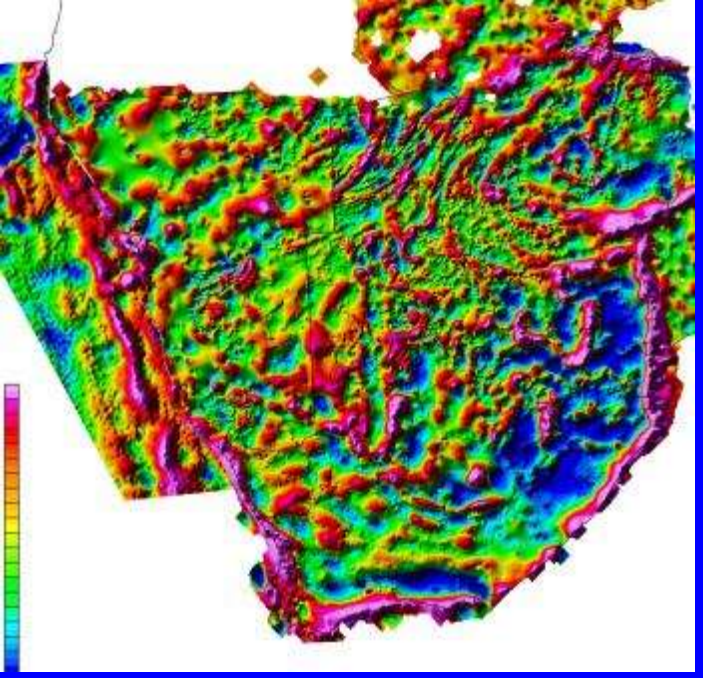
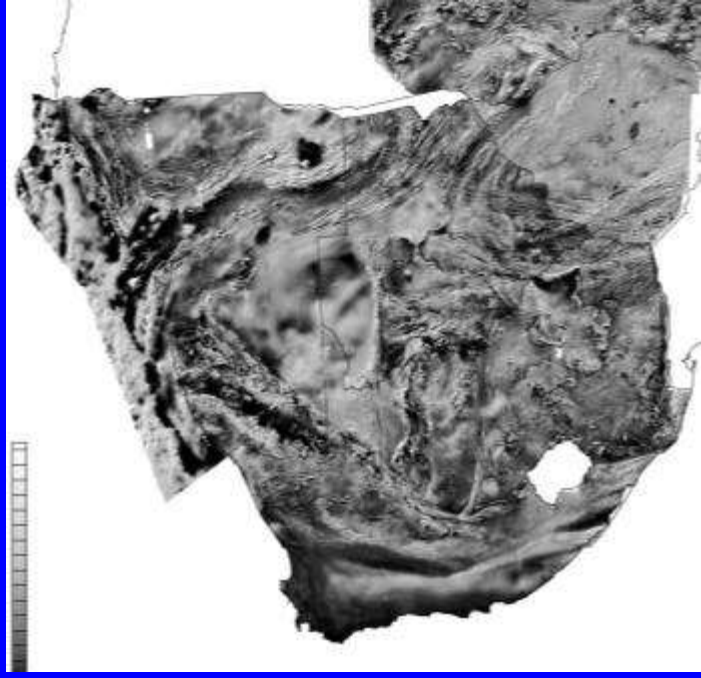


Geological Society of Zimbabwe

Summer Symposium

2017



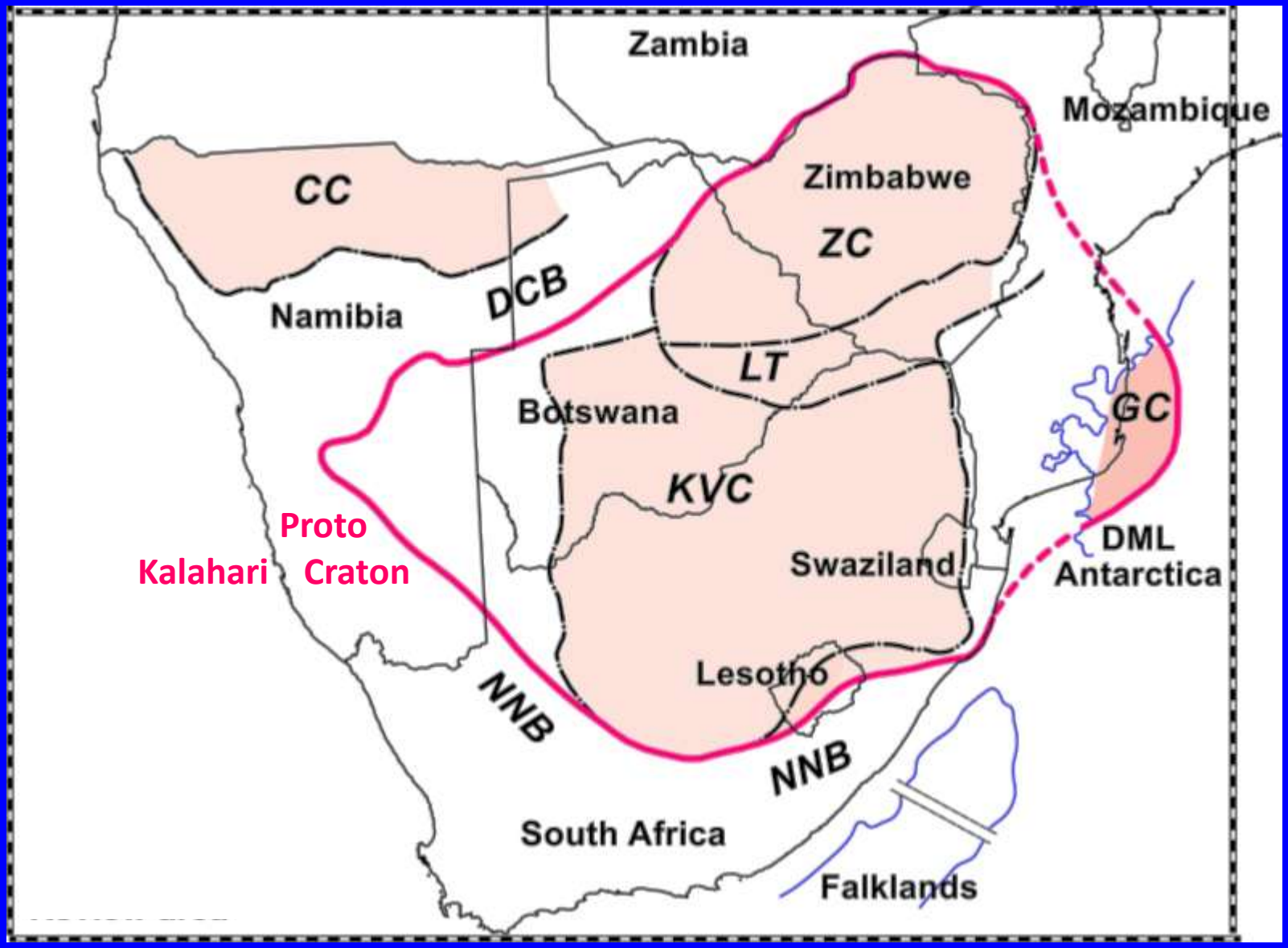
SOUTHERN AFRICA UNDER COVER - SOME NEW INSIGHTS

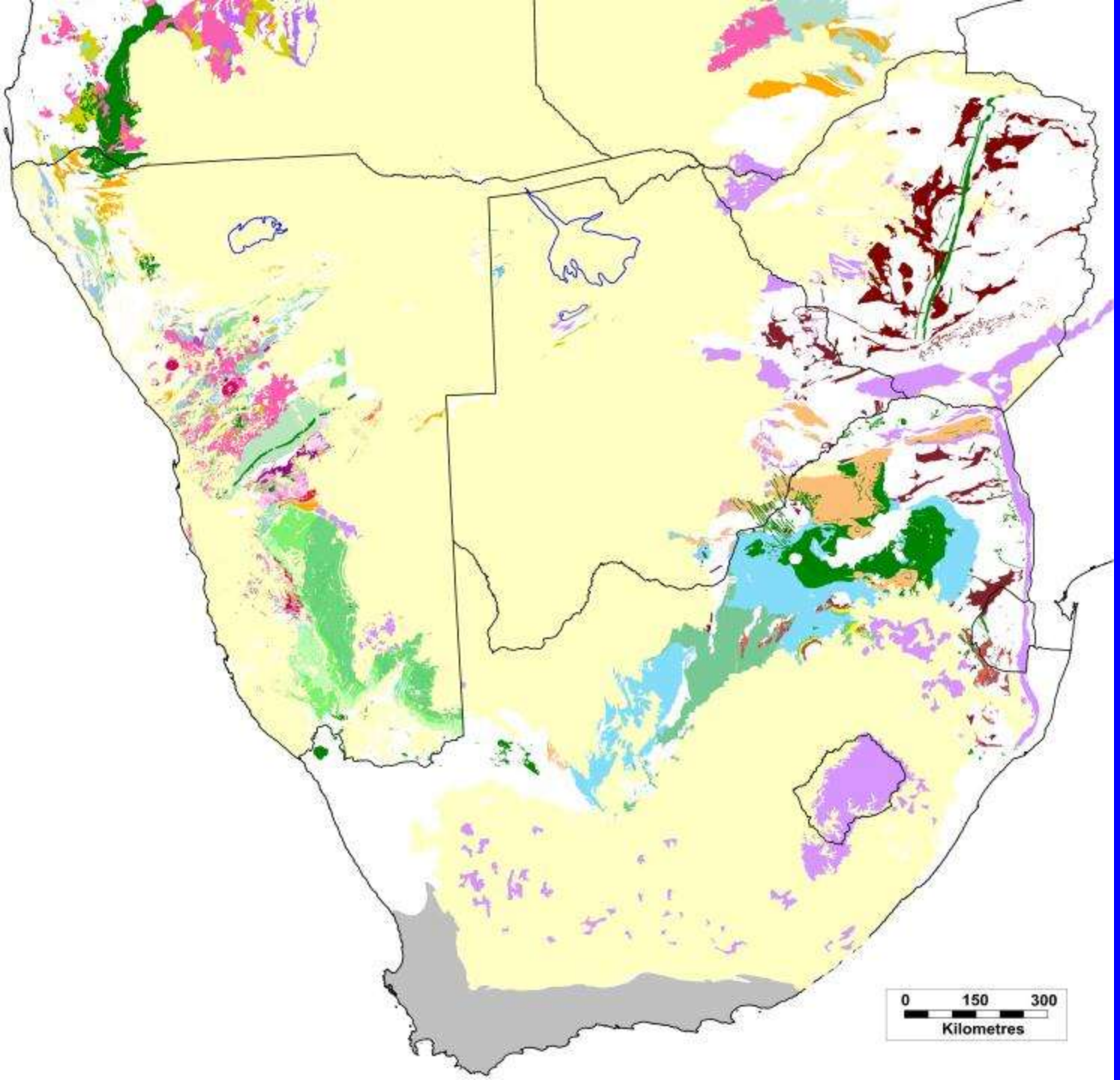
AN INTEGRATED GEOPHYSICAL AND GEOLOGICAL INTERPRETATION

Branko Corner

Manica Minerals Ltd

INTERPRETATION COVERAGE



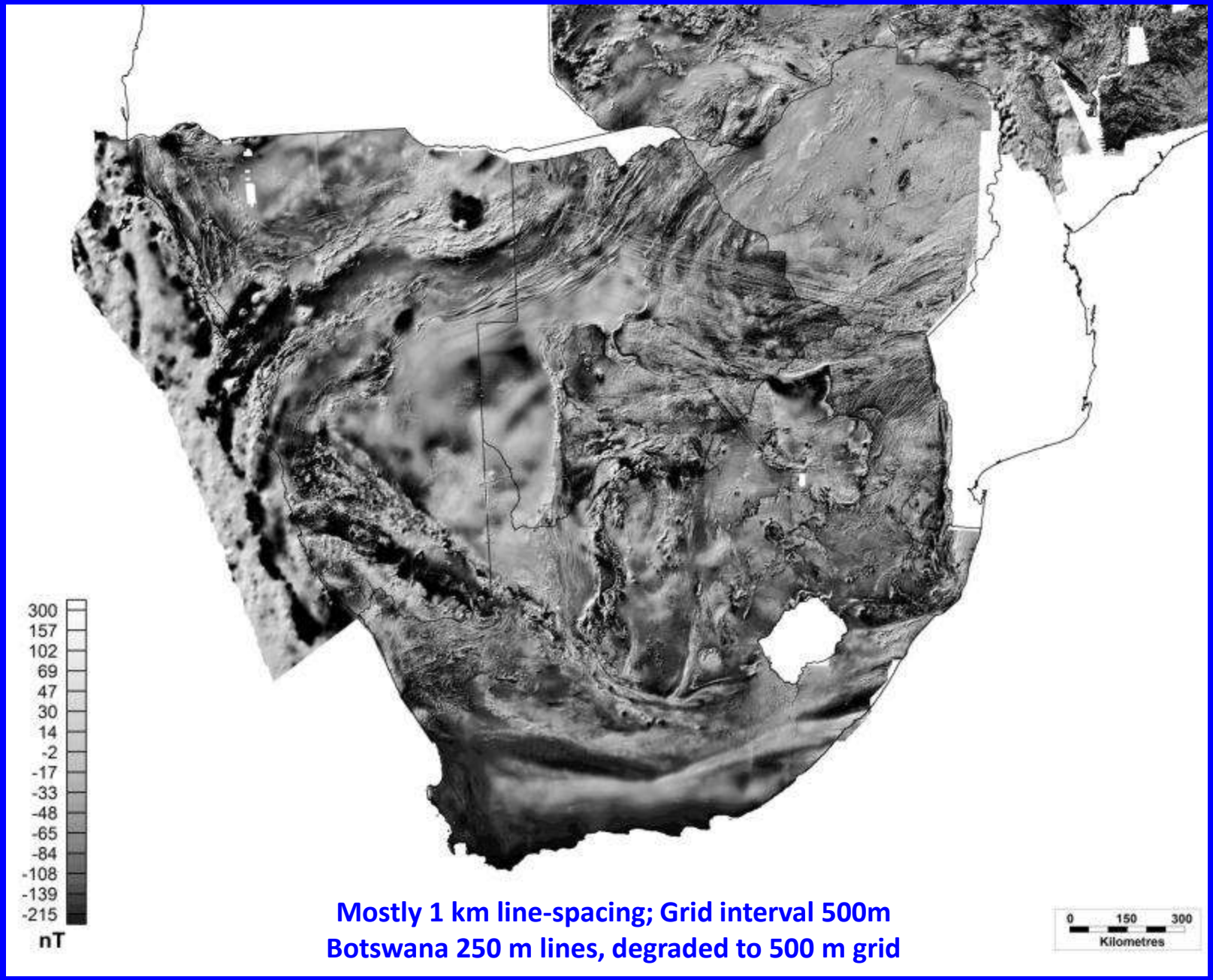


COVER EXTENT

Selected Pre-Cambrian outcrop geology of Southern Africa

with
Phanerozoic cover
(yellow, purple, grey)

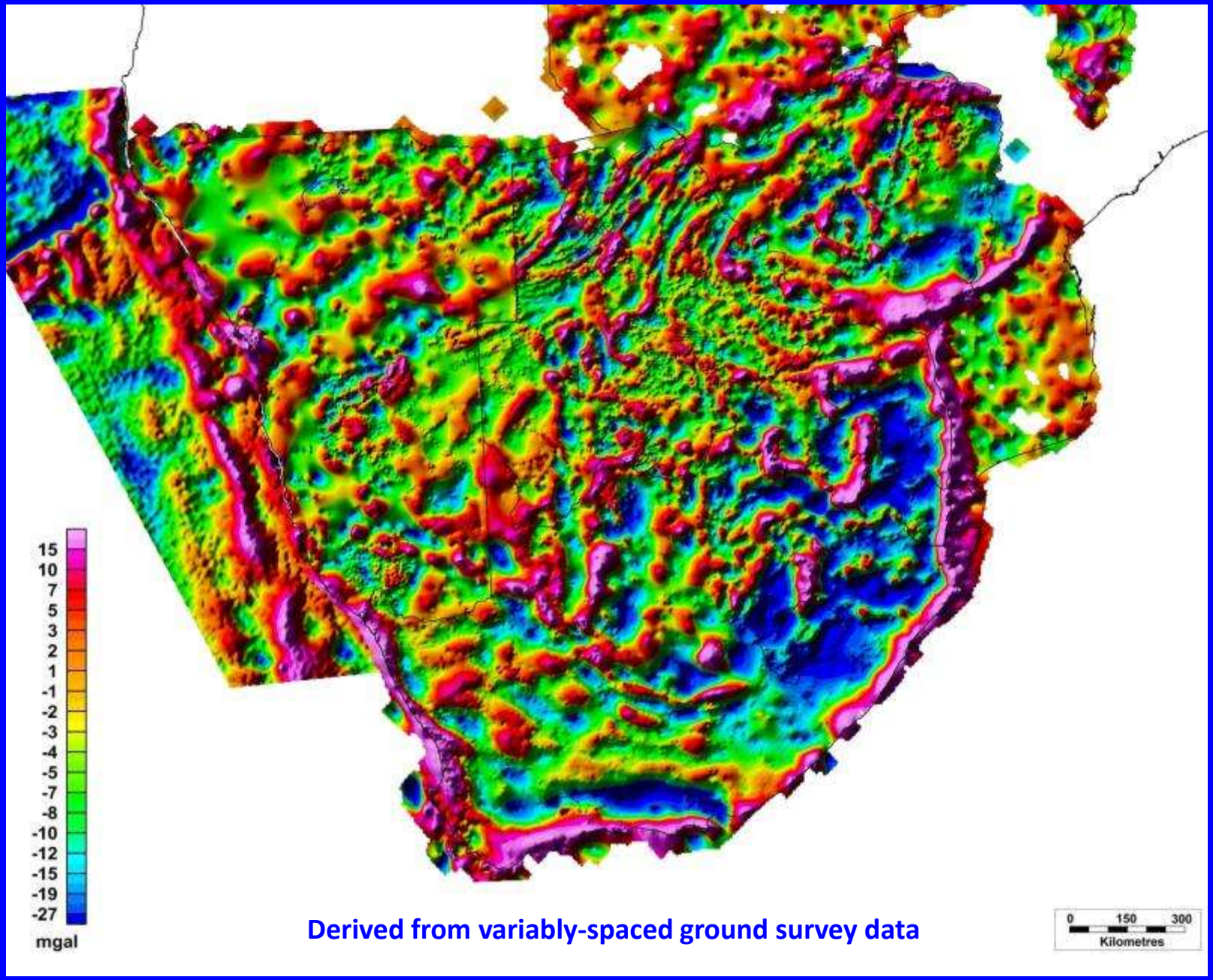
Reduced-to-the-Pole aeromagnetic data (RTP of Total Magnetic Intensity)



Mostly 1 km line-spacing; Grid interval 500m
Botswana 250 m lines, degraded to 500 m grid

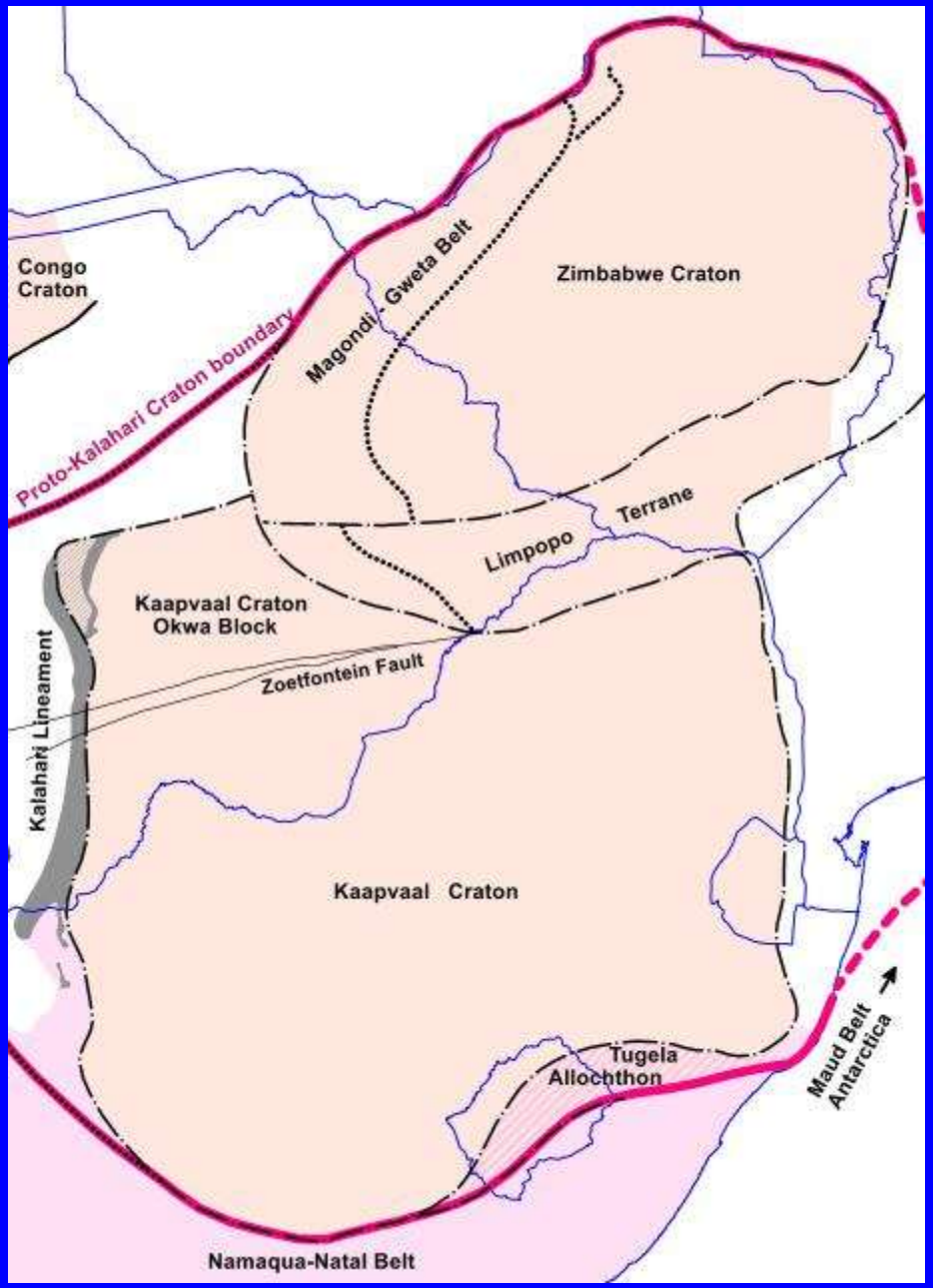
Residual Bouguer Gravity data

Free-Air Gravity data offshore Namibia, courtesy NAMCOR

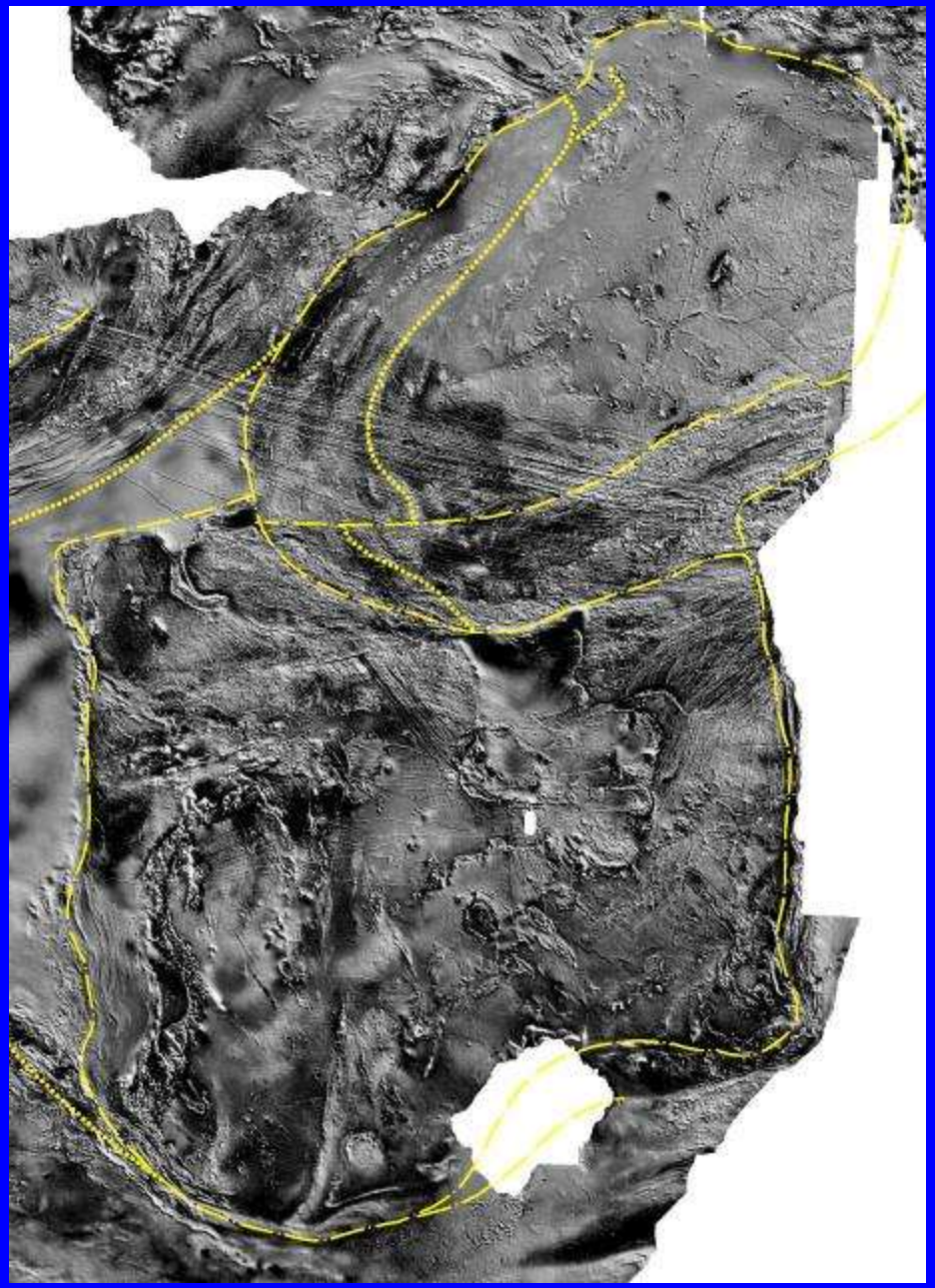


Derived from variably-spaced ground survey data

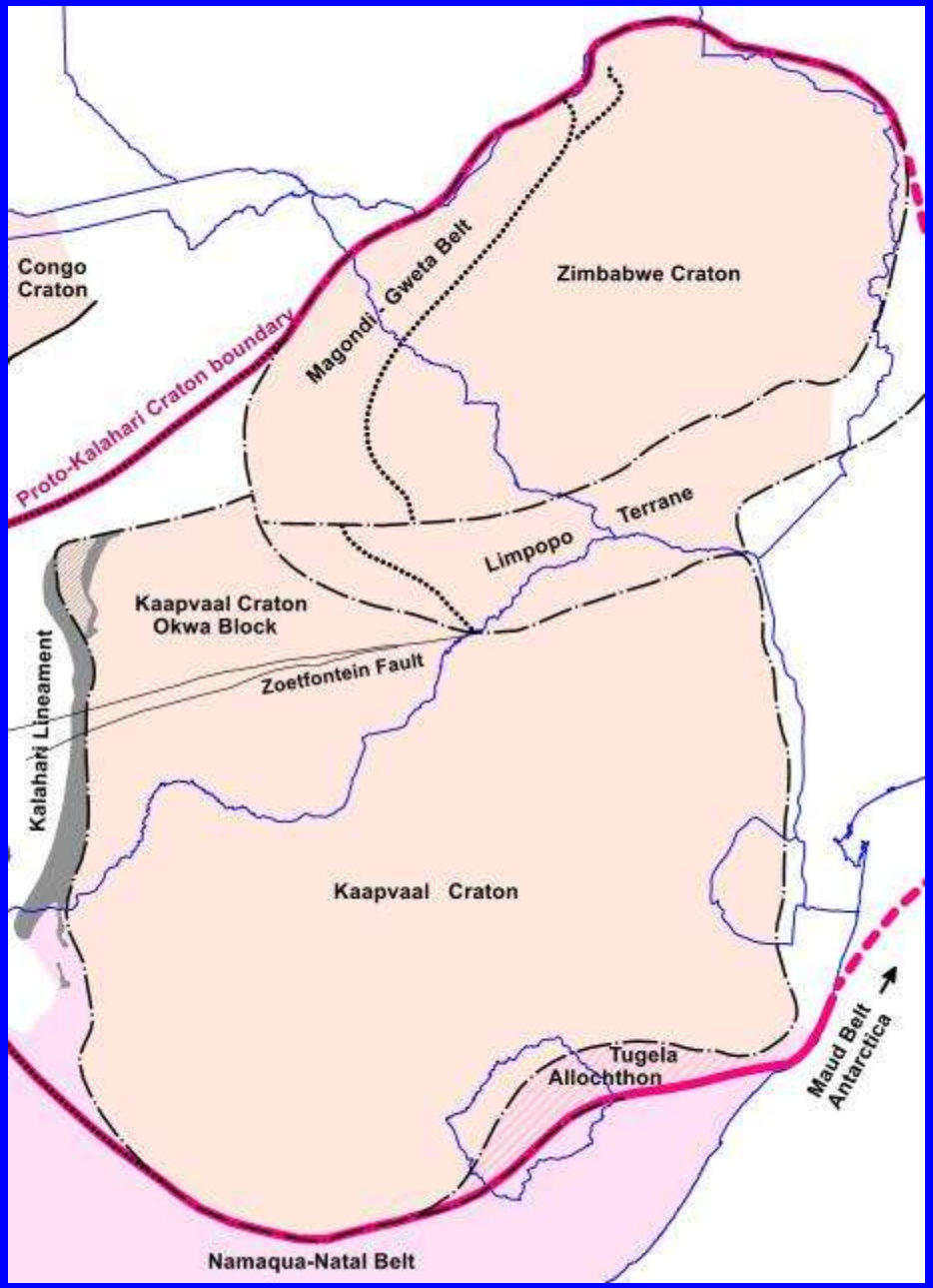
Kaapvaal and Zimbabwe Cratons



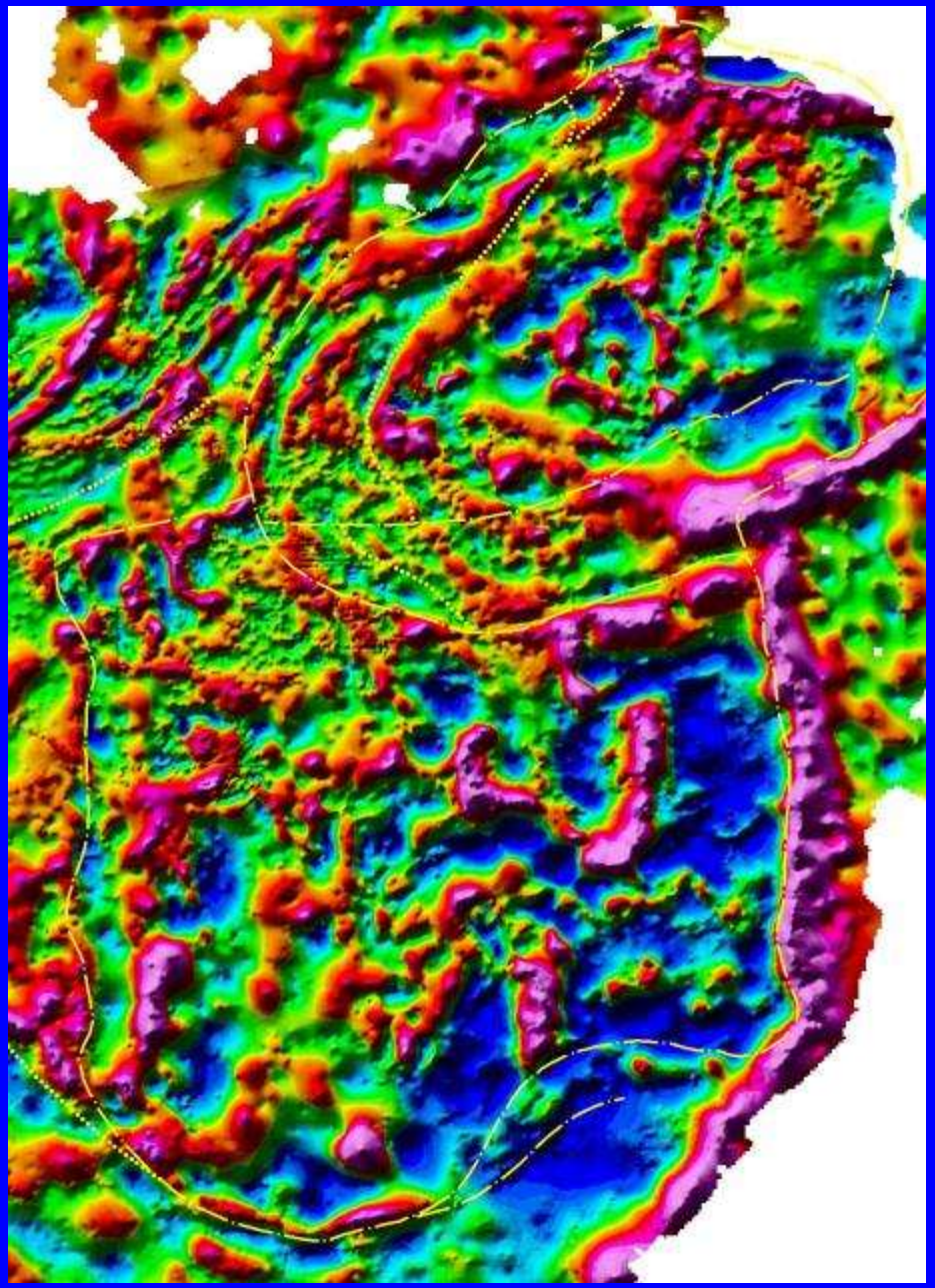
RTP of Total Magnetic Intensity

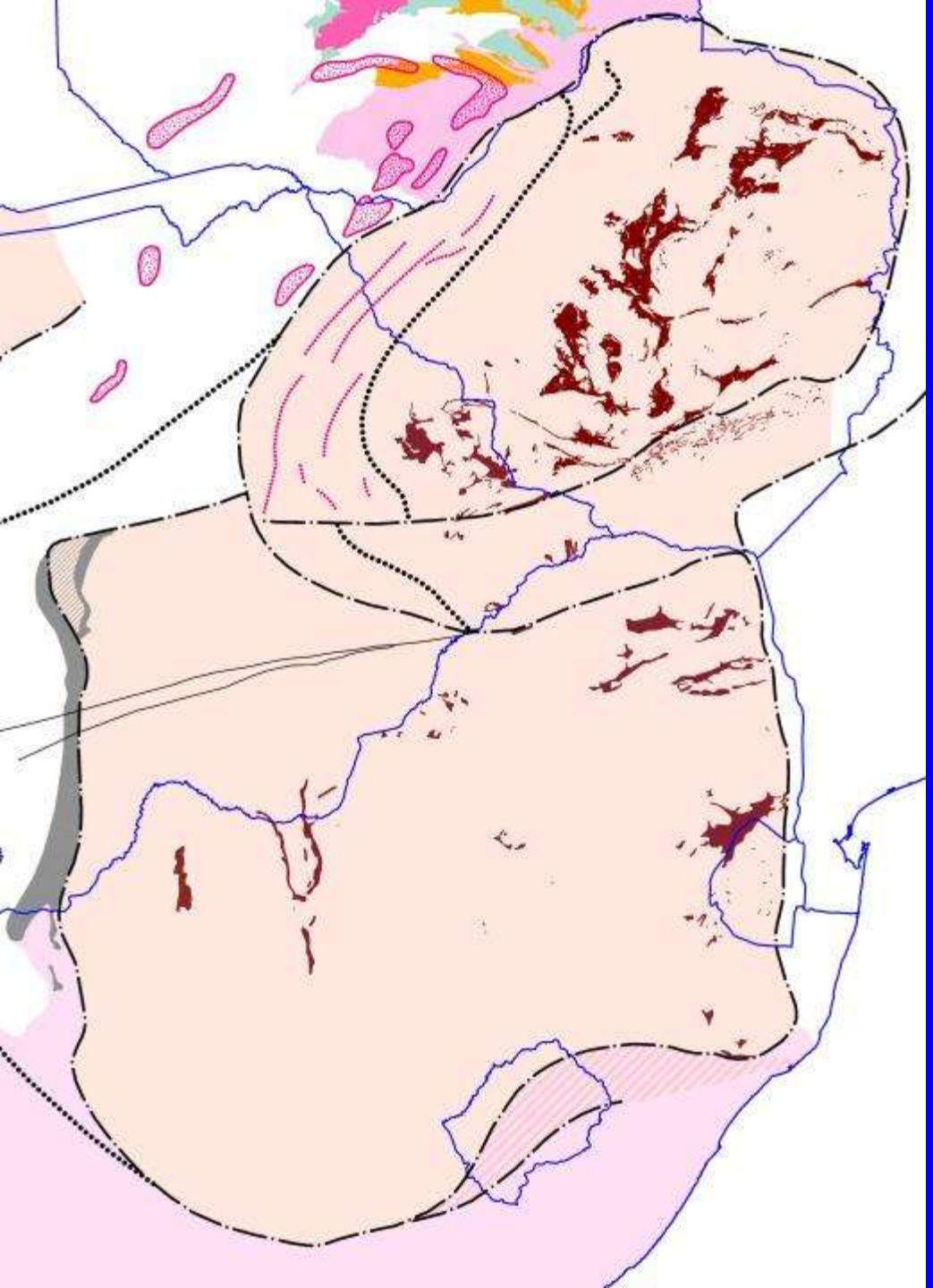


Kaapvaal and Zimbabwe Cratons



Residual filter of Bouguer Gravity

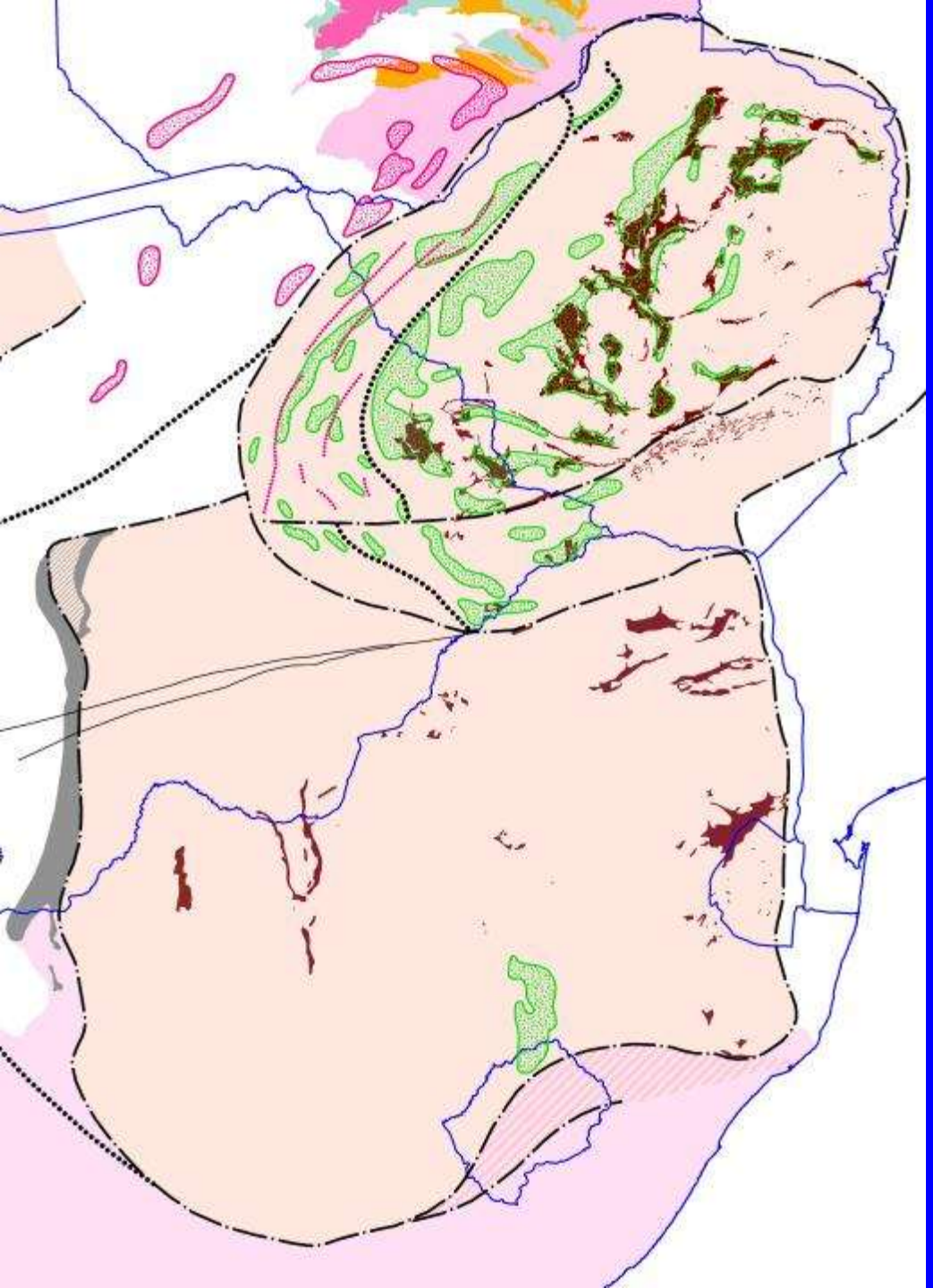




Kaapvaal and Zimbabwe Cratons

Greenstone Belts
(mostly published mapping)

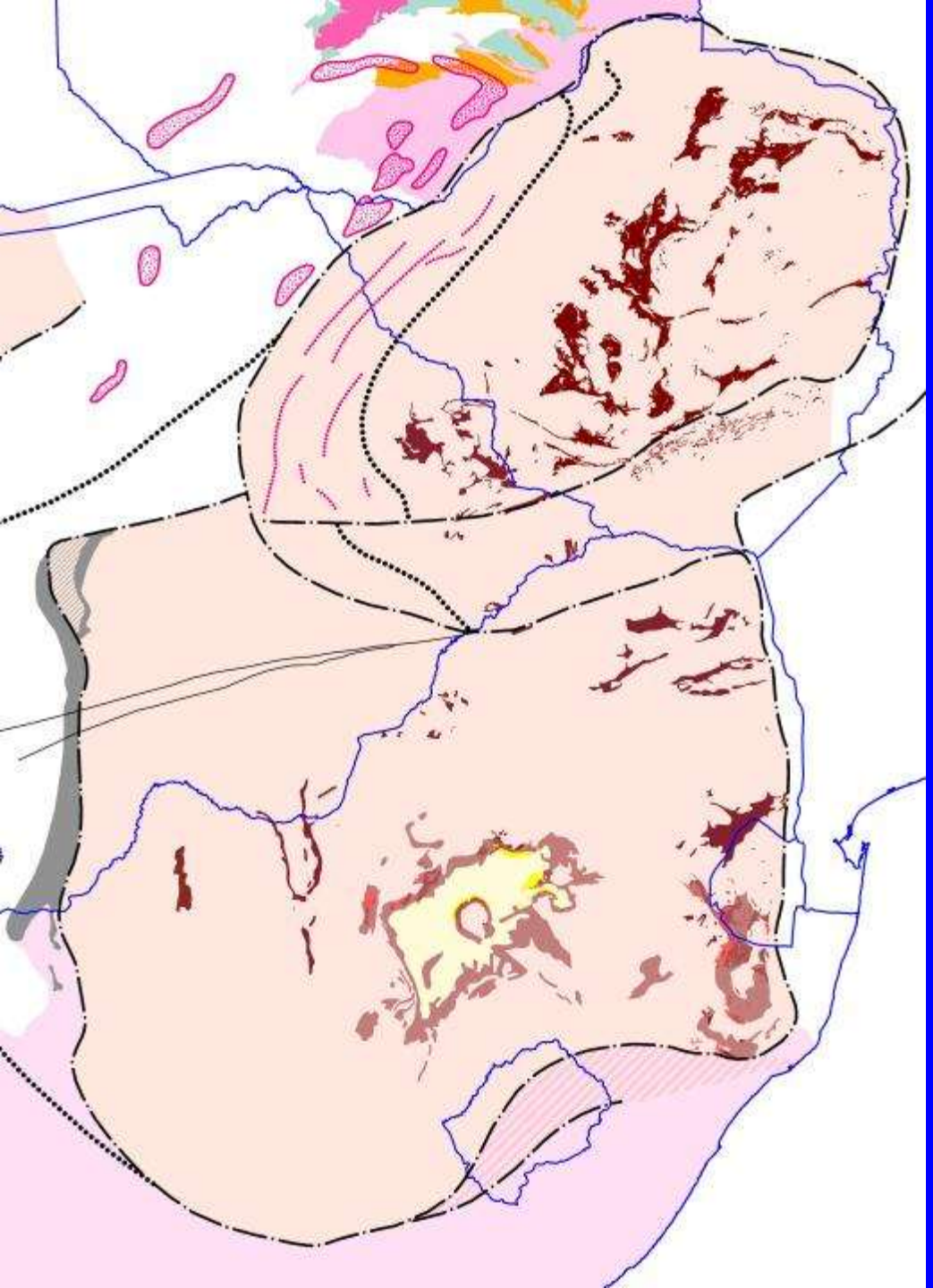
- Karoo and all younger cover
- Karoo basalts, sills
- Intrusions, undifferentiated
- Waterberg, Olifantshoek Groups
- Transvaal Supergroup
- Ventersdorp Supergroup
- Wits Basin: Central Rand Group
- Wits Basin: West Rand Group
- Greenstone. Swazian



Zimbabwe-Botswana Greenstone Belts

coincident residual
Bouguer Gravity anomalies

- Karoo and all younger cover
- Karoo basalts, sills
- Intrusions, undifferentiated
- Waterberg, Olifantshoek Groups
- Transvaal Supergroup
- Ventersdorp Supergroup
- Wits Basin: Central Rand Group
- Wits Basin: West Rand Group
- Greenstone. Swazian



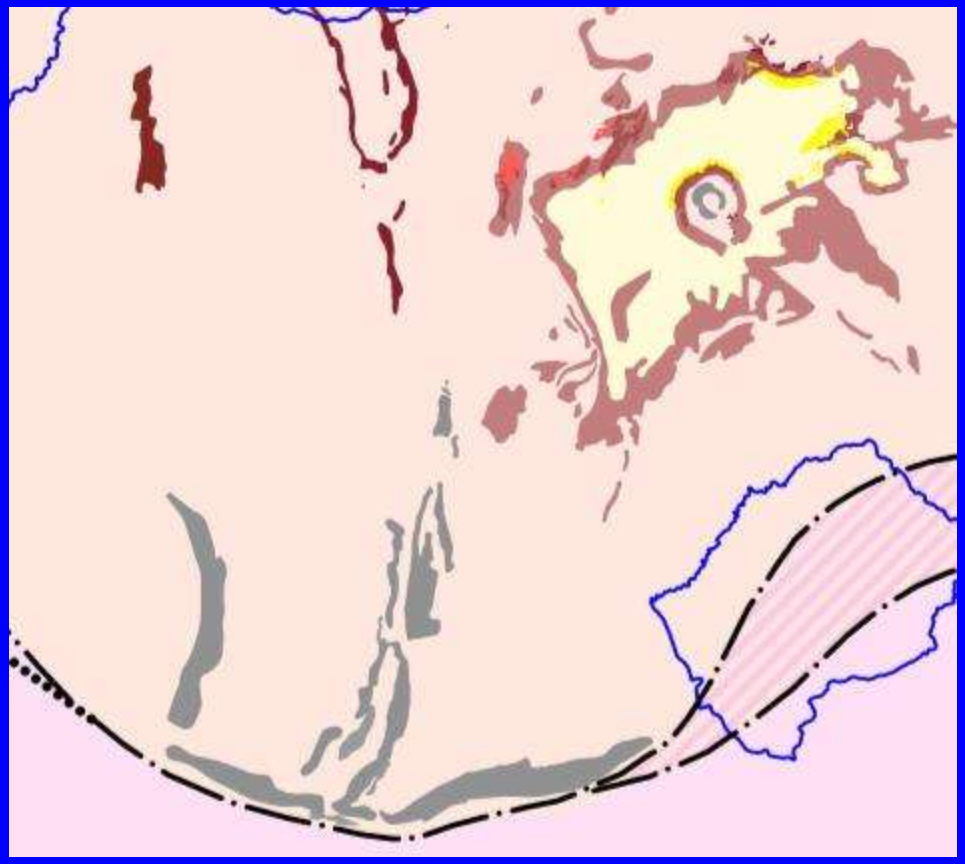
Mapped and interpreted Witwatersrand and Pongola Supergroups

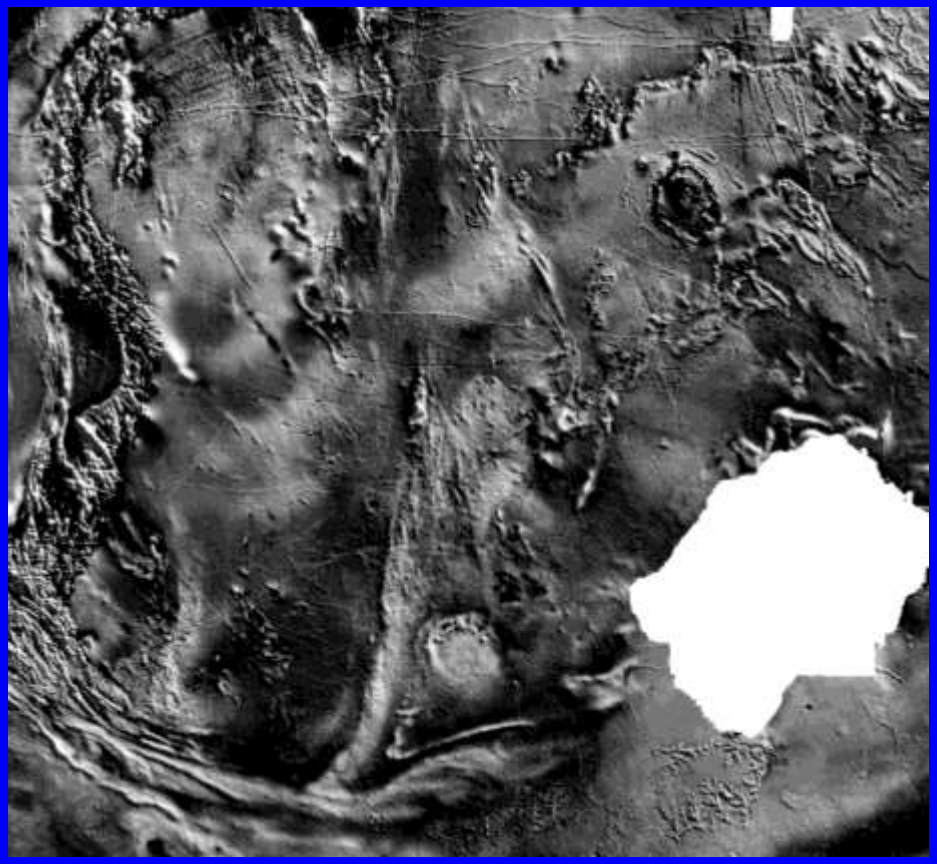
Also showing the Dominion Group

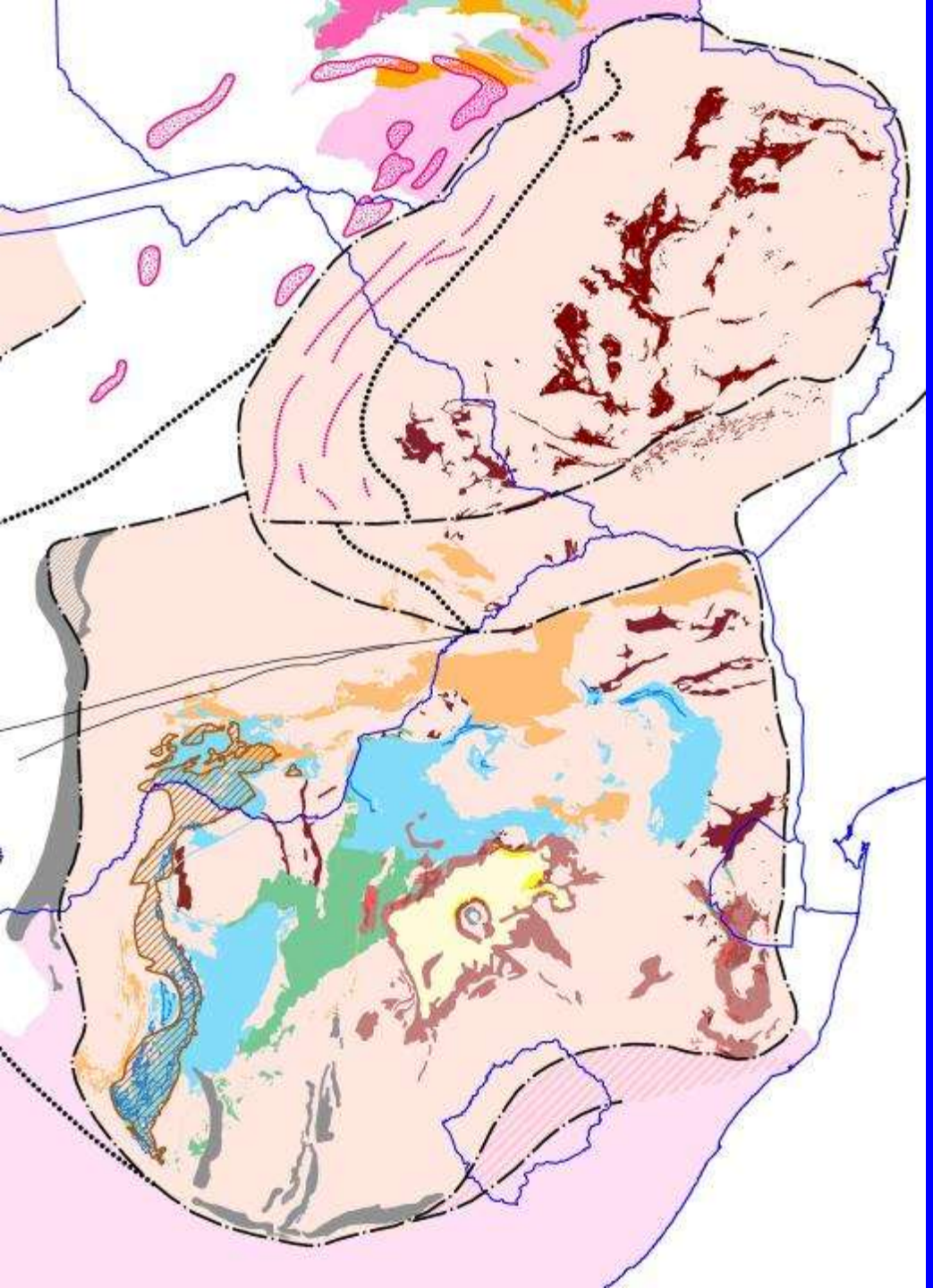
- Karoo and all younger cover
- Karoo basalts, sills
- Intrusions, undifferentiated
- Waterberg, Olifantshoek Groups
- Transvaal Supergroup
- Ventersdorp Supergroup
- Wits Basin: Central Rand Group
- Wits Basin: West Rand Group
- Greenstone. Swazian

Magnetized Basement:

The Colesberg and Strydenburg Lineaments





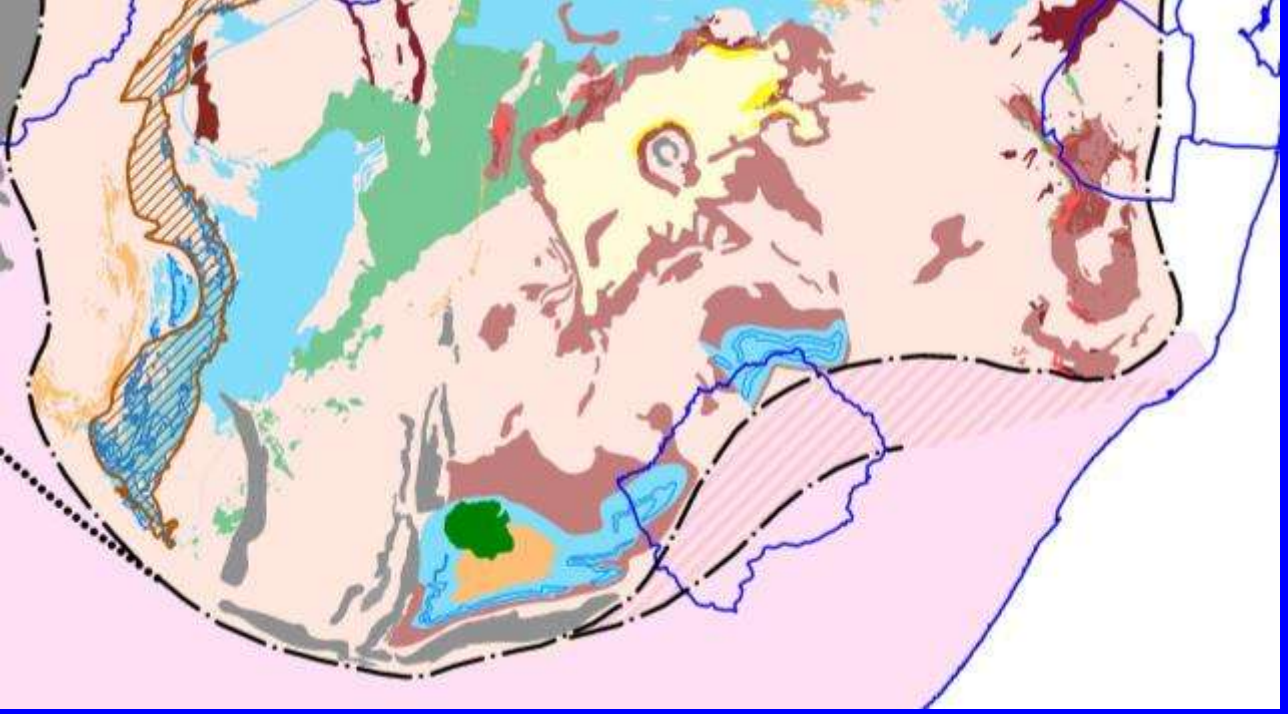


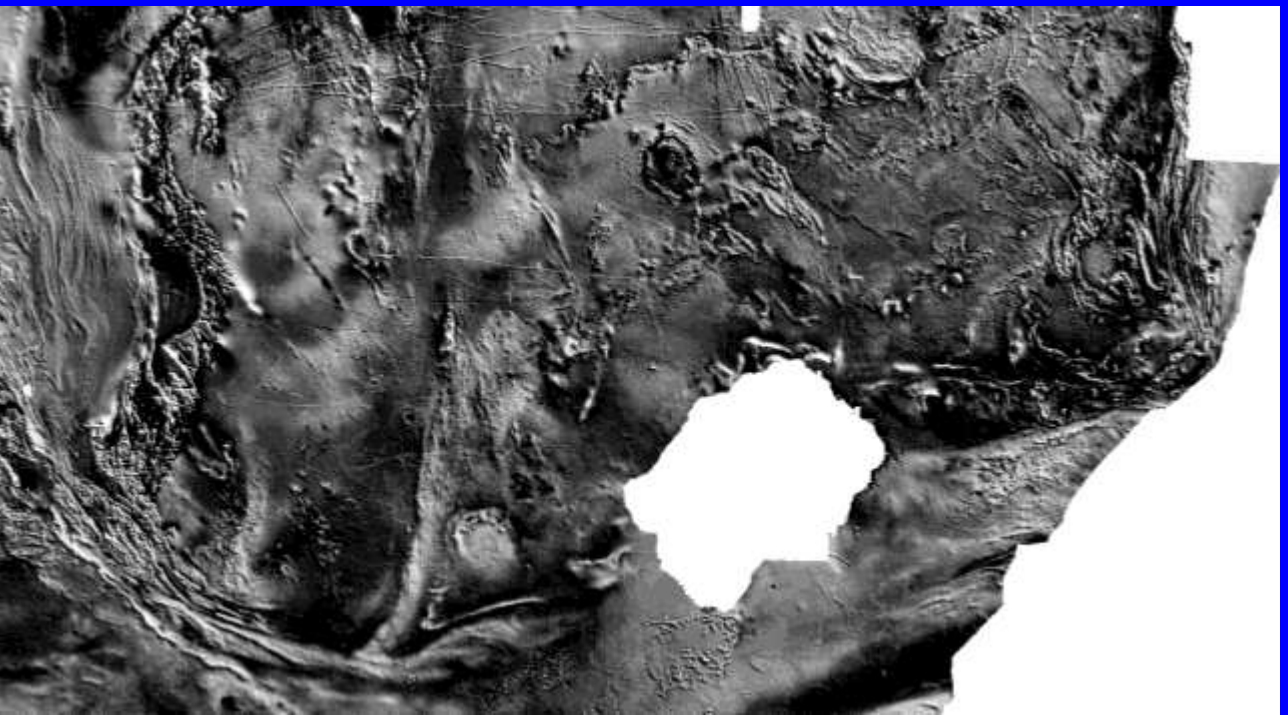
Mapped Ventersdorp and Transvaal Supergroups

also Waterberg, Soutpansberg, Olifants and Palapye Groups

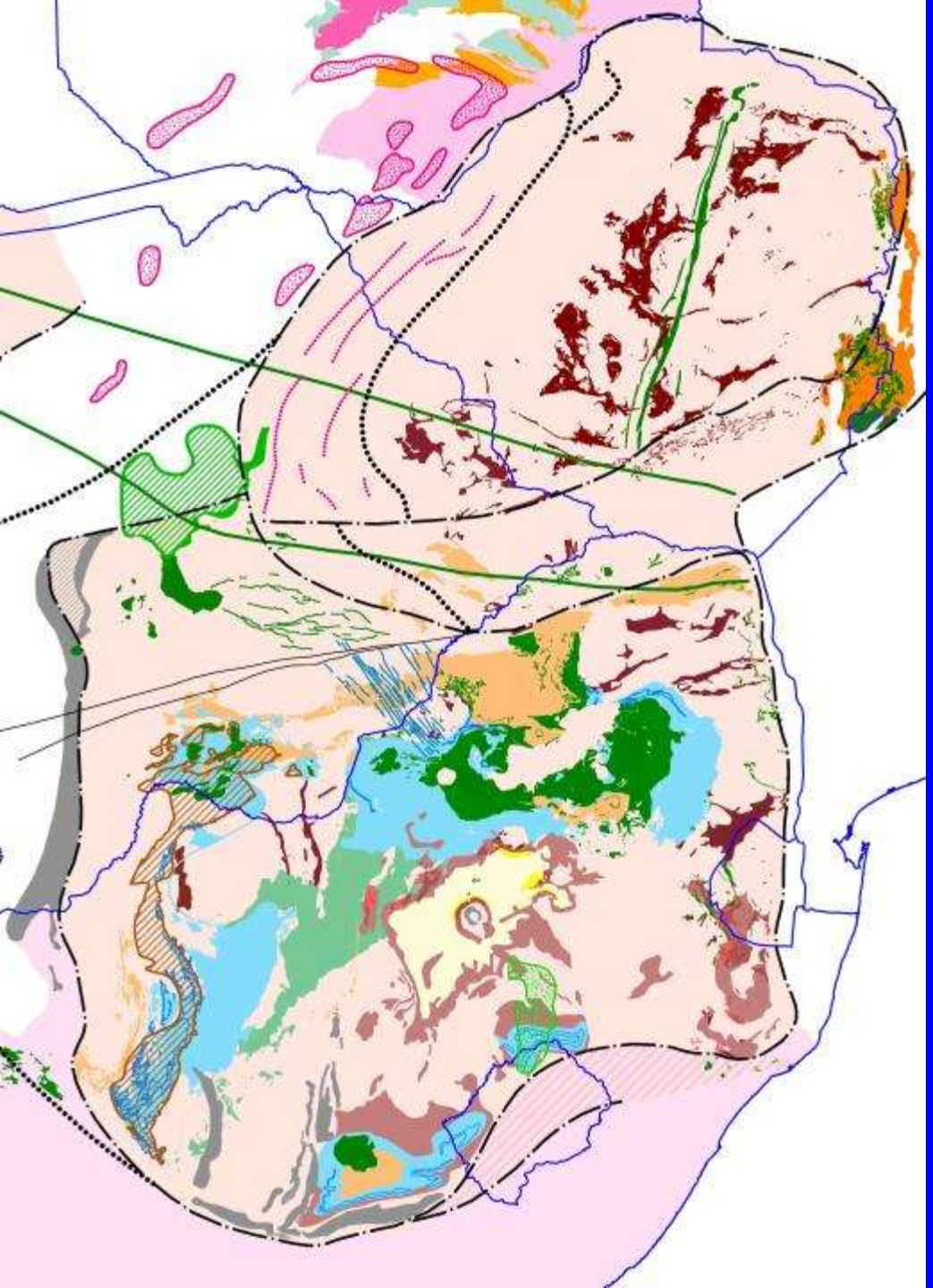
Magnetic Kuruman Formation hatched

- Karoo and all younger cover
- Karoo basalts, sills
- Intrusions, undifferentiated
- Waterberg, Olifantshoek Groups
- Transvaal Supergroup
- Ventersdorp Supergroup
- Wits Basin: Central Rand Group
- Wits Basin: West Rand Group
- Greenstone. Swazian





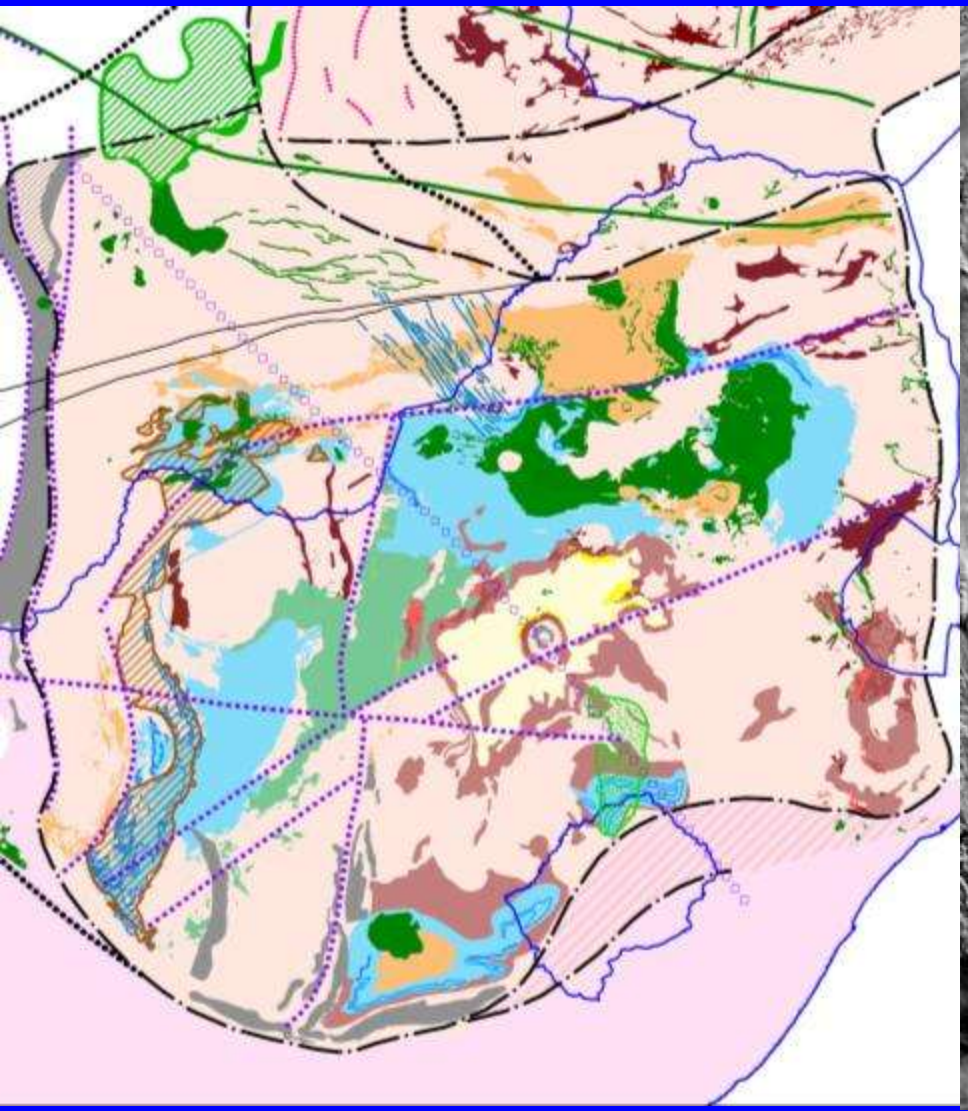
Southern Witwatersrand, Transvaal and Waterberg Basins

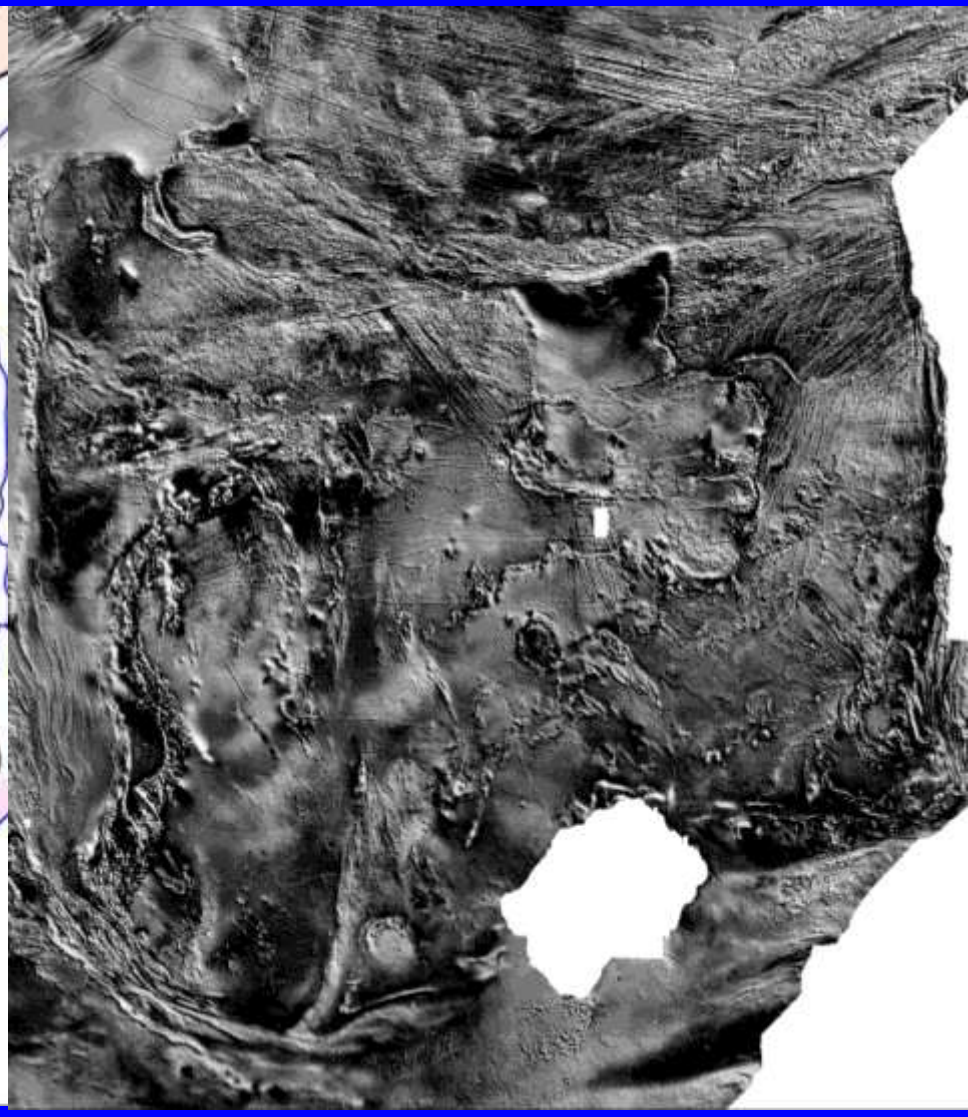


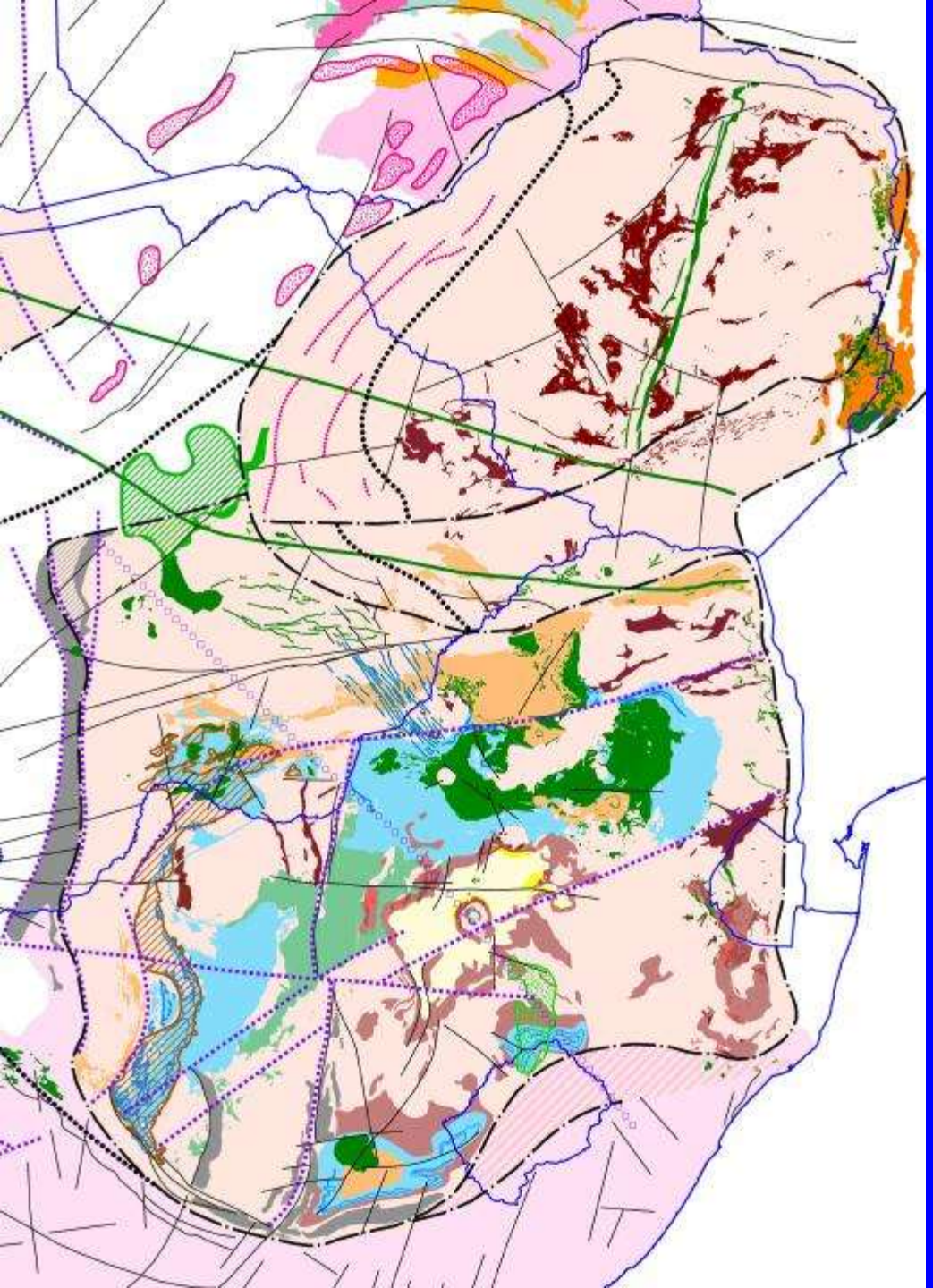
Major intrusions, undifferentiated

- Karoo and all younger cover
- Karoo basalts, sills
- Intrusions, undifferentiated
- Waterberg, Olifantshoek Groups
- Transvaal Supergroup
- Ventersdorp Supergroup
- Wits Basin: Central Rand Group
- Wits Basin: West Rand Group
- Greenstone. Swazian

Interpreted Lineaments: locus of broader structural corridor







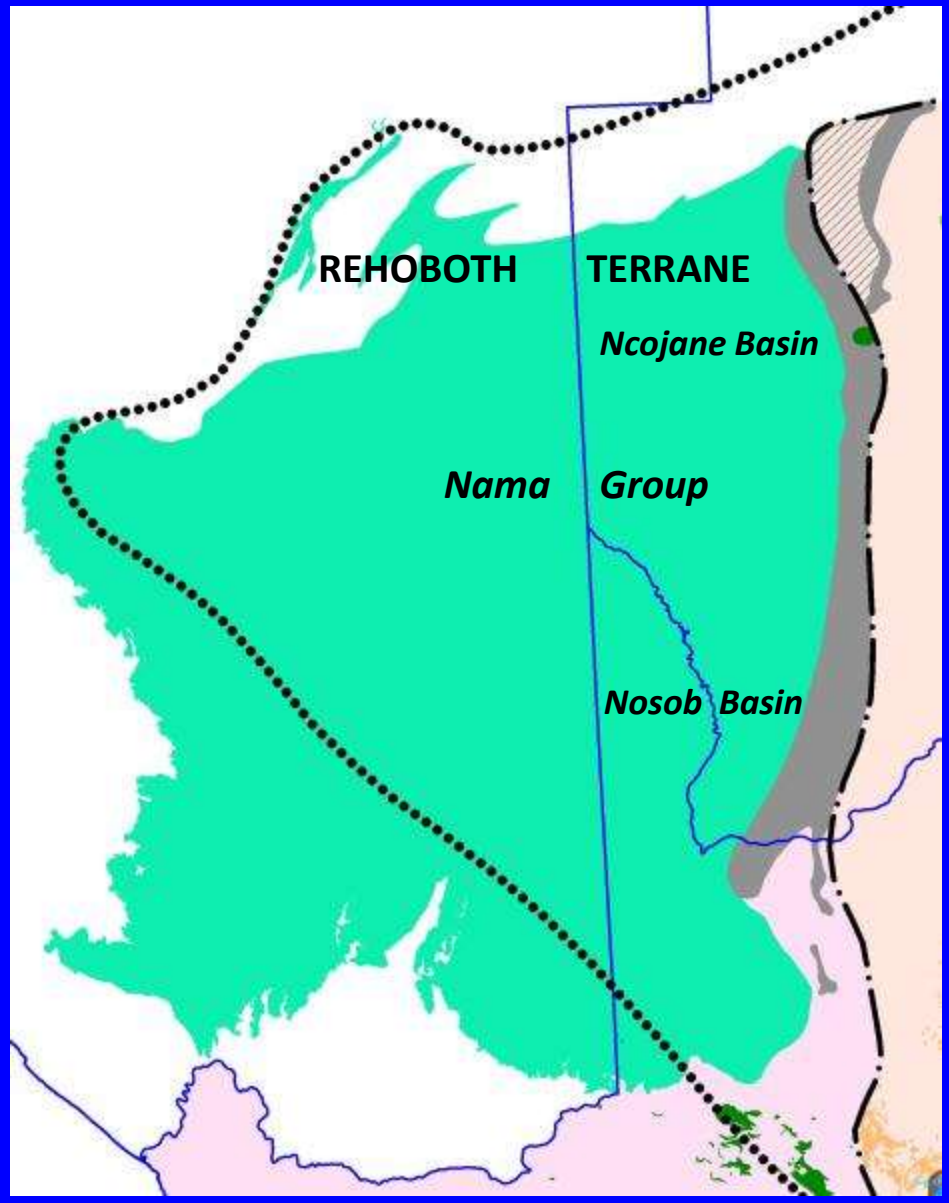
Interpreted Lineaments

and geophysically interpreted faults

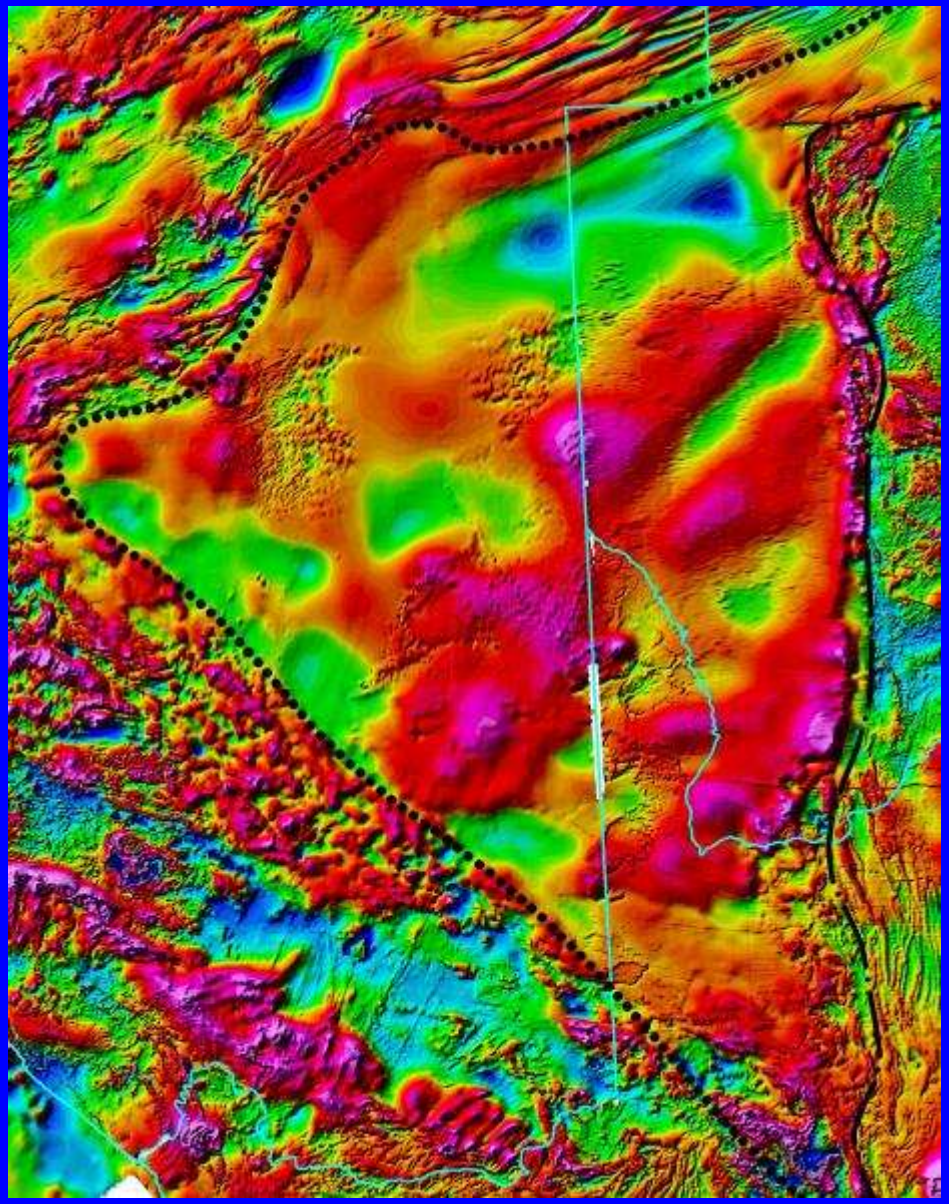
- Karoo and all younger cover
- Karoo basalts, sills
- Intrusions, undifferentiated
- Waterberg, Olifantshoek Groups
- Transvaal Supergroup
- Ventersdorp Supergroup
- Wits Basin: Central Rand Group
- Wits Basin: West Rand Group
- Greenstone. Swazian

REHOBOTH TERRANE – a deep basement

Nama Group extent

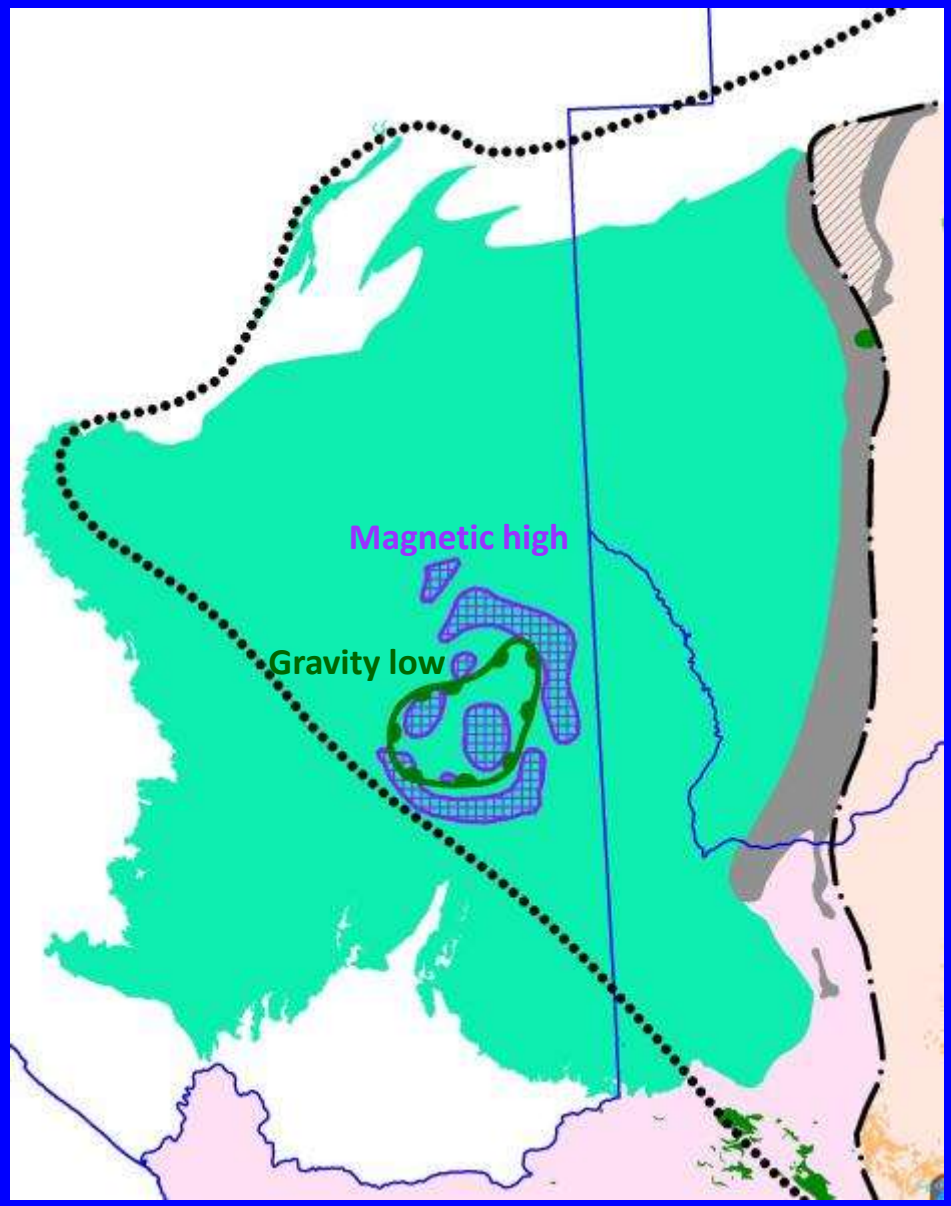


TMI

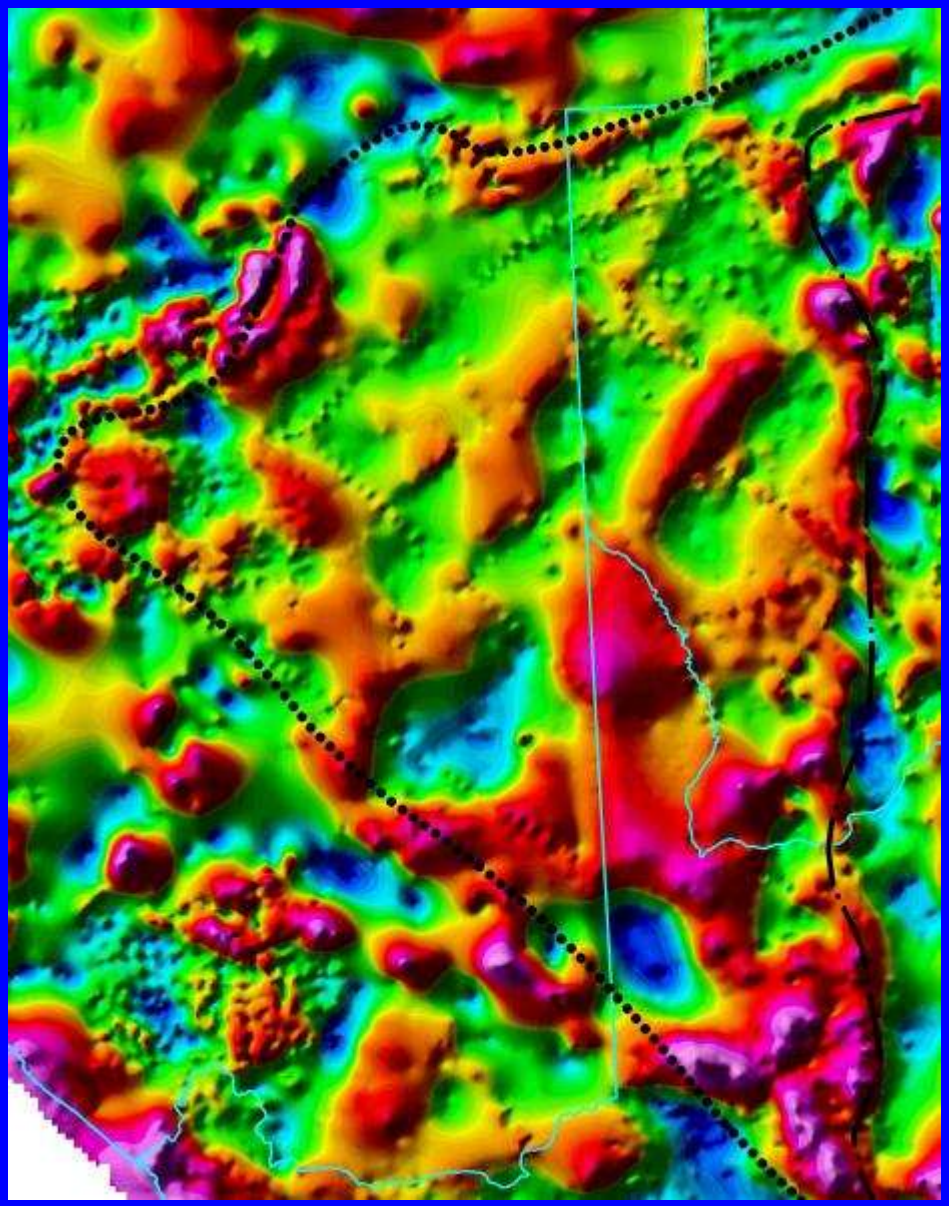


KARAS IMPACT STRUCTURE

Annular magnetic high, central gravity low

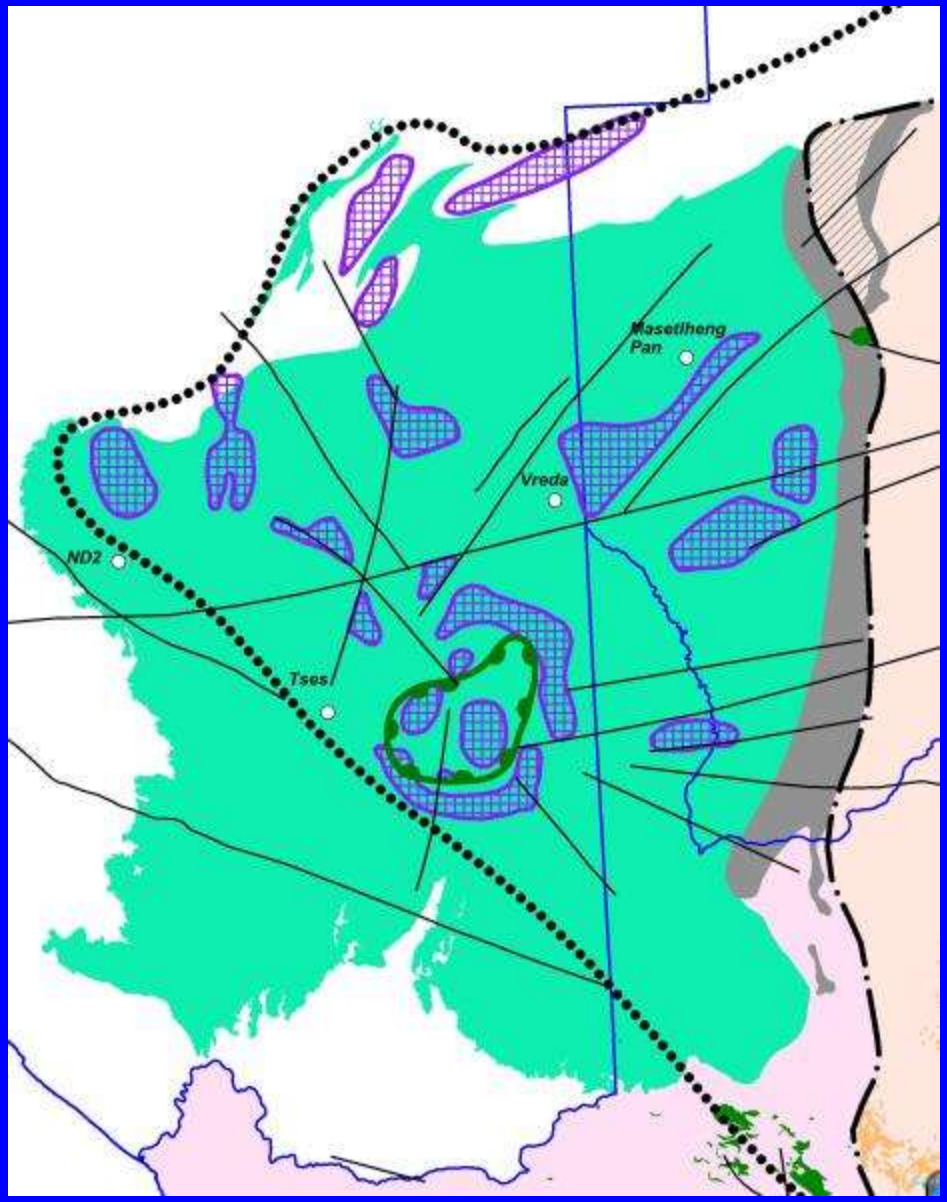


Bouguer Gravity Residual

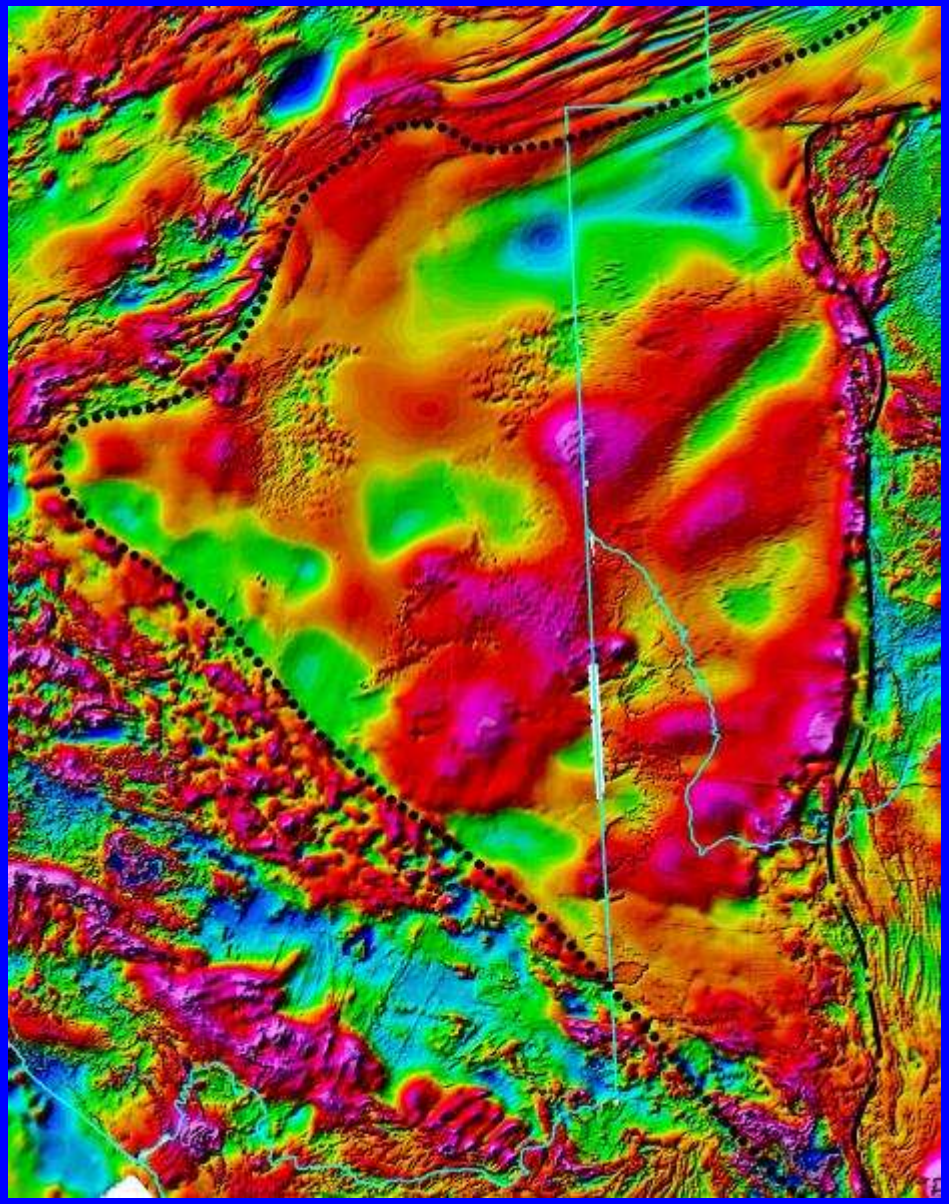


Deep basement sources: possible Sinclair (Umkondo) volcanics

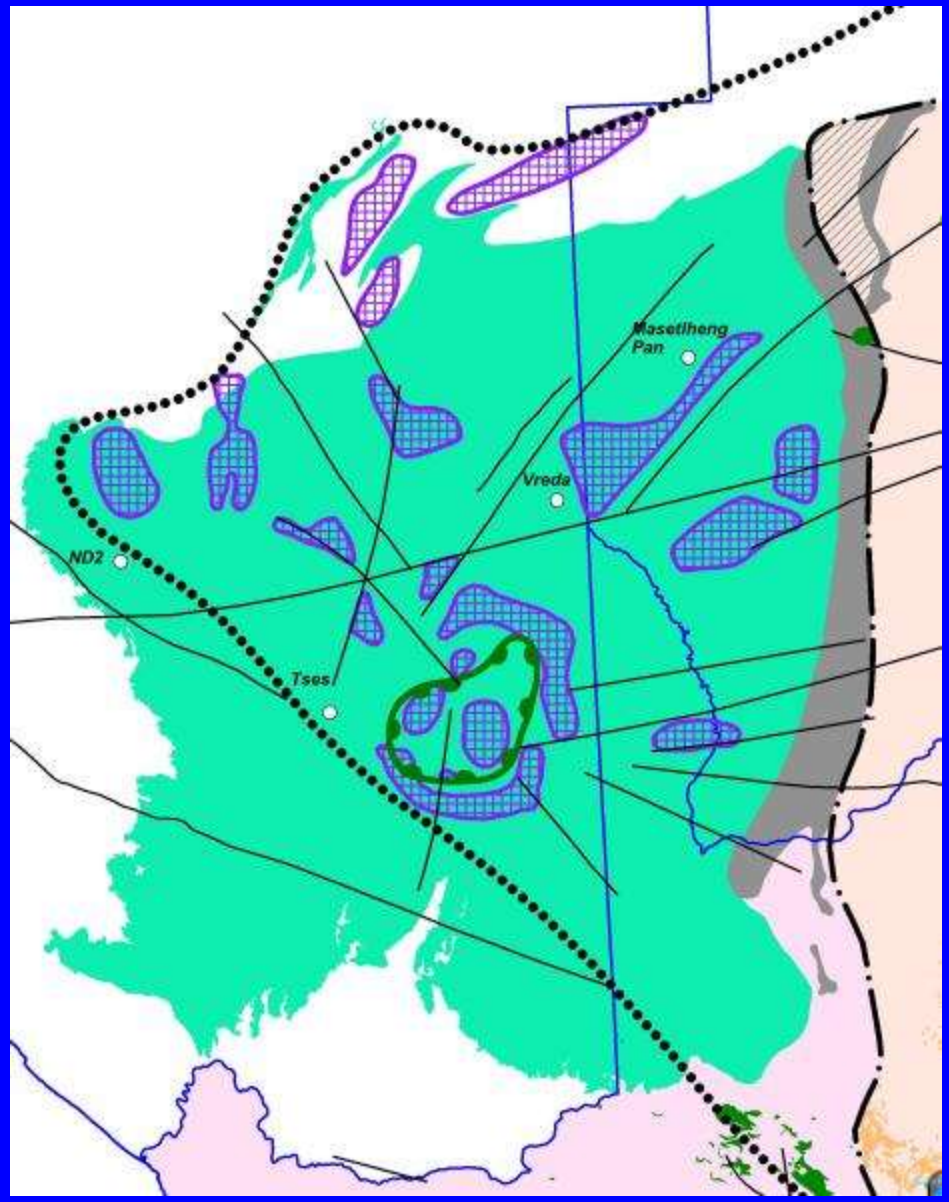
Deep-source magnetic highs



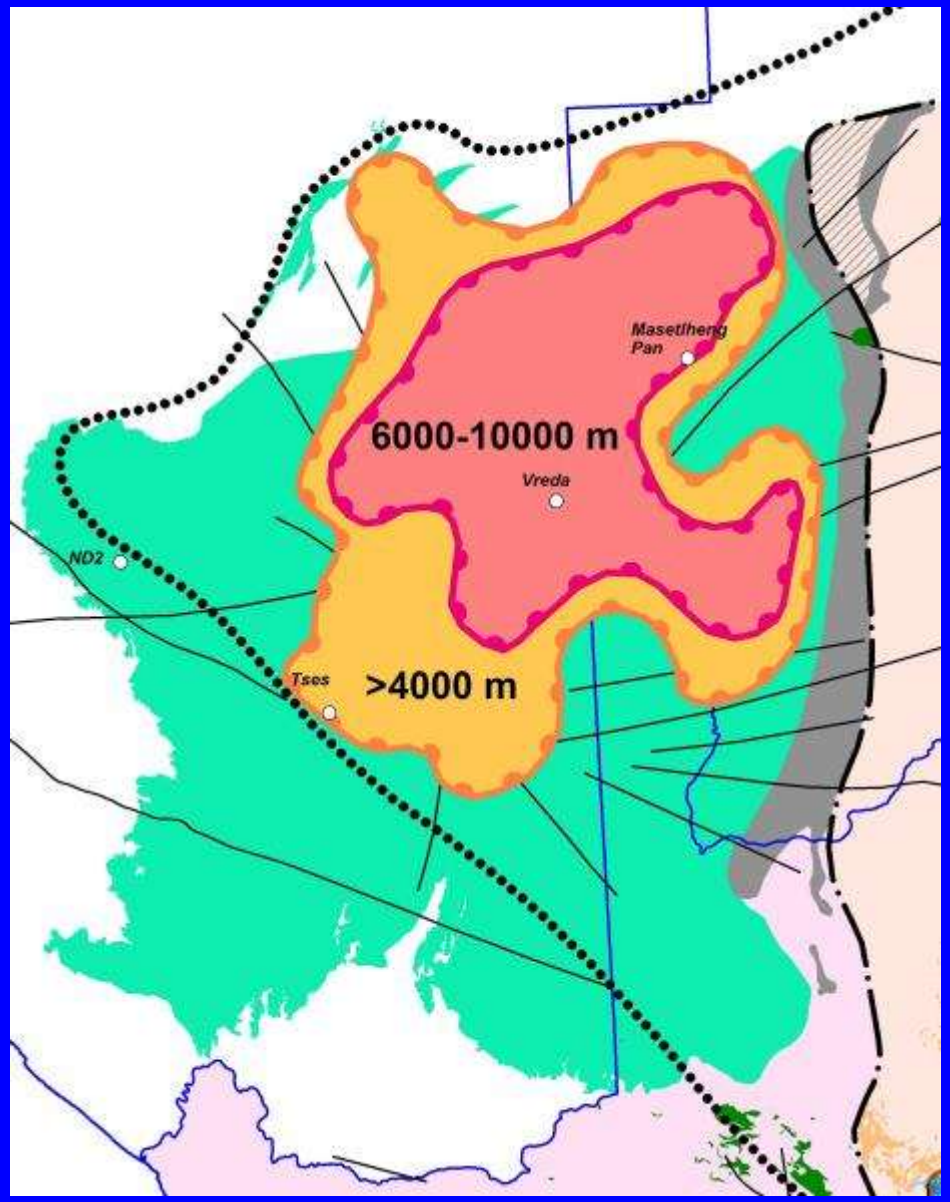
TMI

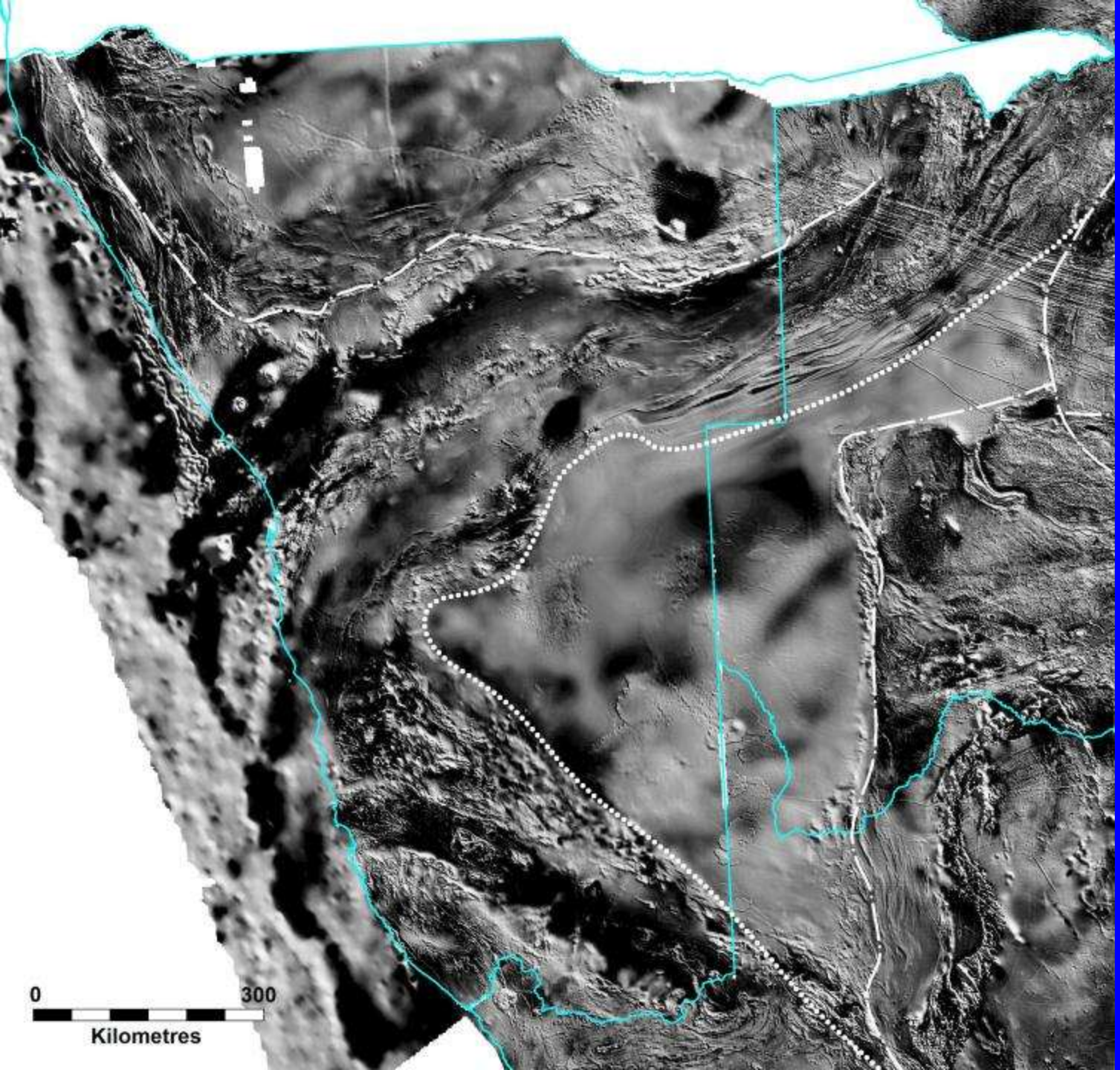


Depth to magnetic basement, derived from aeromagnetic data (2D Euler deconvolution)



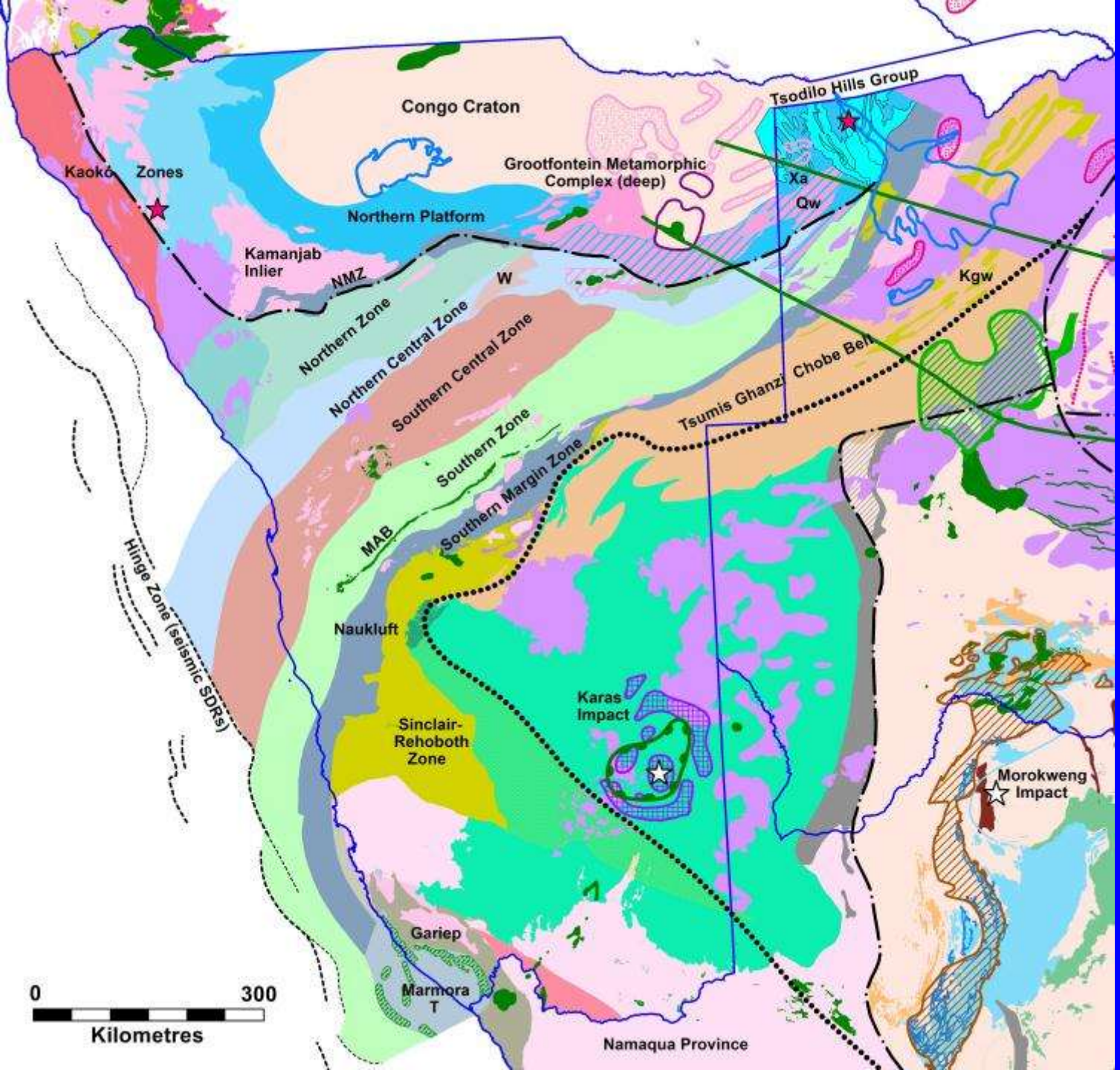
Pre-Nama sedimentray pile





Reduced-to-the-Pole aeromagnetic data

- Namibia: 1 km line spacing
- Offshore Namibia 20 km line spacing
- Botswana 250 m and 1 km line spacing

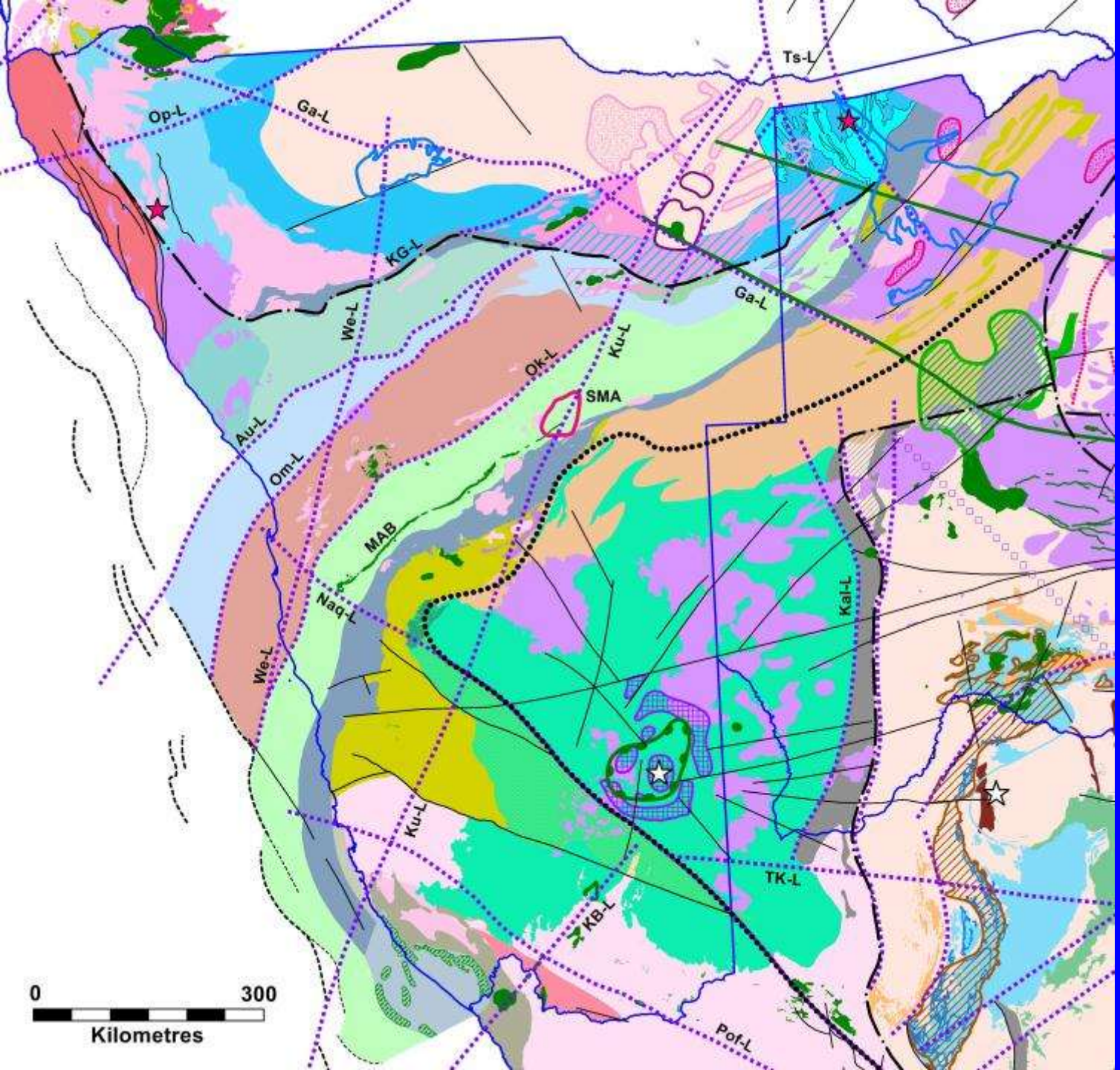


The Damara-Ghanzi-Chobe Orogenic Belt

Its basement and Tectono-stratigraphic Zones

Karoo basalts, sills

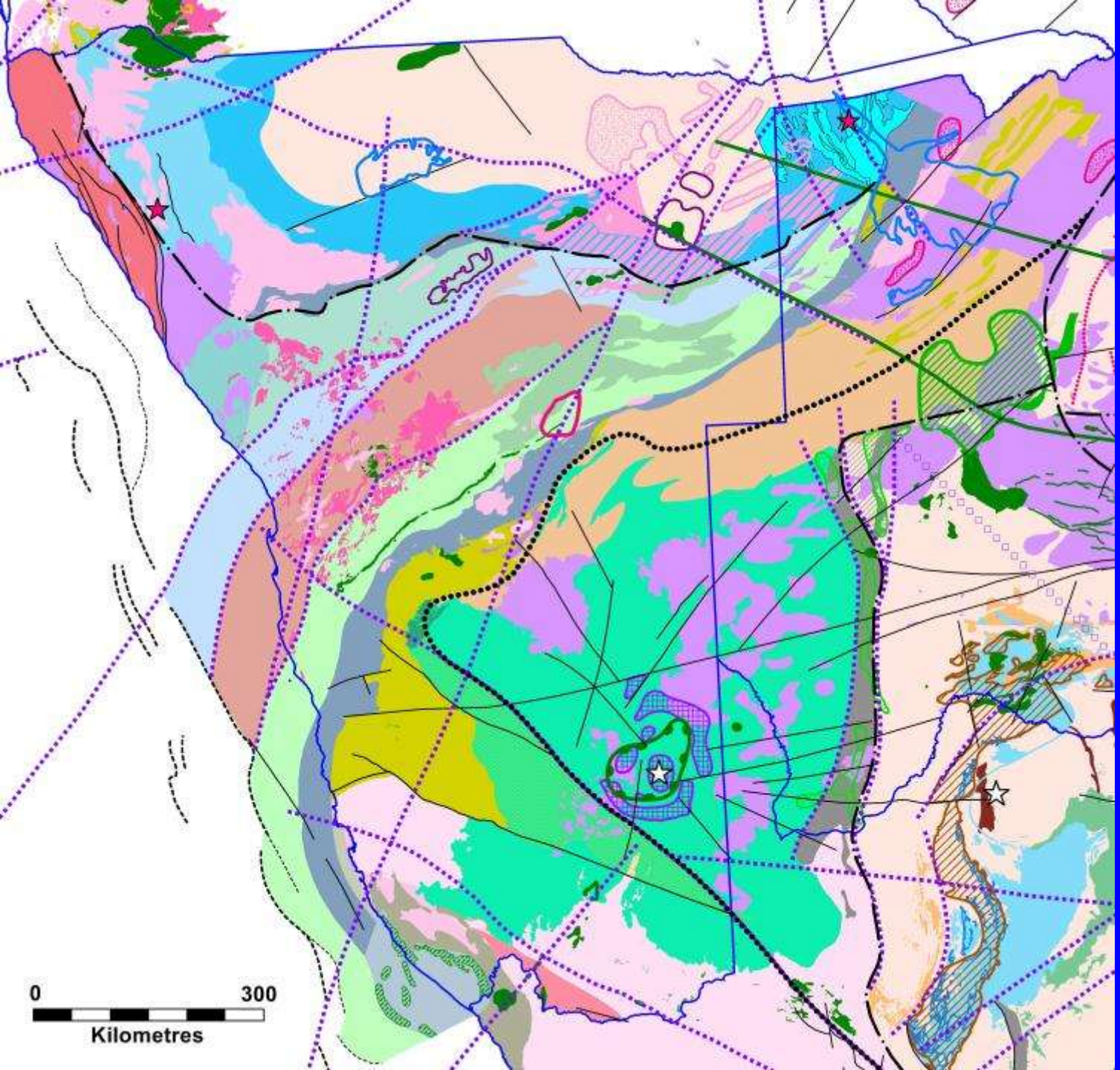
The basalts and dolerites are highly magnetic and noisy, thus compromising interpretation of deeper geology



Lineaments :

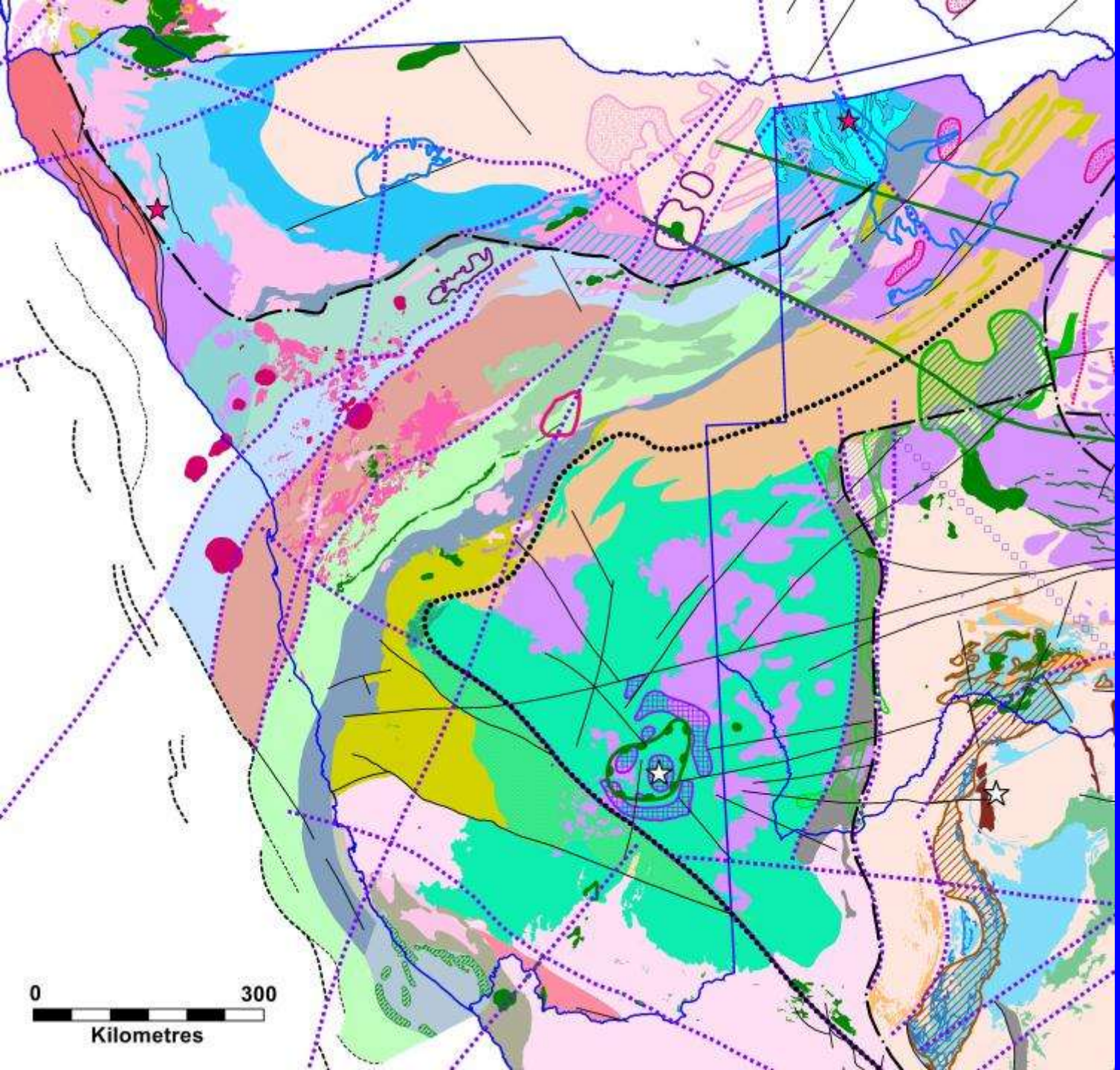
structural corridors bound and cut the Tectono-stratigraphic zones

★ **Archaean ages**



Damaran granites

- Salem
- Donkerhuk
- Red granites



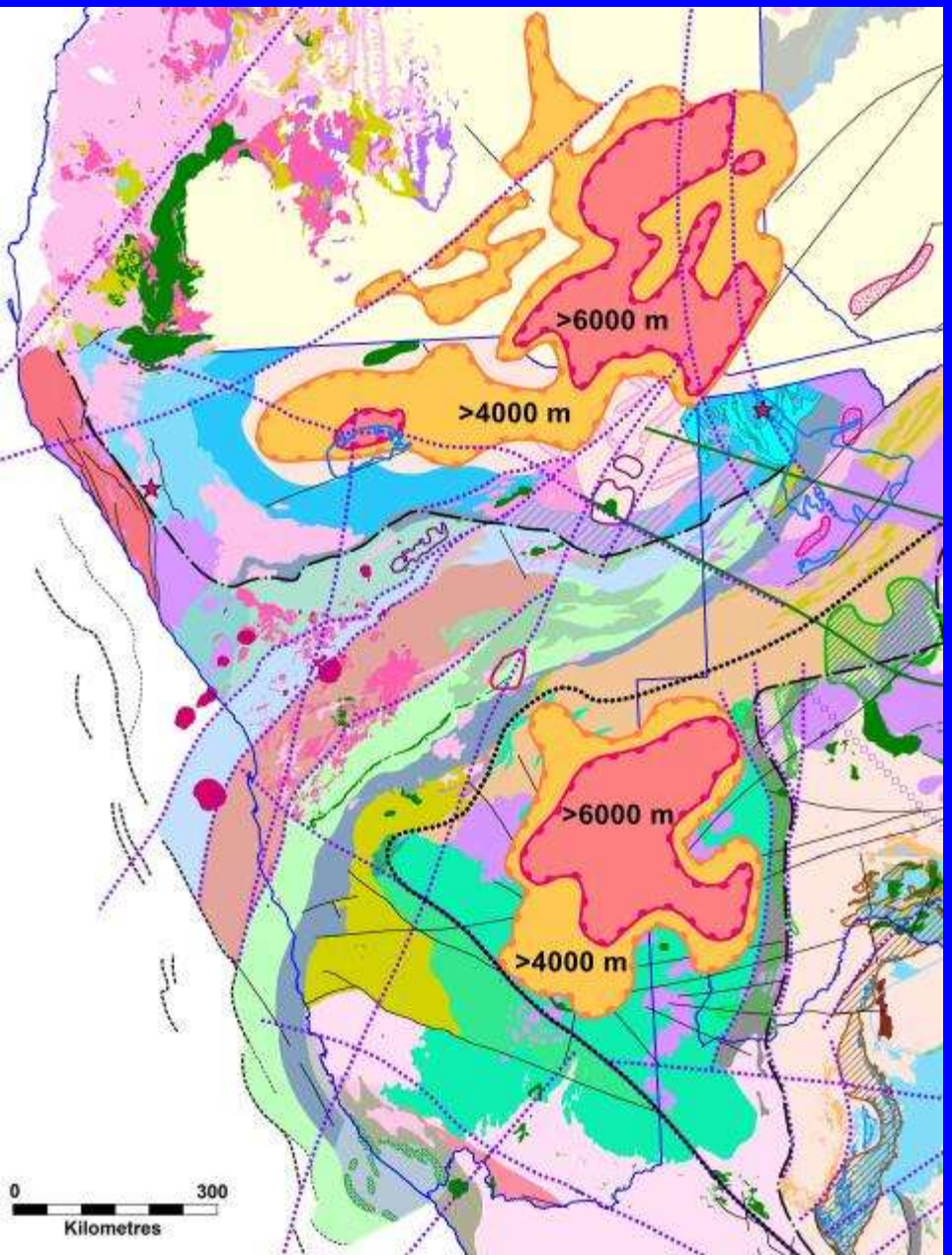
Cretaceous Igneous Complexes:

- Okorusu
- Paresis
- Brandberg
- Messum
- Erongo
- Cape Cross

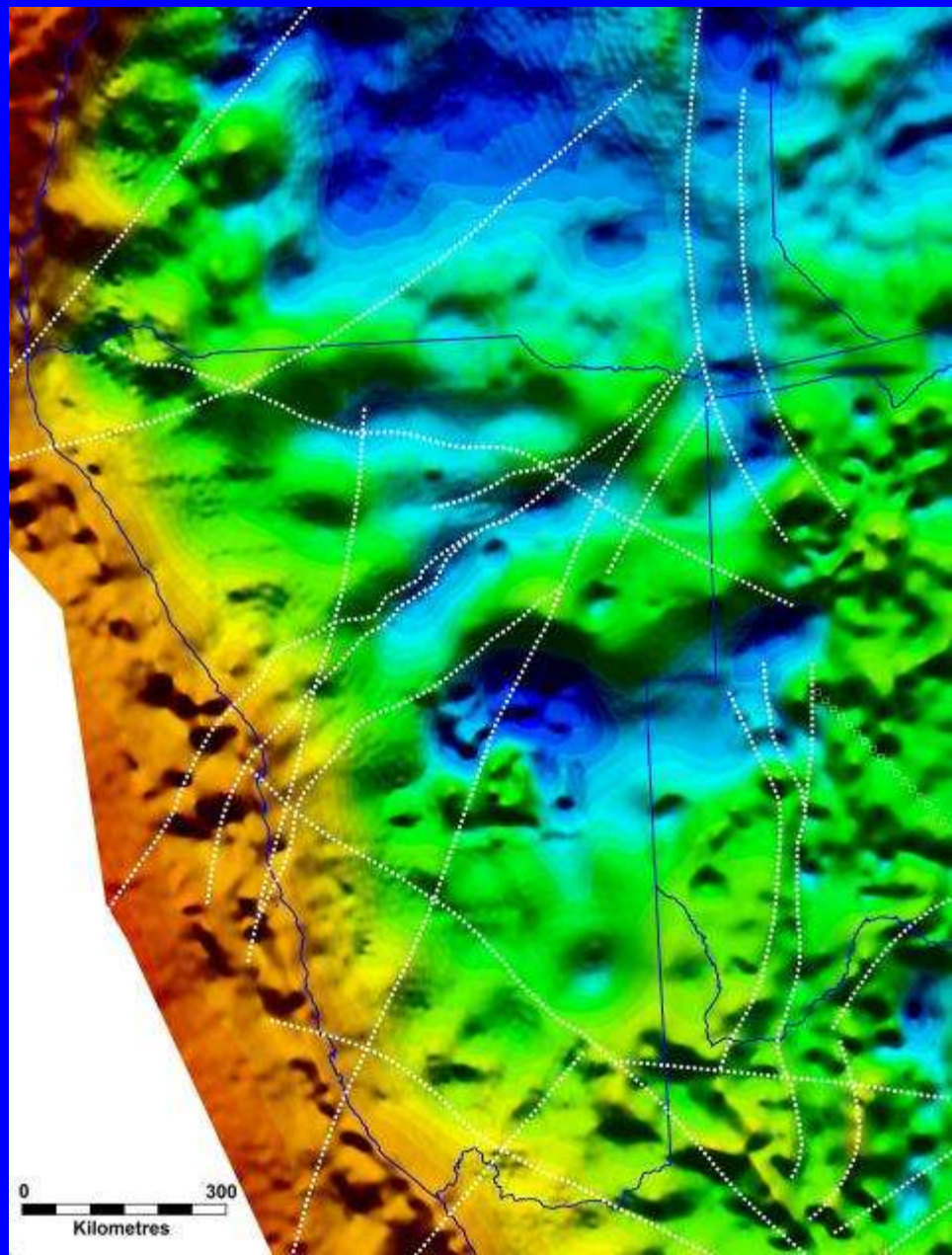
Offshore complexes (interpreted):

- Cape Cross ext.
- Cape Seal
- Walvis Bay

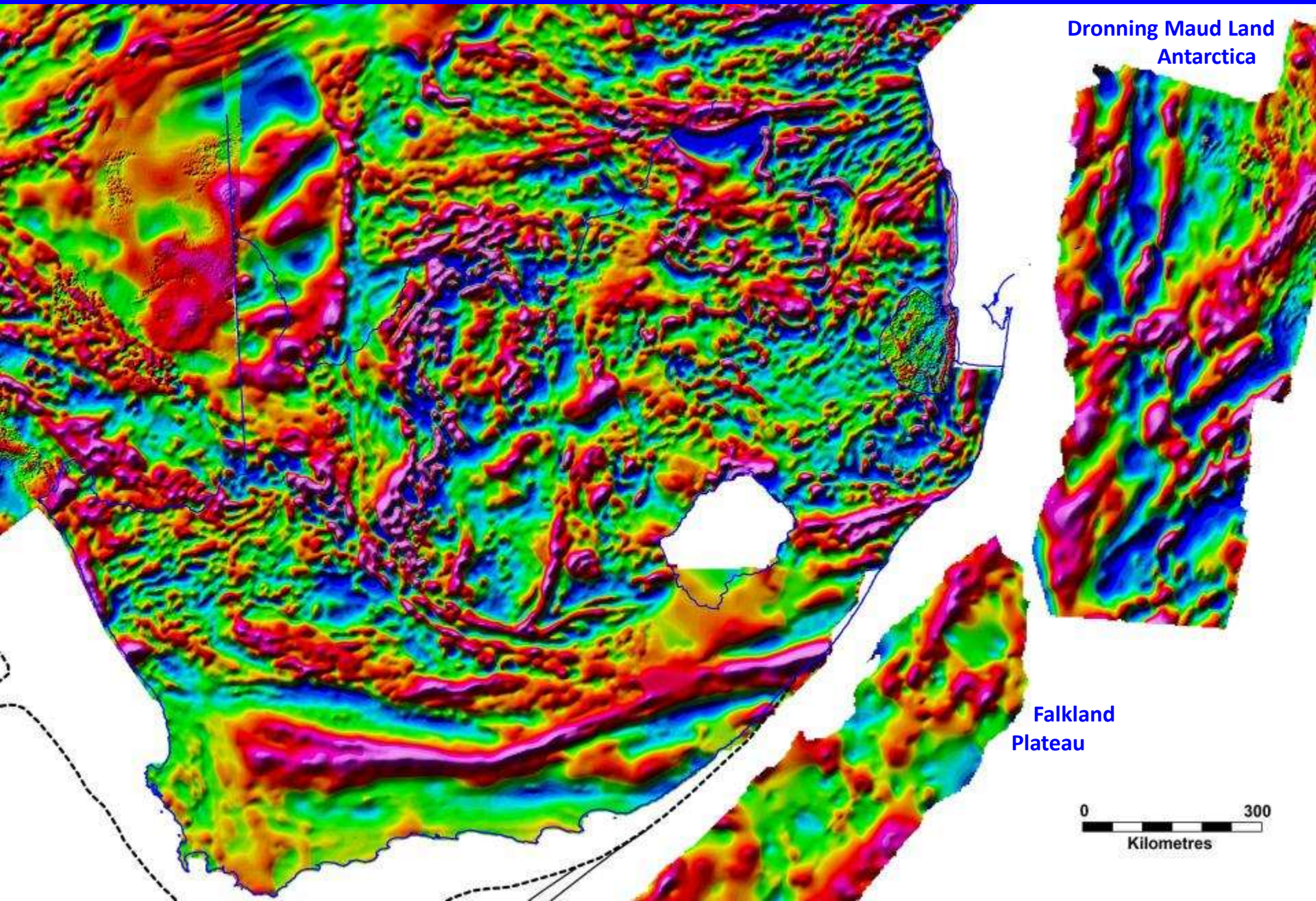
Deep Basins



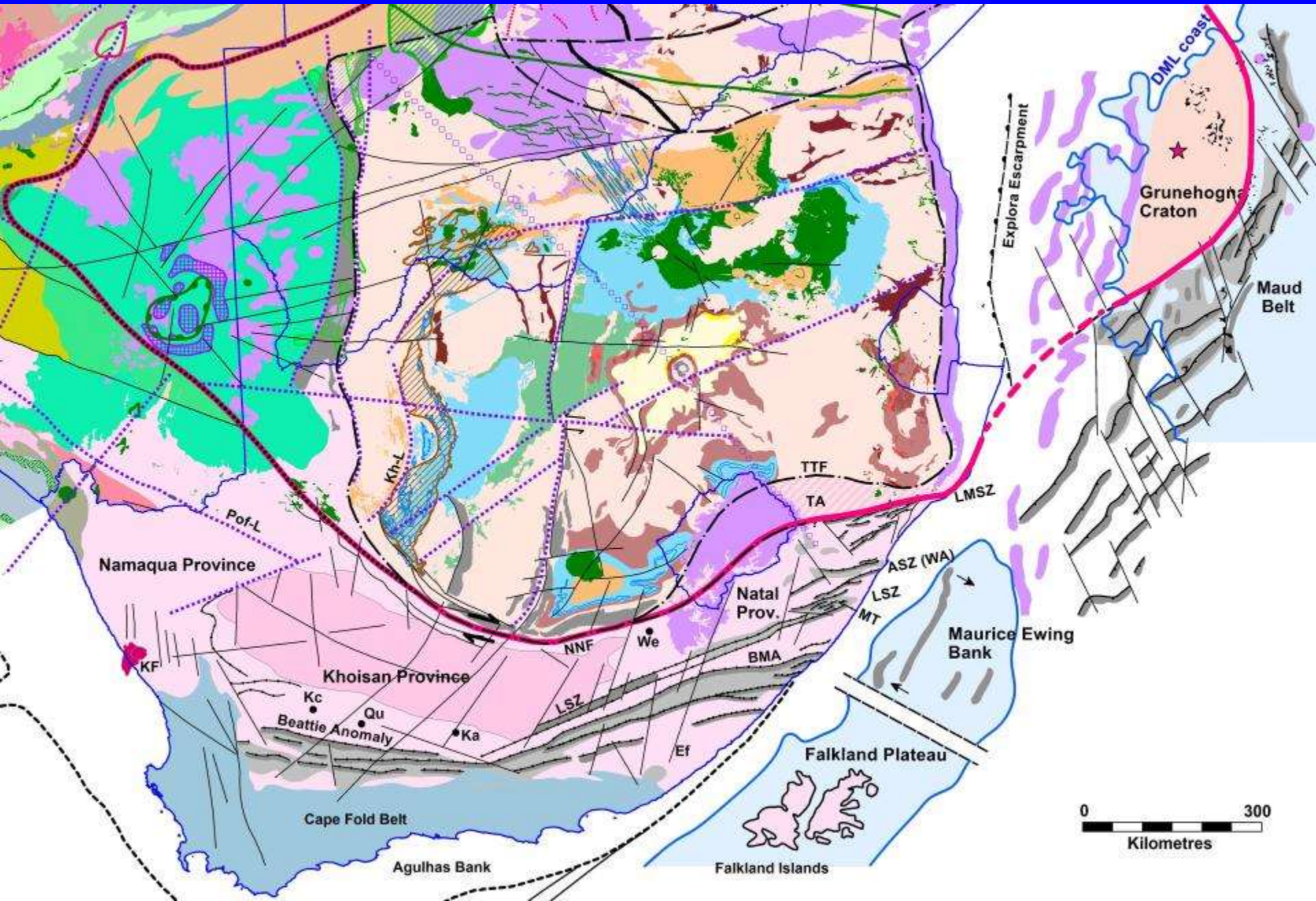
Bouguer Gravity
(Bureau Gravimetrique International)



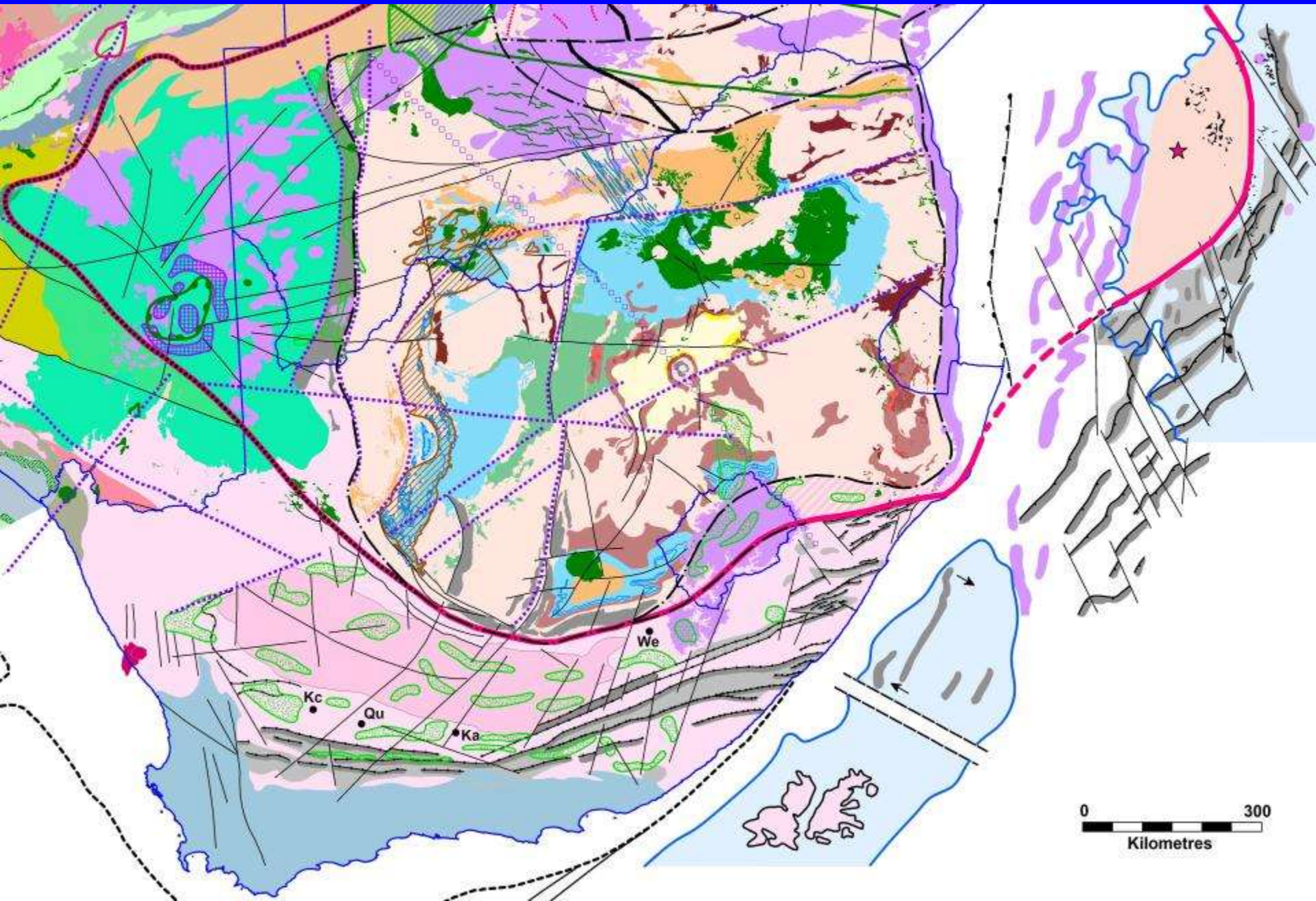
Extensions within Gondwana: the Beattie Magnetic Anomaly. TMI data



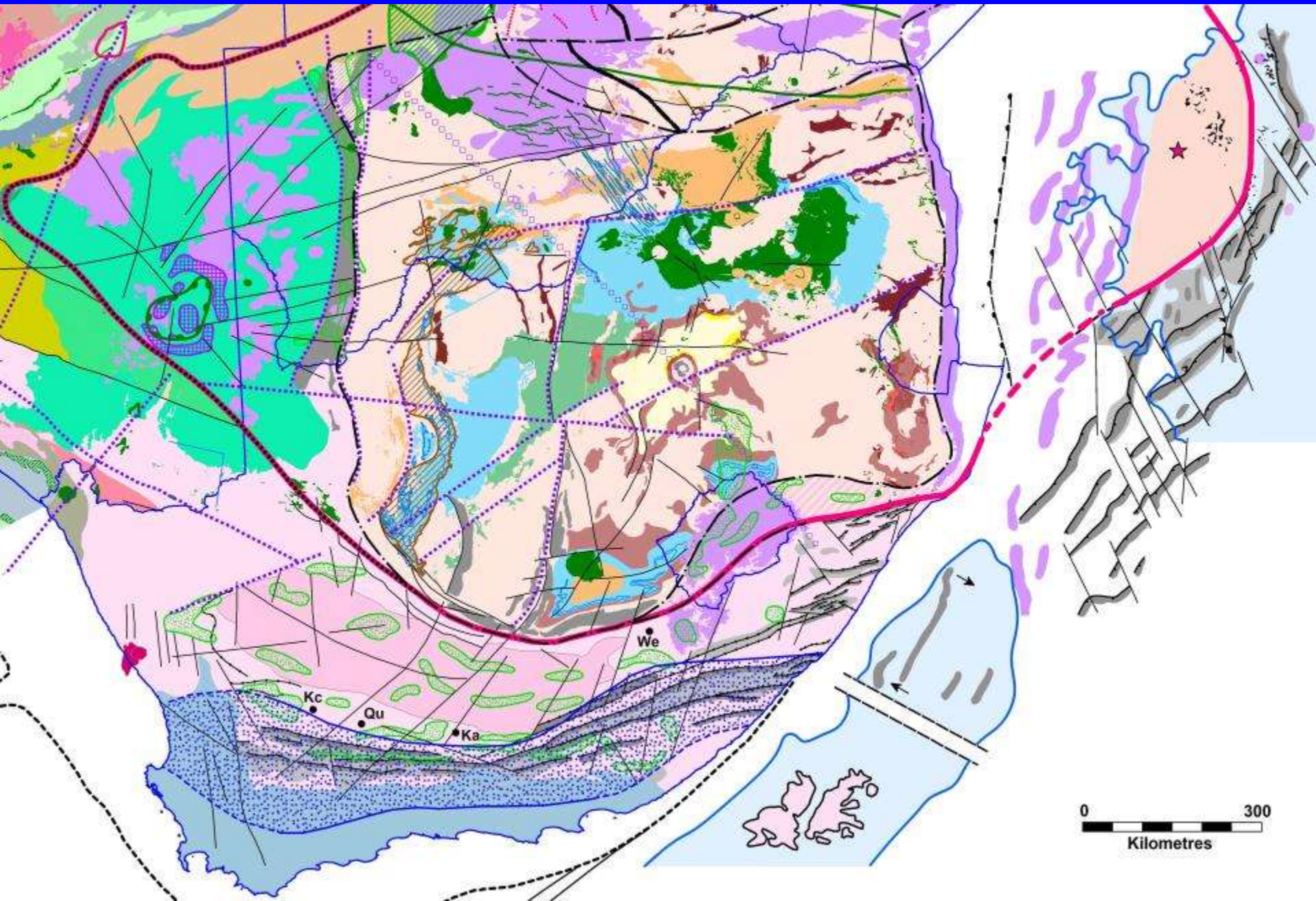
Namaqua-Natal Belt : Extensions into Antarctica within Gondwana

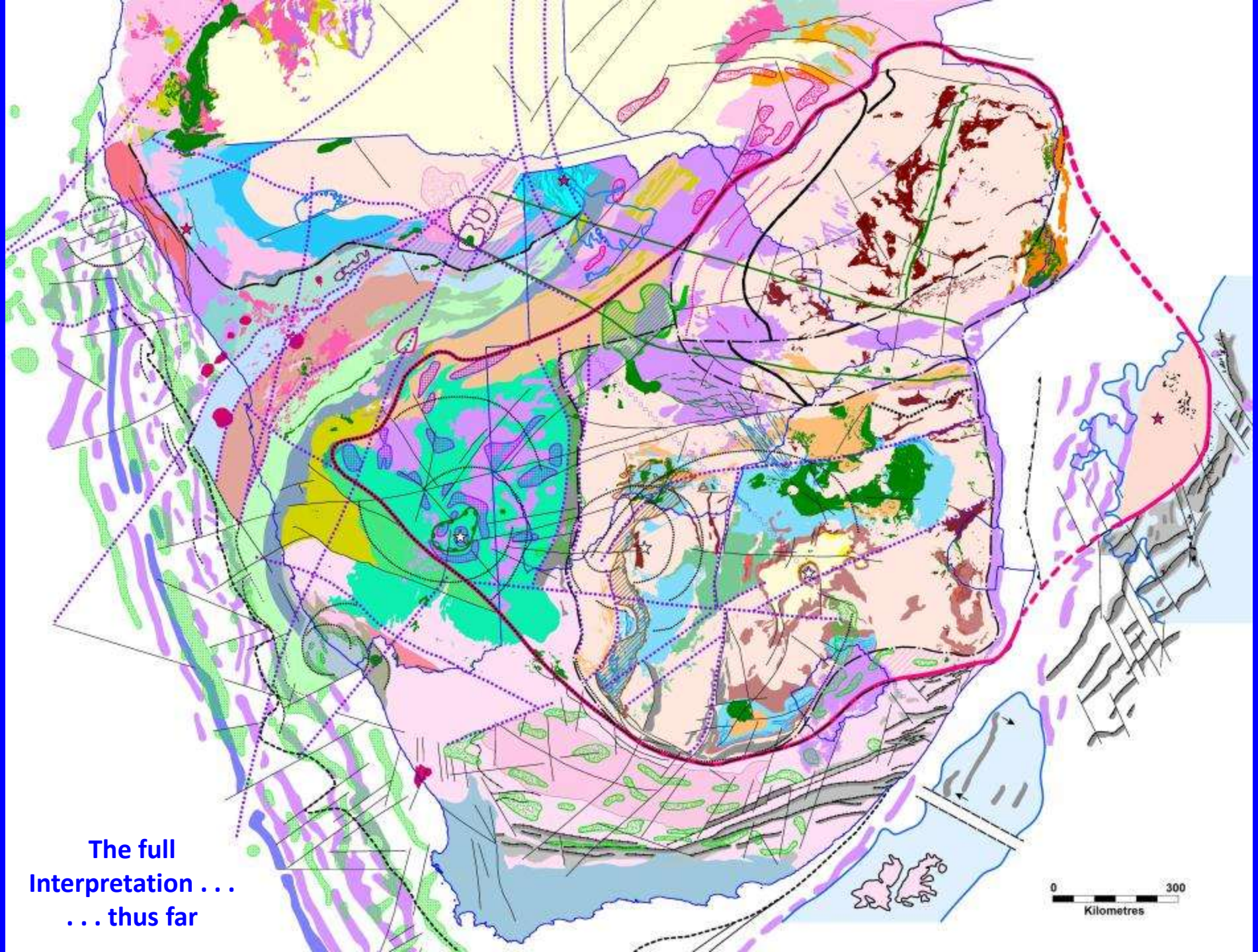


Namaqua-Natal Belt : the Khoisan Province and gravity anomalies



Namaqua-Natal Belt : the Southern Cape Conductive Belt





The full Interpretation . . .
. . . thus far

Thank You