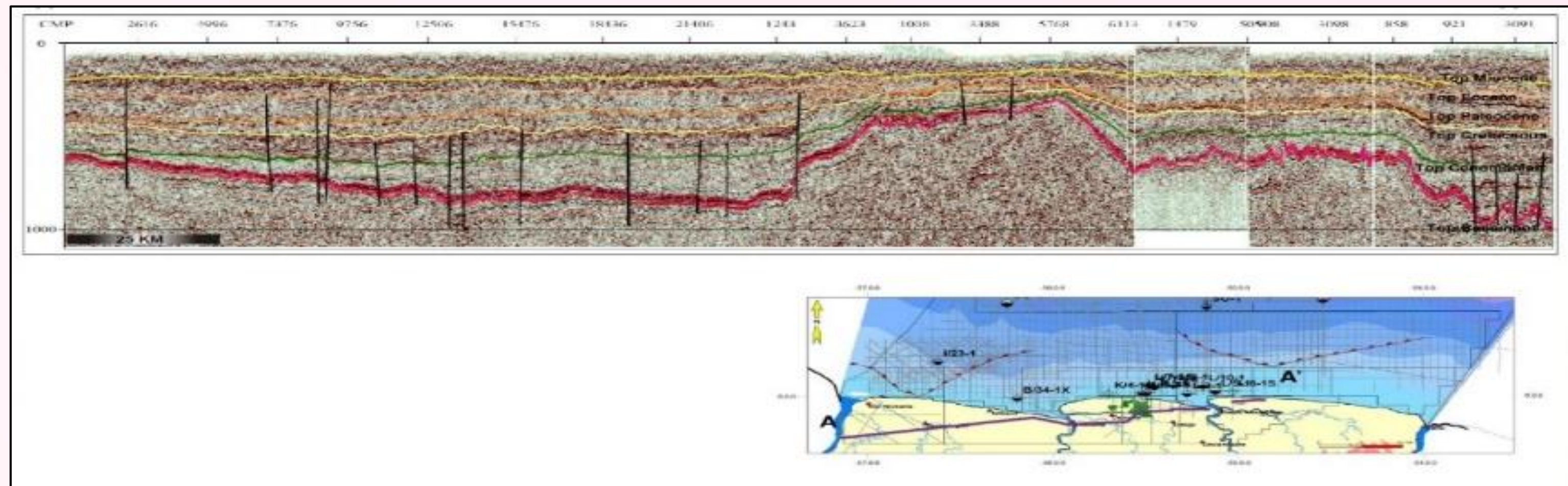


Fig.1. Seismic profile W-E through coastal plain: Bakhuis Horst trap for oil Tambaredjo (Staatsolie database)

- Bakhuis Montains is dated between 2.07-2.05 Ga within the Trans Amazonian Orogeny (De Roever et al., 2003)
- The border faults are dated ± 1.2 Ga. (Nickerie metamorphic episode) and are recognized by the extensive mylonitization (Bosma et al., 1983)
- Morphological freshness of the eastern fault scarp suggests that the Bakhuis Horst has been active relatively recently (Fig.3).

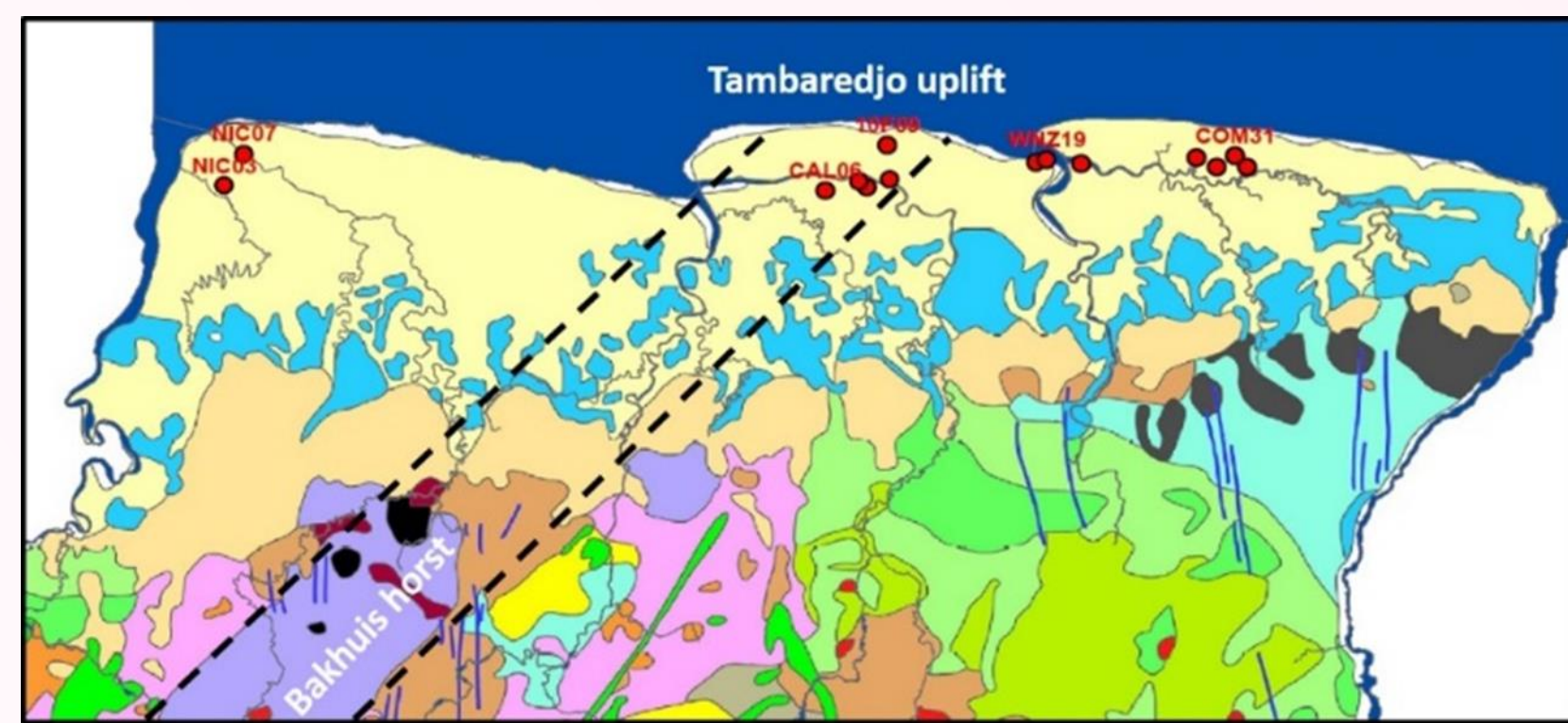


Fig.2. Conjectural continuation of the Bakhuis horst into the Tambaredjo uplift, on a simplified geological map of northern Suriname. Red dots represent studied wells.

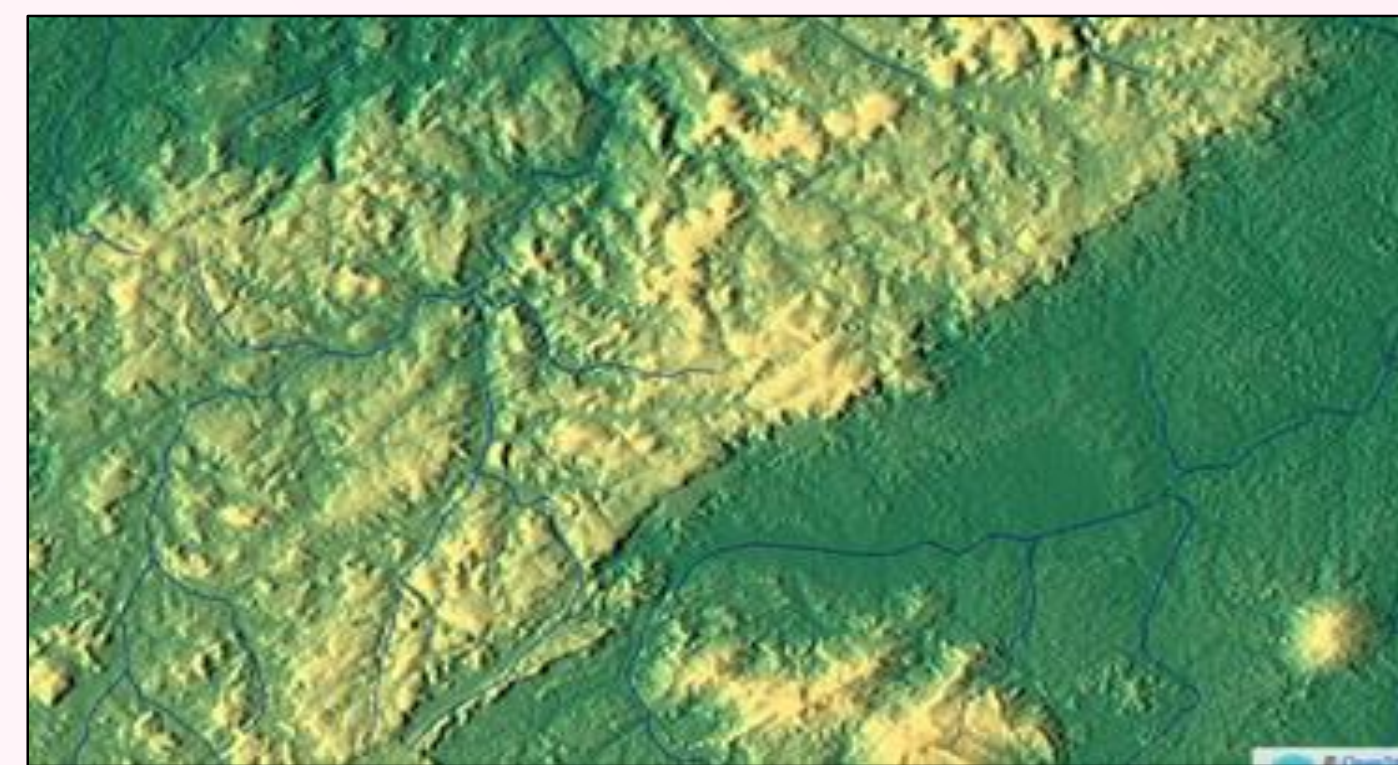


Fig.3. The Bakhuis Horst and its eastern border fault.

- Recent aeromagnetic data cast doubt on the continuation of the Bakhuis horst into the Tambaredjo uplift, as it seems that the Bakhuis structure is cut off by the 2.18-2.09 Ga Marowijne Greenstone Belt, in spite of its older age (Fig. 4a).
- Also the aeromagnetic border faults of the Bakhuis Belt don't continue into the Greenstone belt even though the border faults are both younger than the Bakhuis Granulite Belt and the Greenstone Belt.

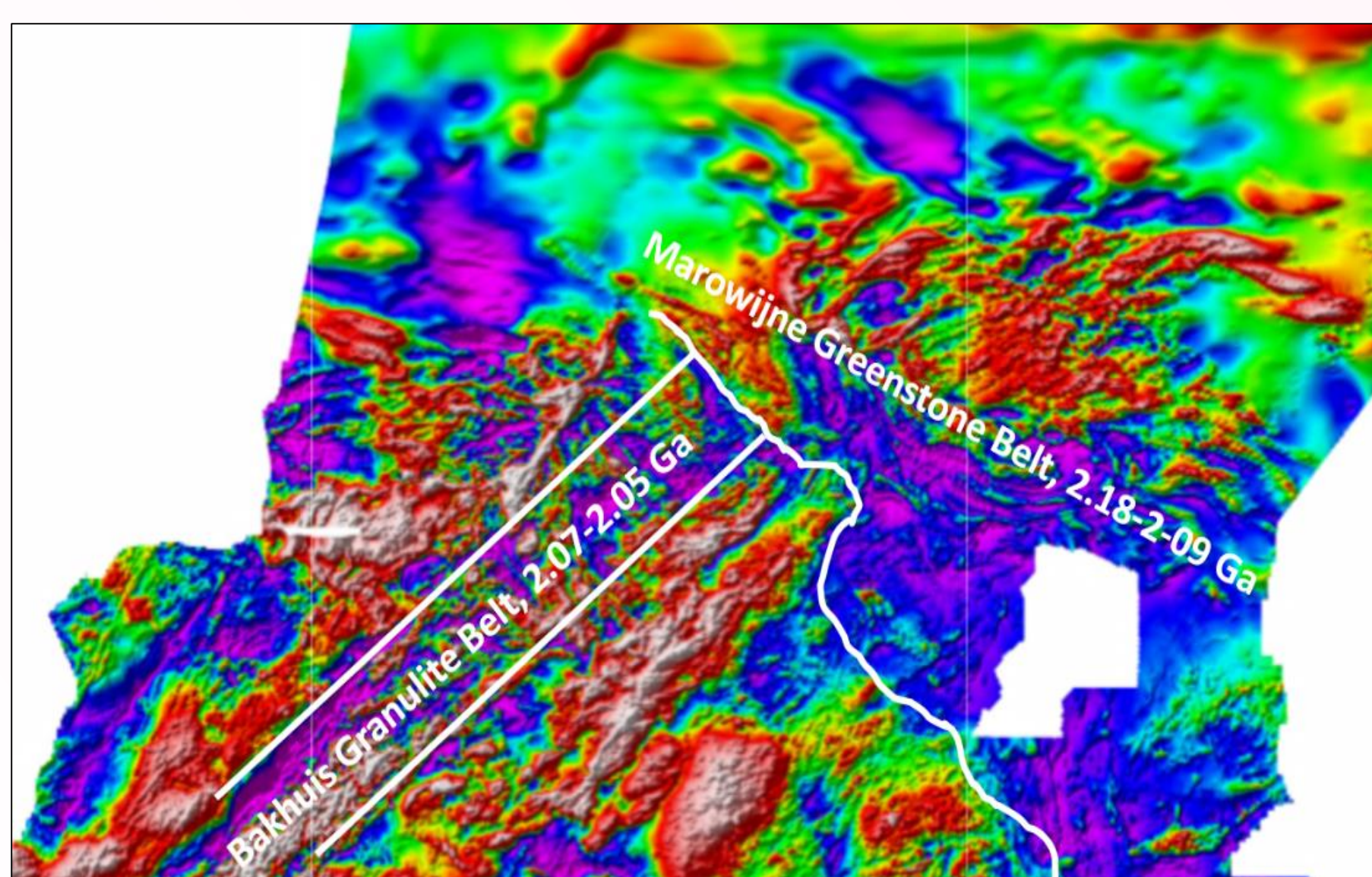


Fig.4a. Aeromagnetics suggest that the Bakhuis Granulite Belt is cut off by the Marowijne Greenstone Belt.



Fig.4b. Northern Suriname Shear Zone (NSSZ) elaborated by Voicu et al, 2001

- To solve these problems the nature of the Precambrian rocks from oil wells are studied to know if they show more similarities to the Bakhuis Granulites or Marowijne Greenstones.

Methodology

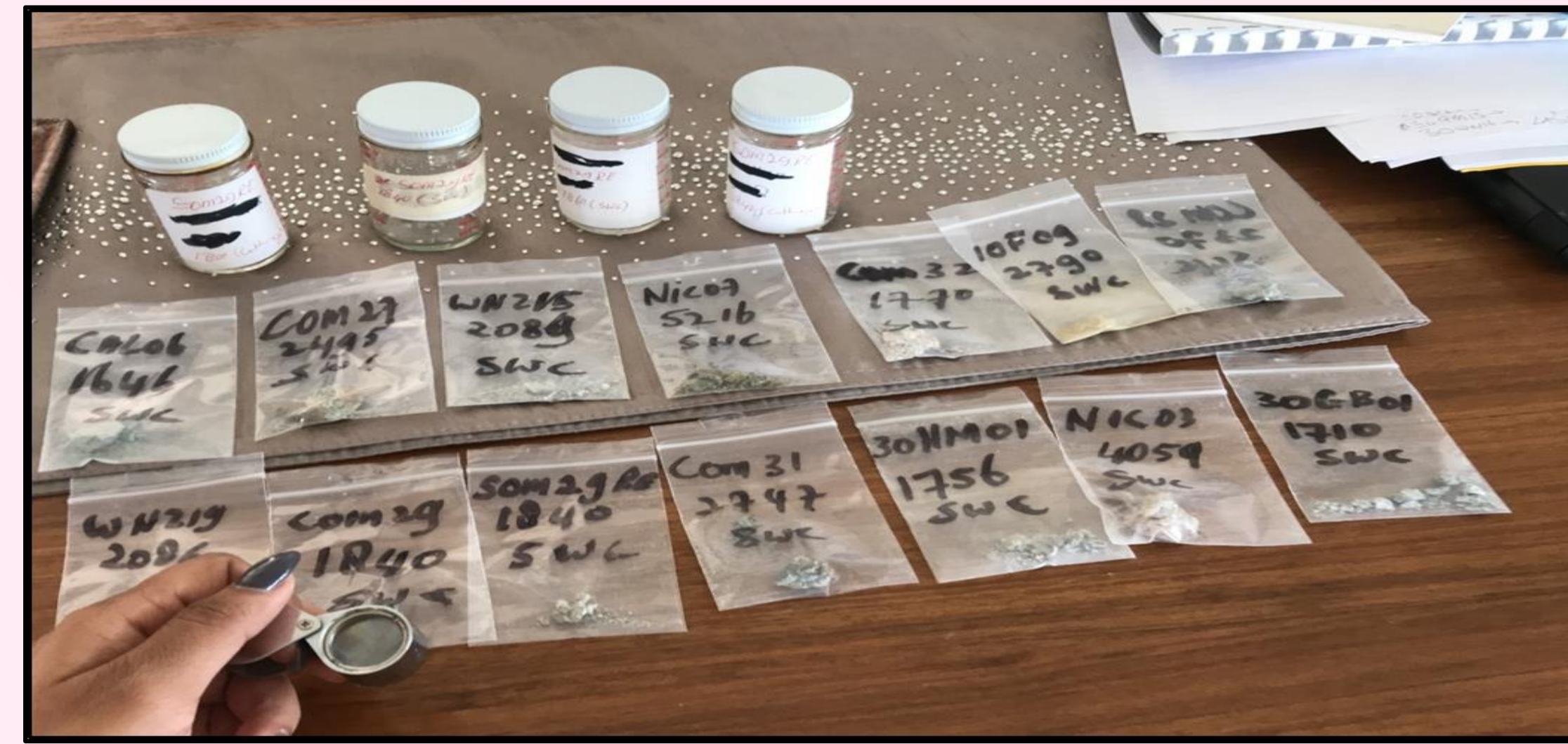


Fig.5. Provided samples by Staatsolie used for microscopic research

Using Petrel, out of 154 oil wells drilled by Staatsolie in the coastal plain, 15 were selected which penetrated the Precambrian basement. Well-bore cuttings and SWC (Side Wall Cores) (Fig.5) from the basement were investigated in the stereomicroscope and in thin sections of impregnated material to establish the rock type below the oil fields.

Results

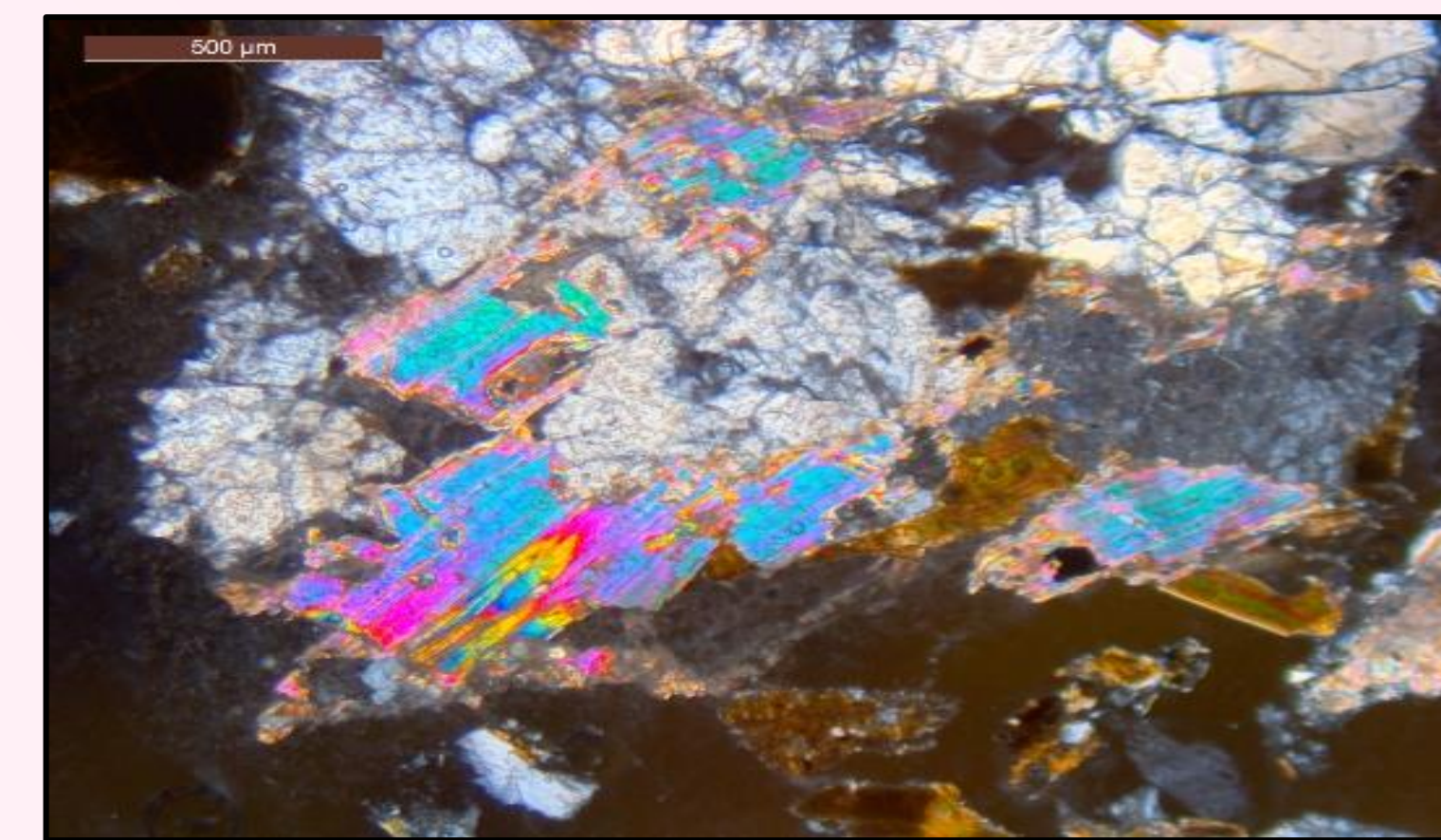


Fig. 6a. Patamacca bimica granite, Tambaredjo

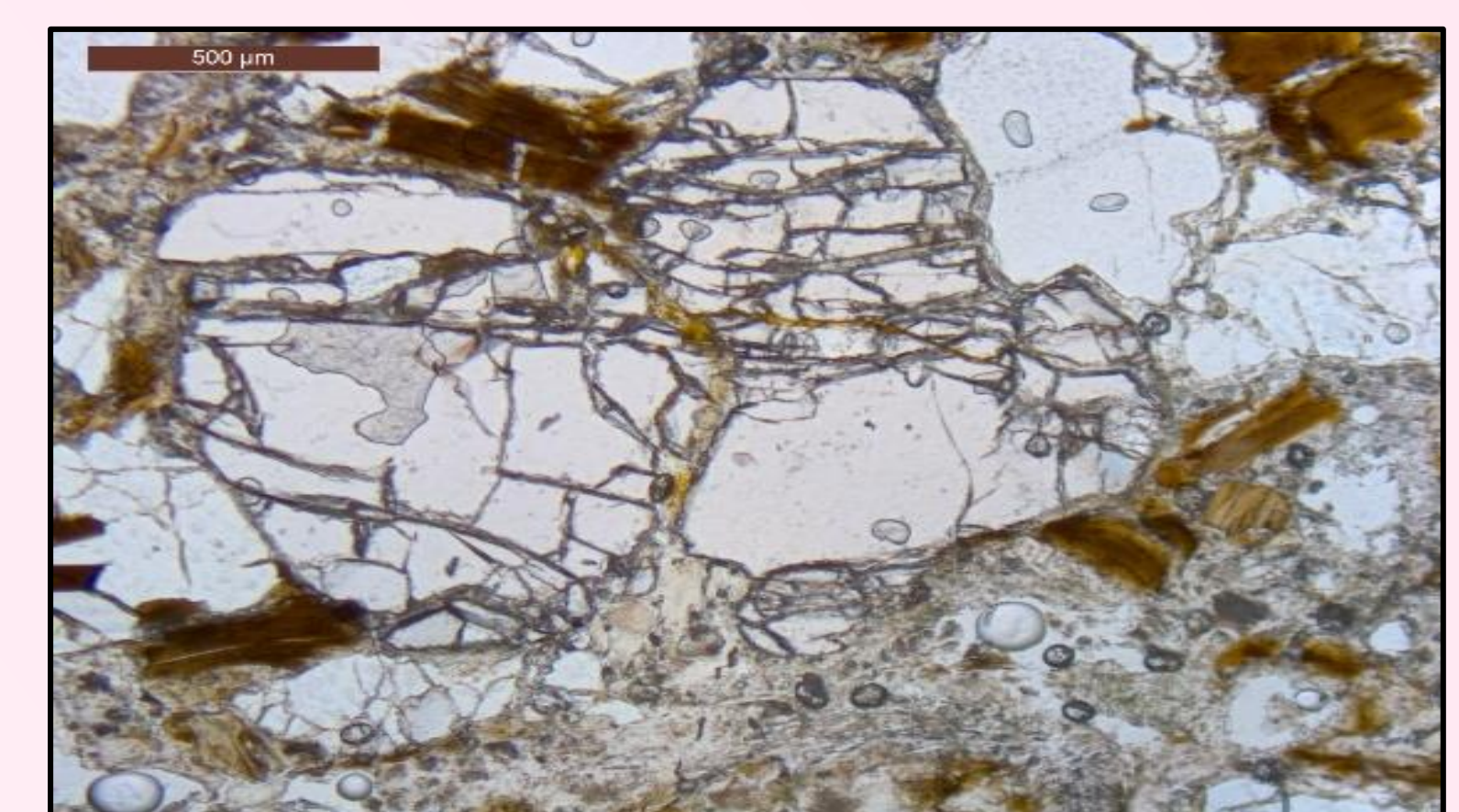


Fig. 6b. Sara's Lust biotite-garnet gneiss, Commewijne

The rocks below the oil wells consist mainly of biotite-garnet-(sillimanite-) gneisses and biotite-muscovite granites, resembling the Sara's Lust Gneiss and Patamacca Bi-Mica Granite, respectively, typical components of the greenstone belt, and differ from the rocks in the Bakhuis Granulite Belt.

Discussion

The fact that the 2.07-2.05 Ga Bakhuis Granulite Belt is cut-off by the older 2.18-2.09 Ga Marowijne Greenstone Belt requires a tectonic event younger than both. The most probable candidate is the Northern Suriname Shear Zone around 2.0 Ga (Voicu et al., 2001) (Fig.4b). It also requires that the mylonitic border faults of the Bakhuis horst are older than the Nickerie Metamorphic Episode of 1.2Ma. Nevertheless, the morphological freshness of the Bakhuis border fault in line with the Tambaredjo border fault supports their common origin. This Mesozoic-Cenozoic uplift event is only not visible in the aeromagnetics because it is an extensional event unlike to give magnetic responses.

Conclusion

In spite of the aeromagnetic discontinuity, the Bakhuis-Tambaredjo Horst is a coherent tectonic entity uplifted during the Mesozoic-Cenozoic, probably related to the breakup of Gondwana.

References

- Bosma, W., S.B. Kroonenberg, K. Maas & E.W.F. De Roever 1983 Igneous and metamorphic complexes of the Guiana Shield in Suriname. *Geologie & Mijnbouw*, 62:241
- De Roever, E.W.F., Lafon, J.-M., Delor, C., Rossi, P., Cocherie, A., Guerrot, C. & Potrel, A., 2003a. The Bakhuis ultra-high temperature granulite belt : I Petrological and geochronological evidence for a counterclockwise P-T path at 2.07–2.05 Ga. *Géologie de la France* 2003, 2-,3,-4: 175–205.
- Voicu, G., Bardoux, M. & Stevenson, R., 2001. Lithostratigraphy, geochronology and gold metallogeny in the northern Guiana Shield, South America: a review. *Ore Geology Reviews* 18: 211–236.