

New geophysical insights into the emplacement controls for uraniferous leucogranites in the southern central Zone of the Damaran Orogen



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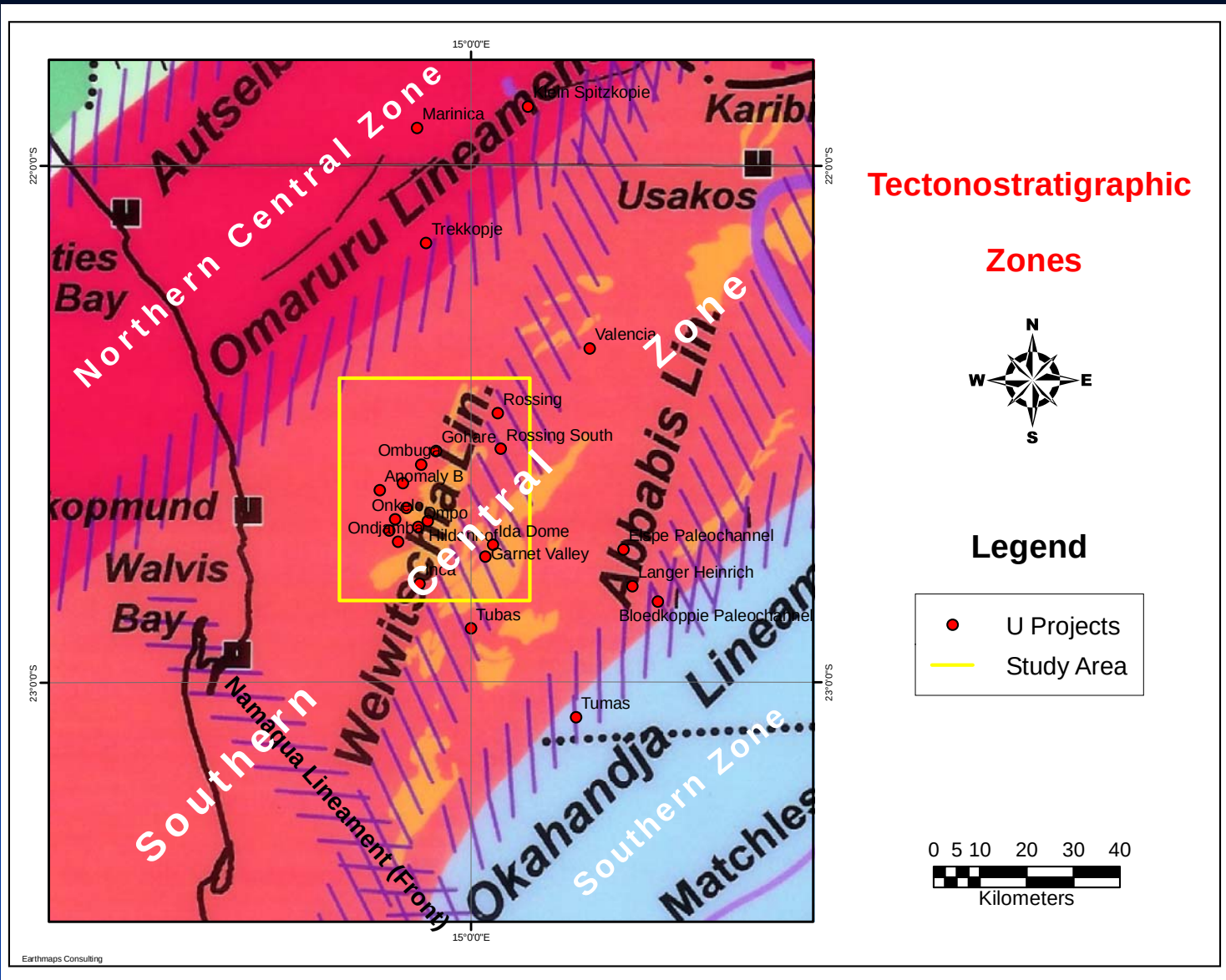
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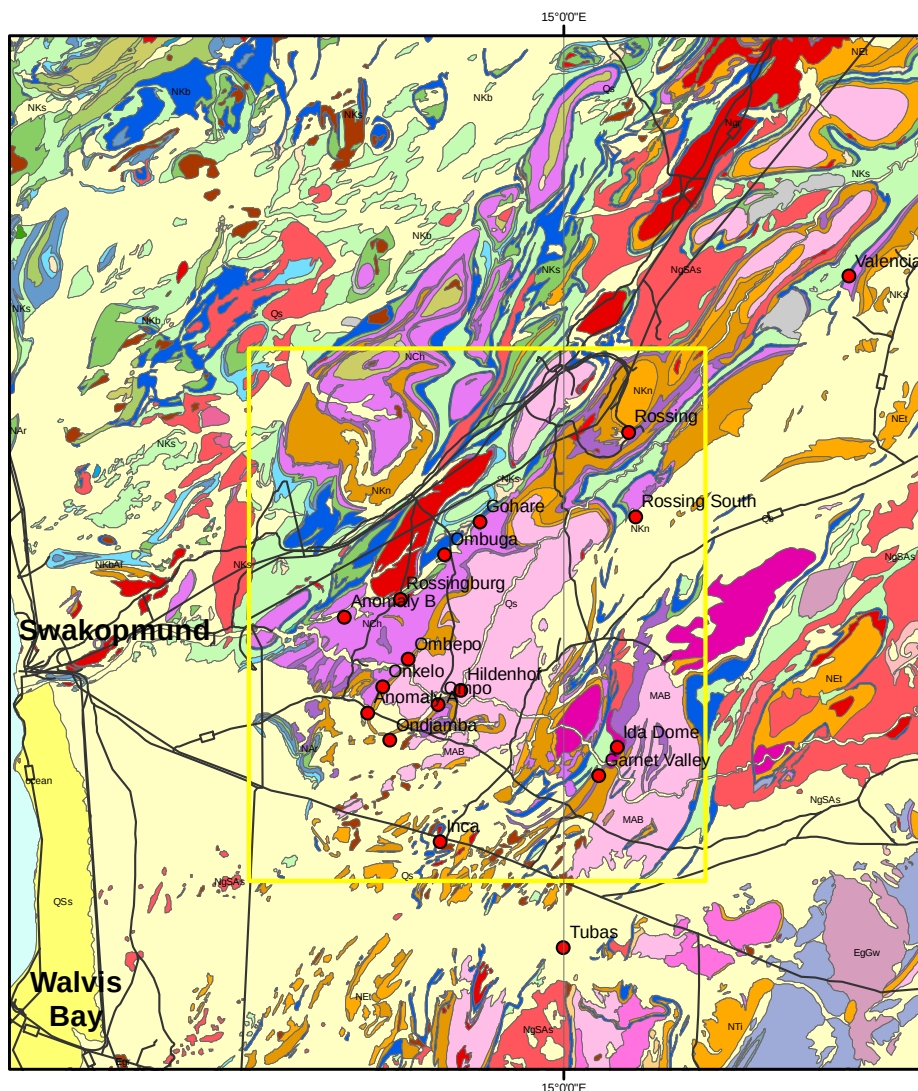
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Acknowledgements:

Uranium Conference 23 - 24 October 2009
Swakopmund, Namibia





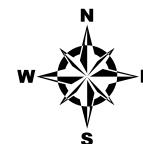


Geology

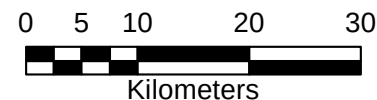
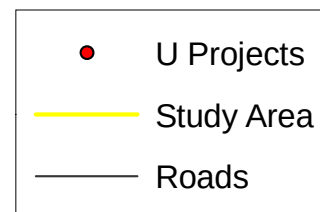
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Source:

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Legend



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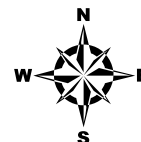
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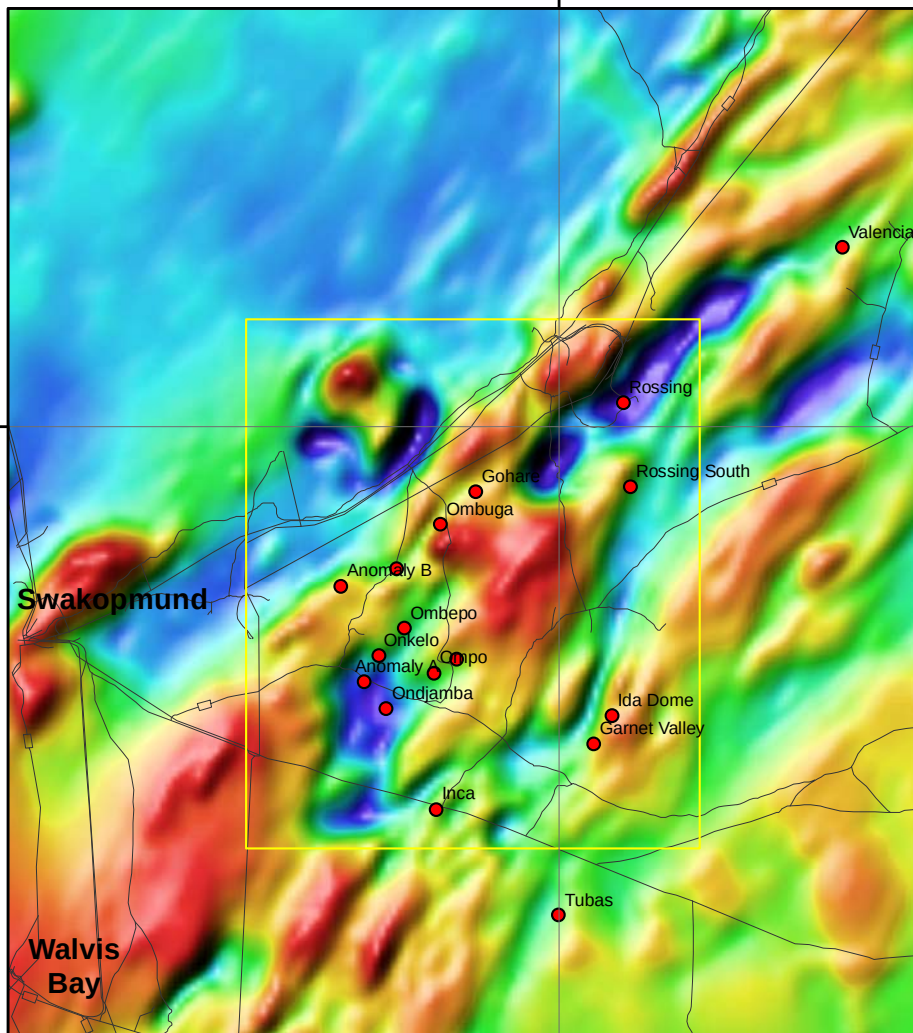
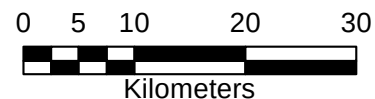
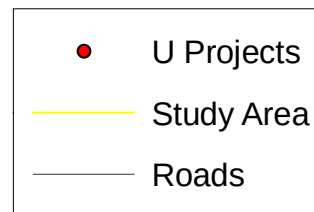
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Magnetic Total Field RTP

1 km line spacing



Legend



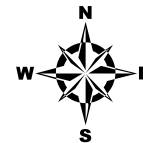
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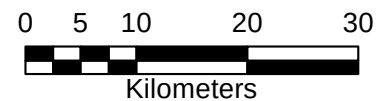
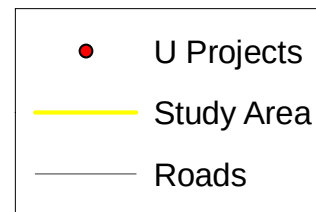


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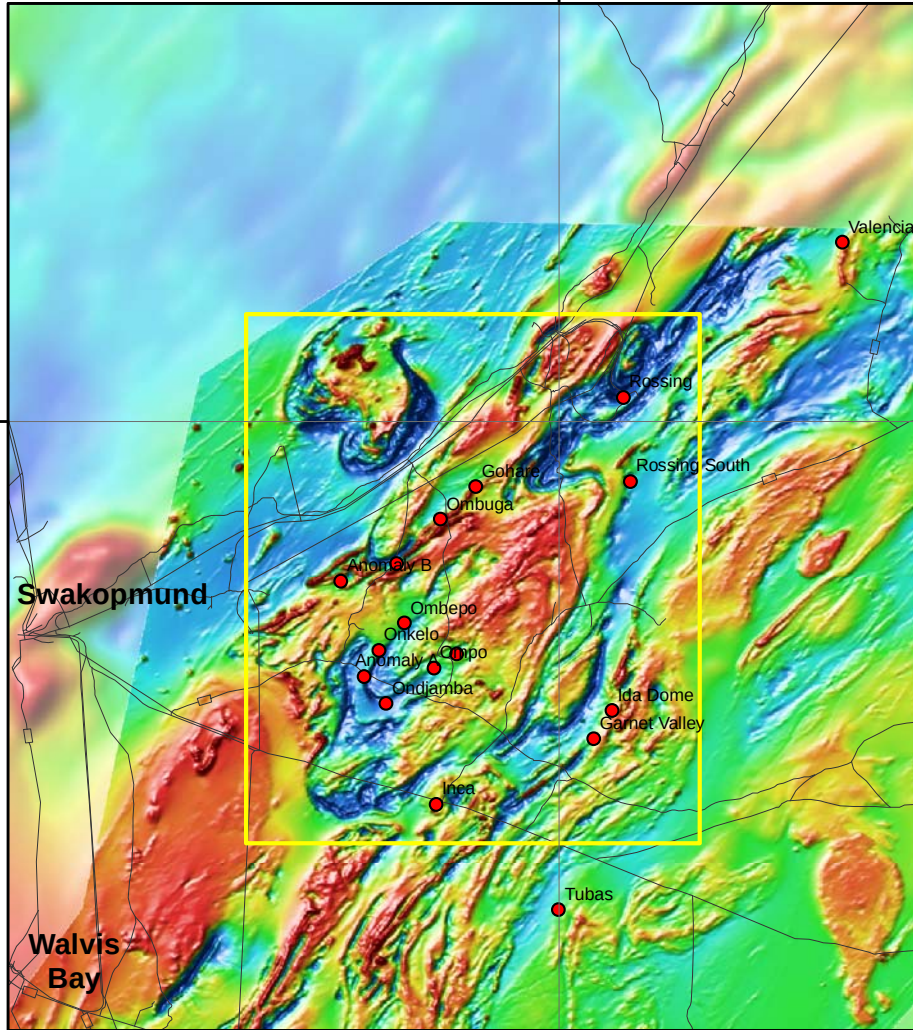
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Legend



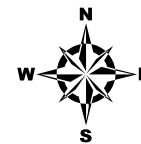
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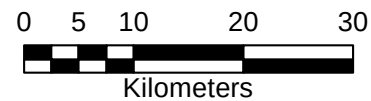
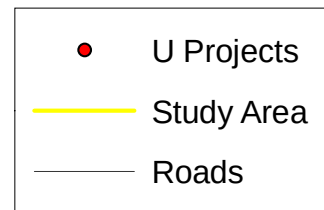
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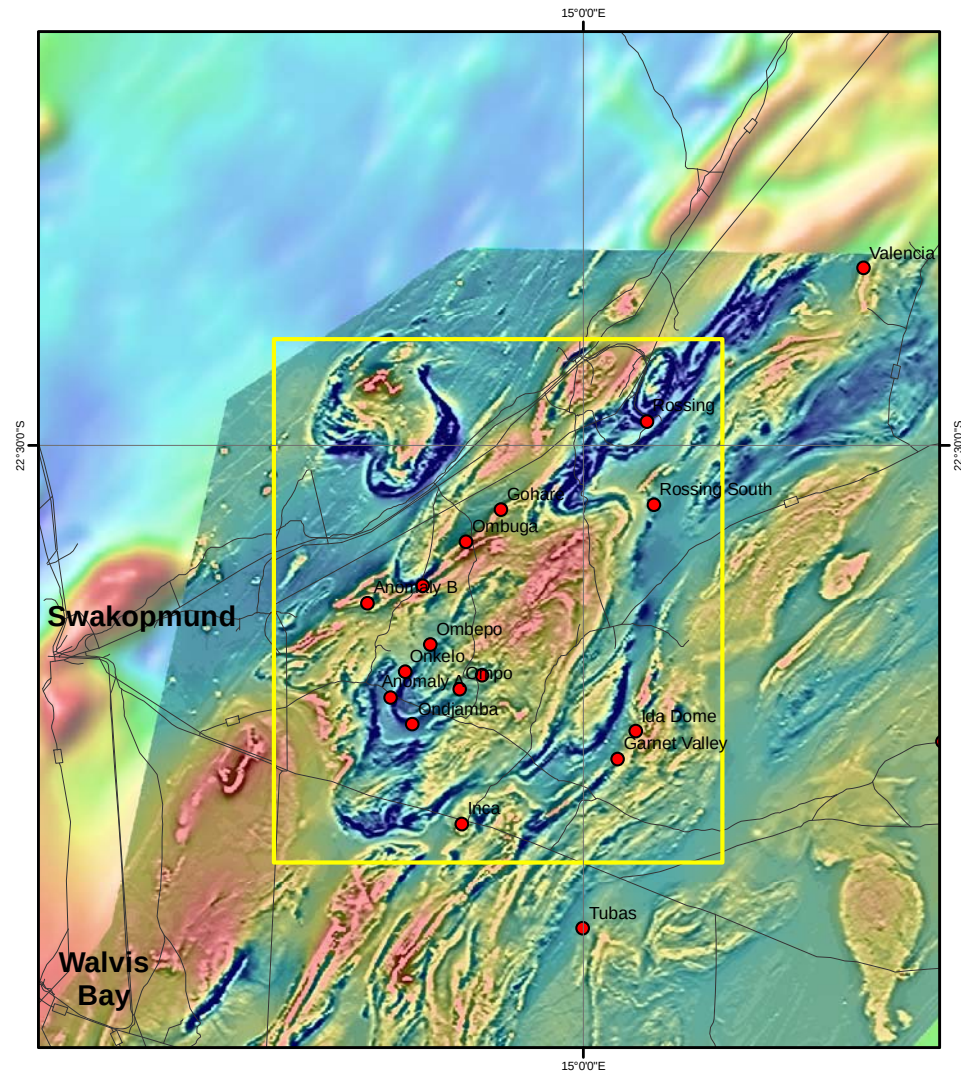
Magnetic VD1 RTP over Magnetic TF RTP



Legend



Data Source:
GSN



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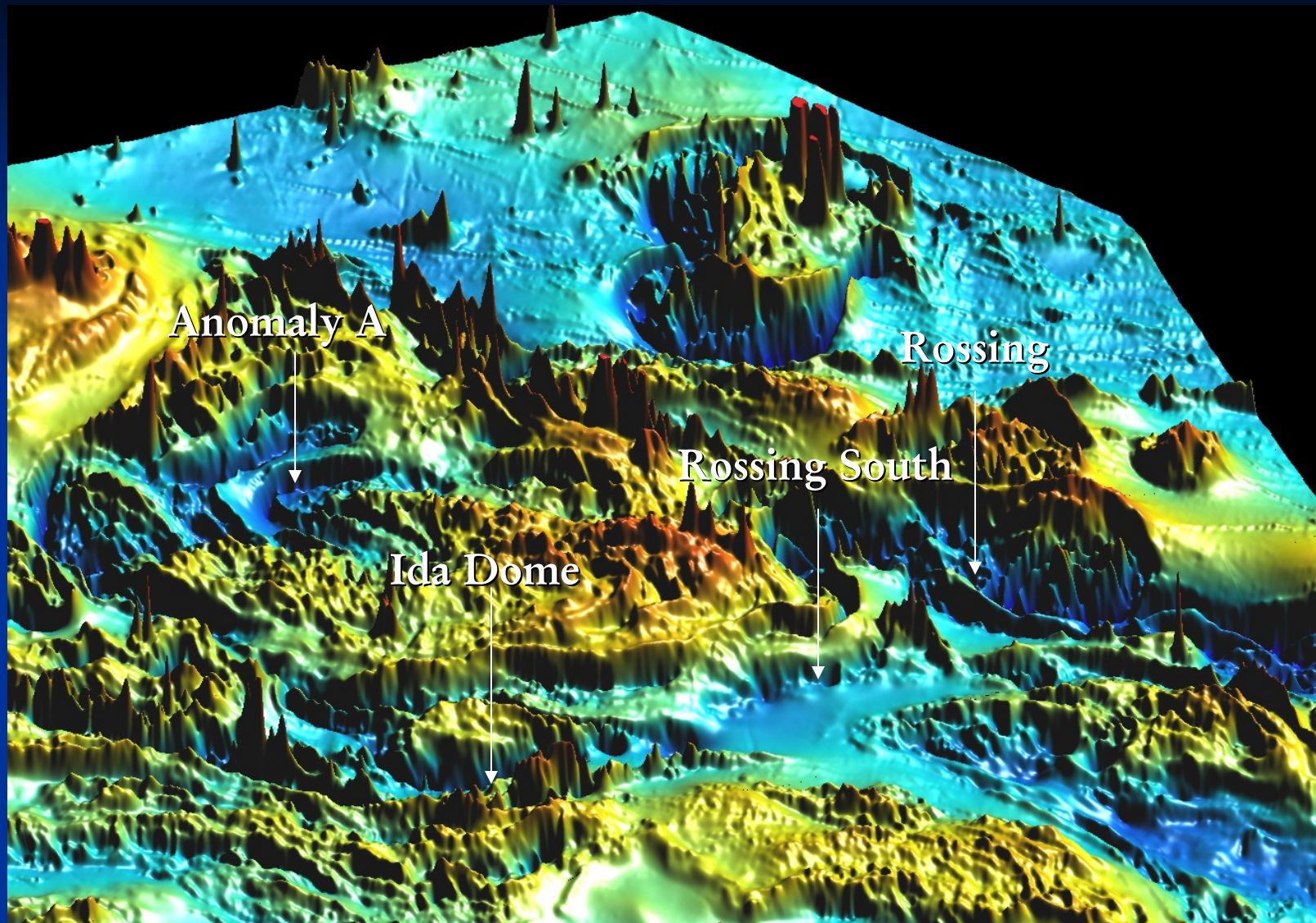


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Total
Magnetic
Field
RTP

Data Source:
GSN

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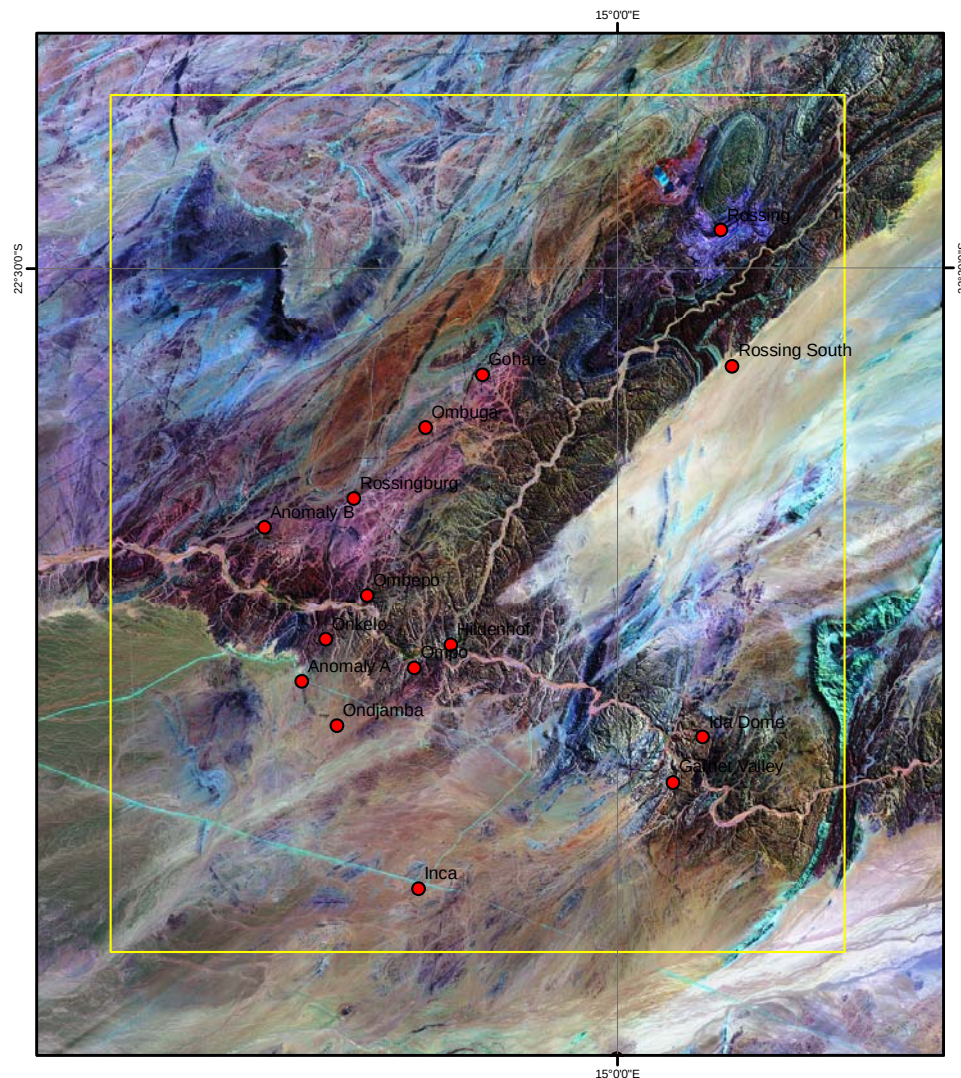
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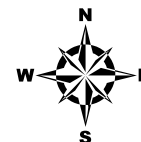
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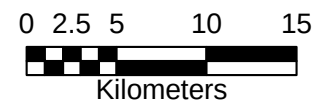
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Landsat 741



Legend

- U Projects
- Study Area



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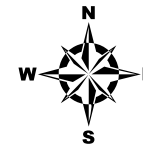
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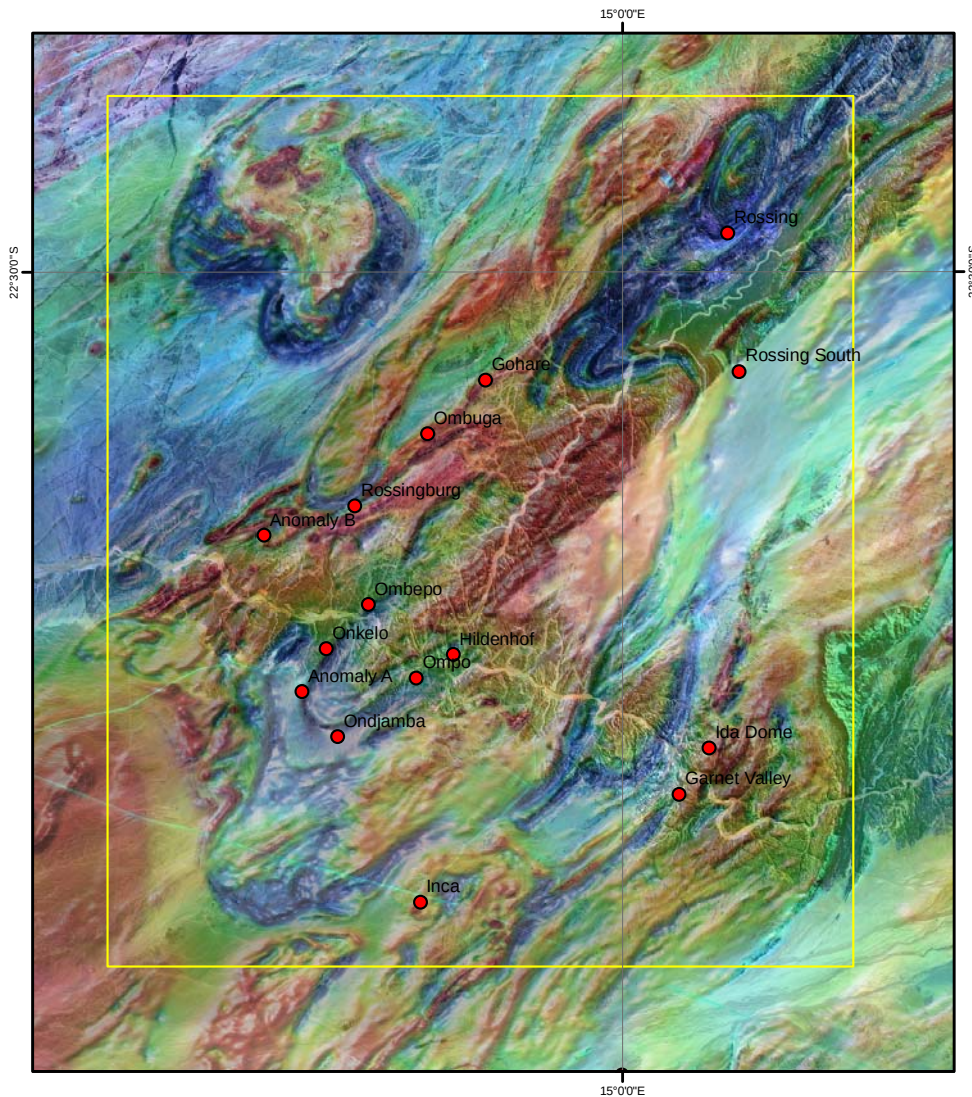
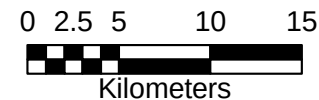
Magnetic Total Field RTP

over
**Landsat
741**



Legend

- U Projects
- Study Area



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Magnetic First Vertical Derivative RTP

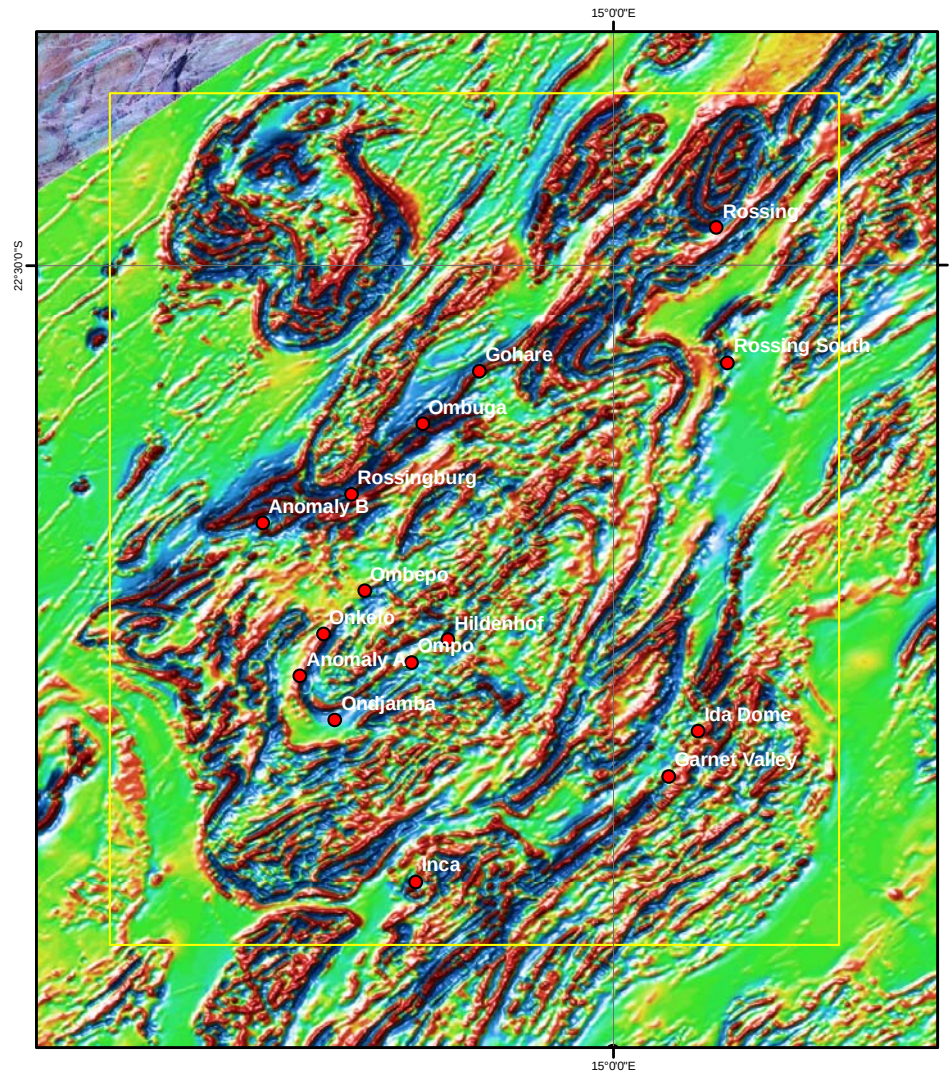


Legend

- U Projects
- Study Area



Data Source:
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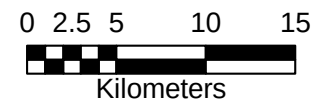
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Magnetic Tilt Derivative RTP

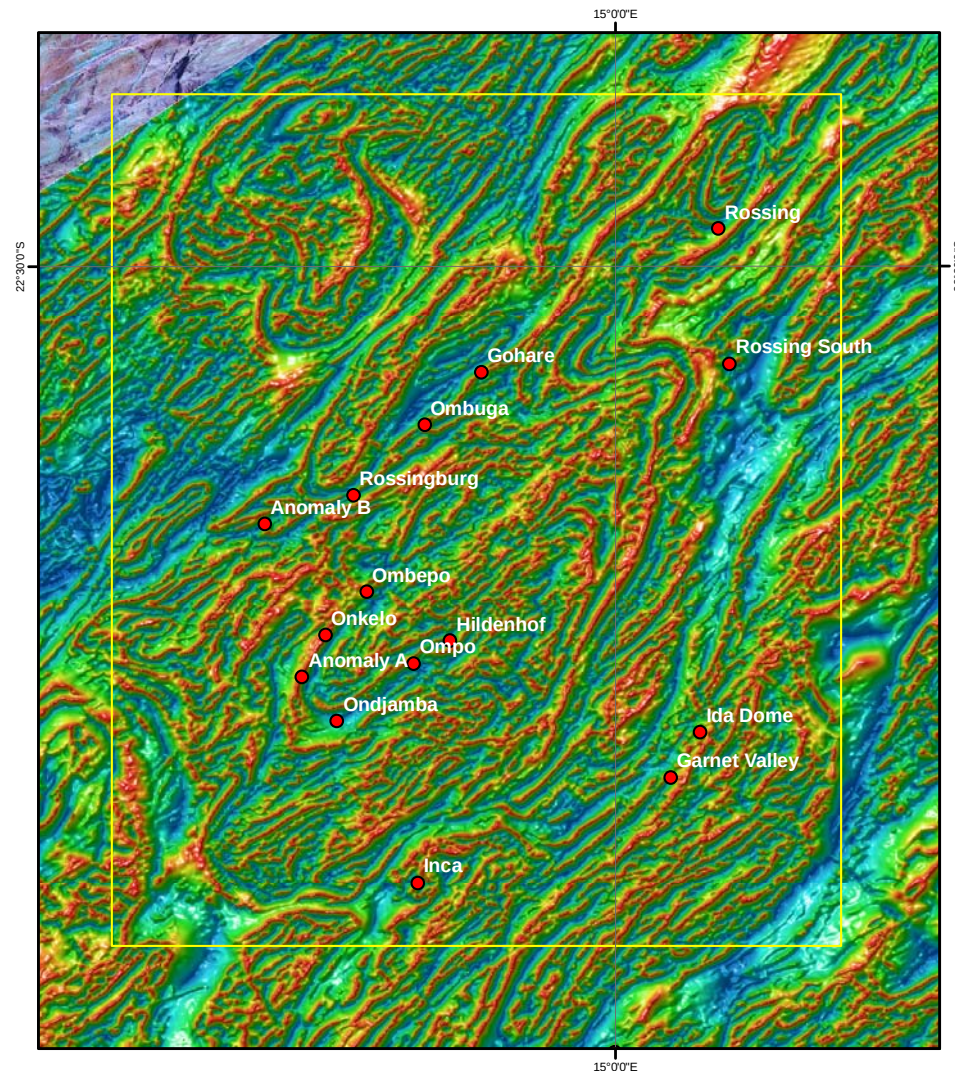


Legend

- U Projects
- Study Area



Data Source:
GSN



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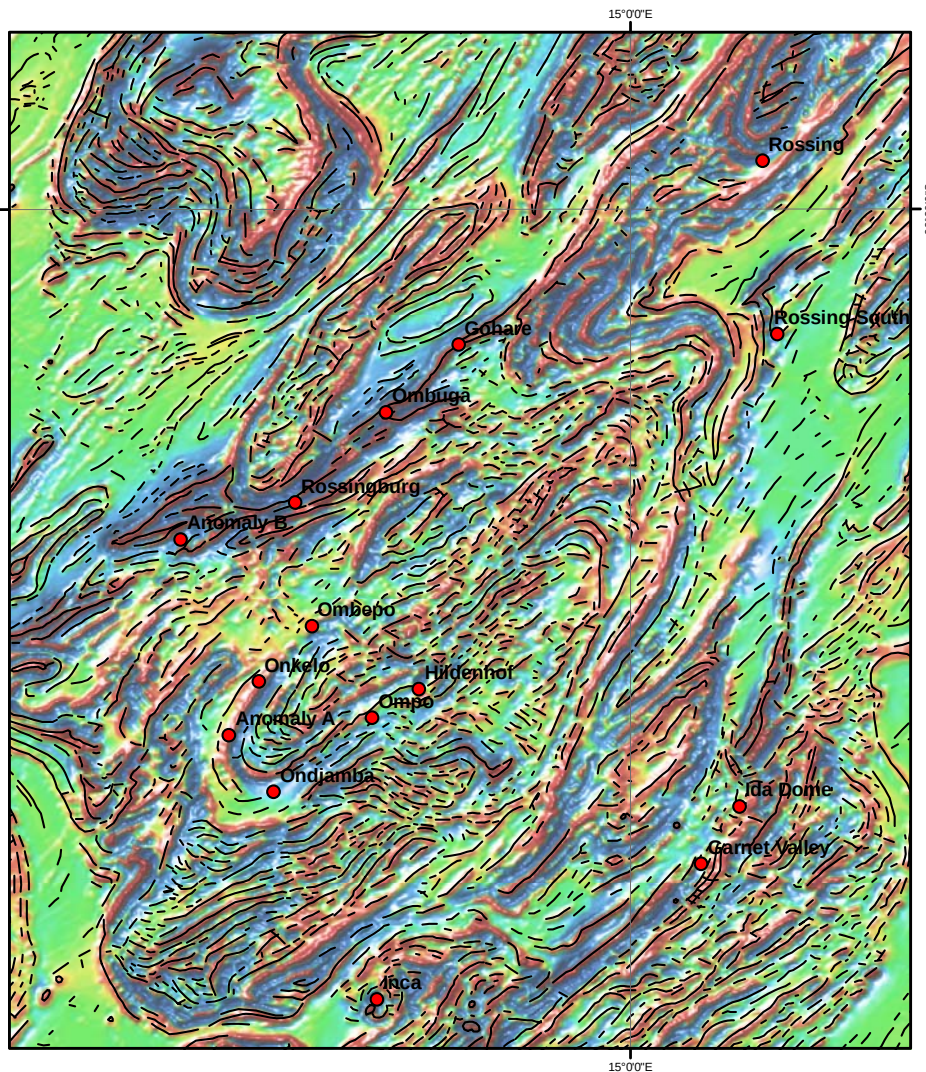


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Magnetic First Vertical Derivative RTP



Legend

- U Projects
- Magnetic Anomaly Trace



Magnetic
Anomaly
Traces

Earthmaps Consulting

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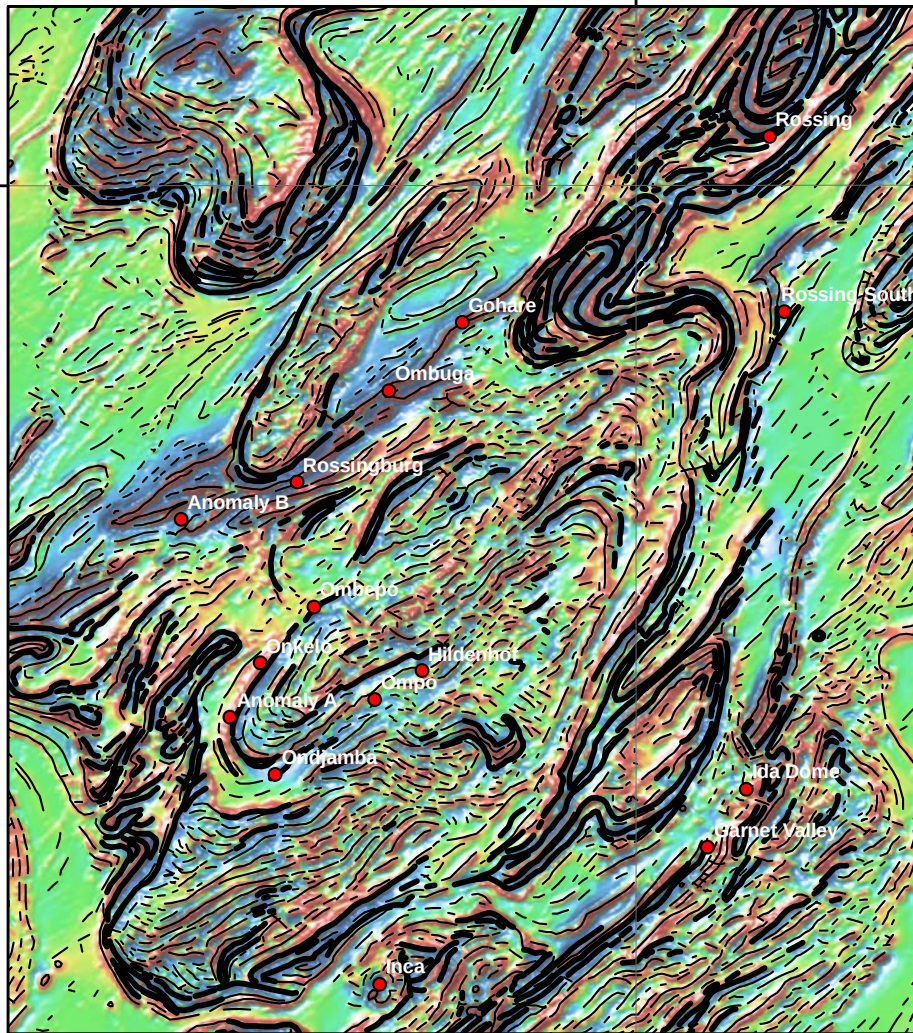


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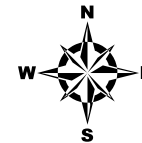
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Magnetic First Vertical Derivative RTP



Legend

- U Projects
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent



Magnetic
Anomaly
Traces:
Remanent

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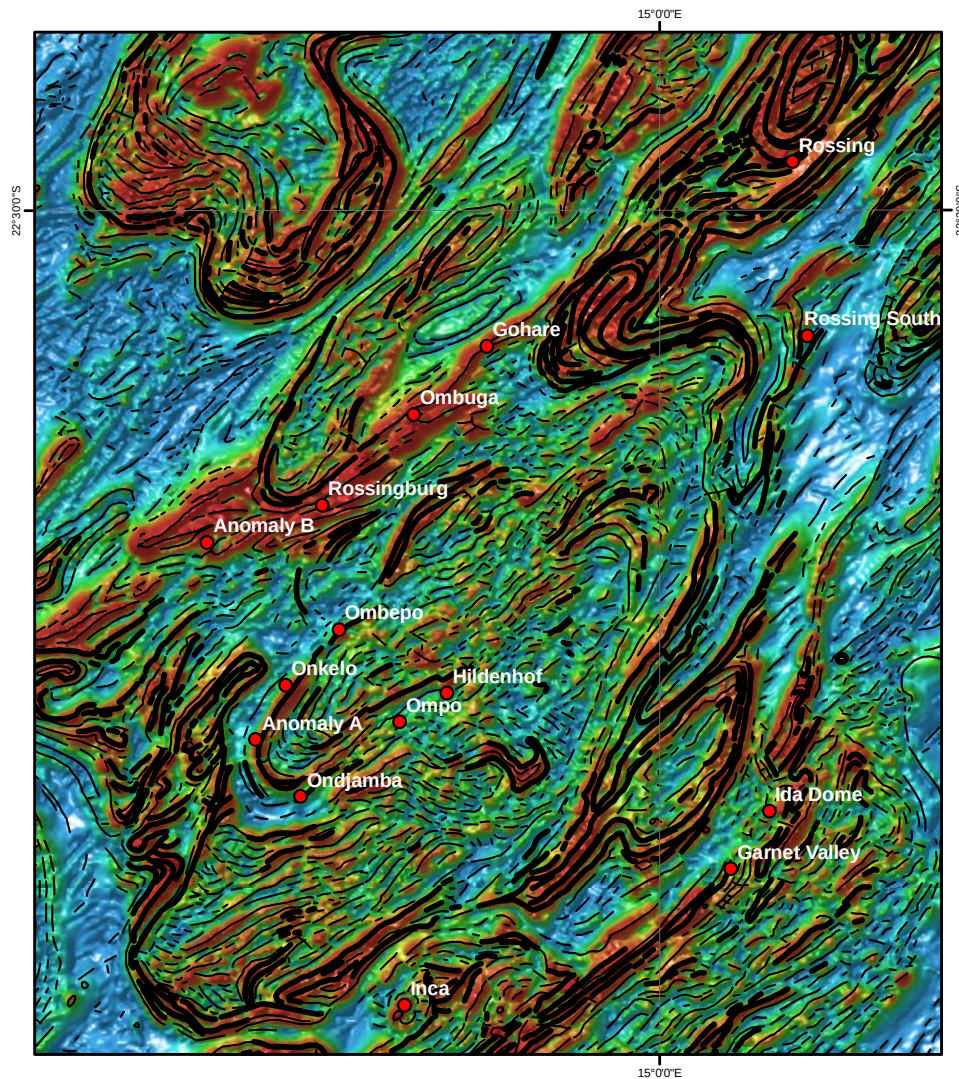
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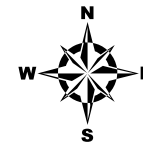
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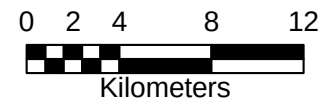


Magnetic Analytic Signal



Legend

- U Projects
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent



Magnetic
Anomaly
Traces:
Remanent

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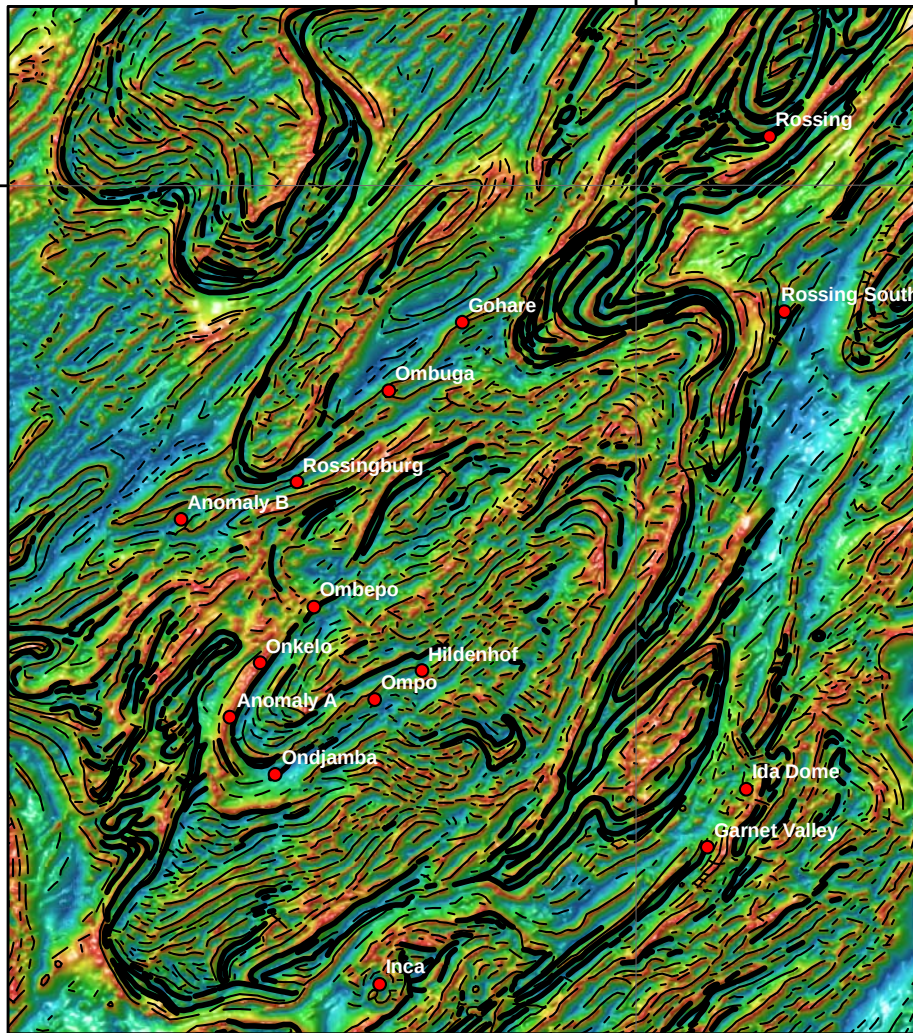


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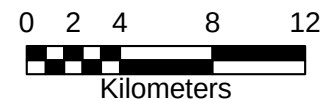


Magnetic Tilt Derivative RTP



Legend

- U Projects
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent



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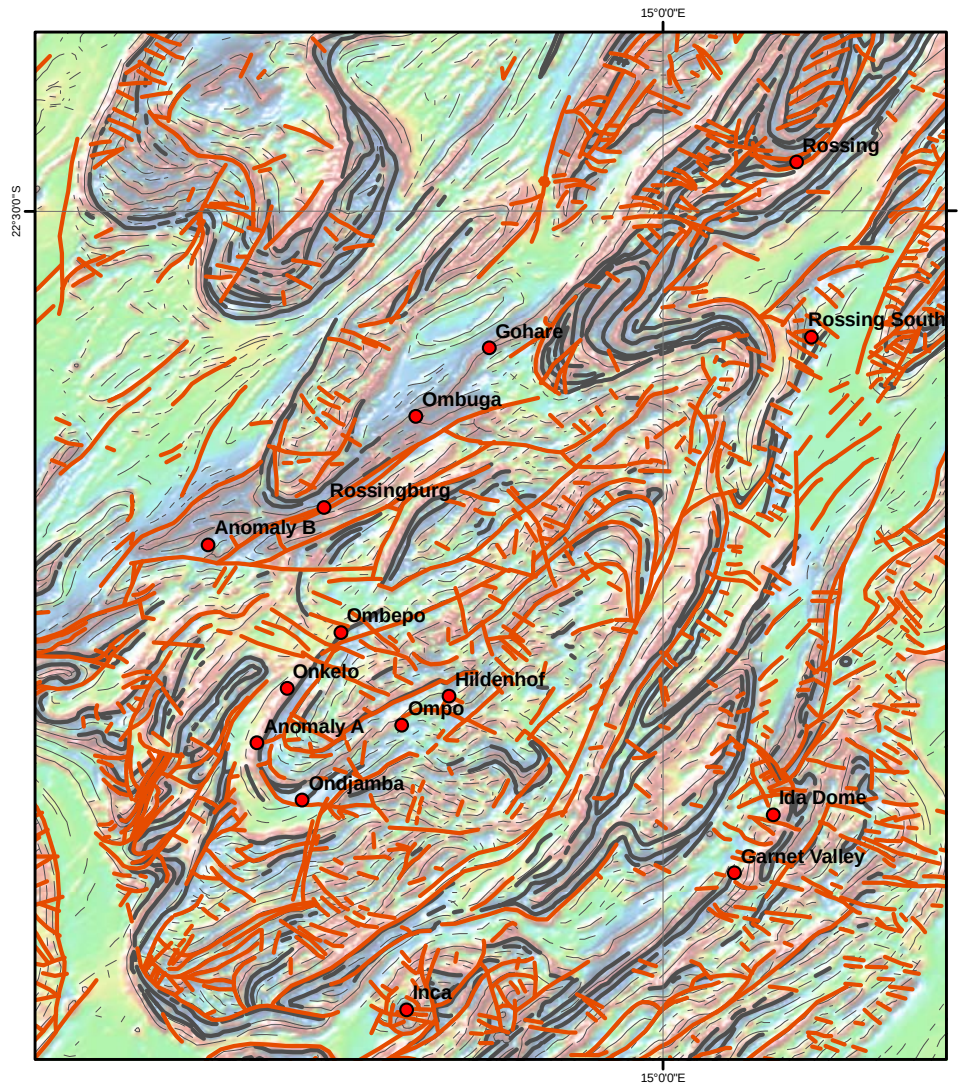
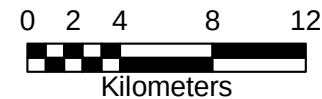
Magnetic First Vertical Derivative RTP

Minor Faults



Legend

- U Projects
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent
- Fault Minor Magnetics



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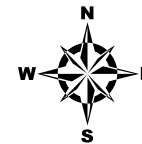
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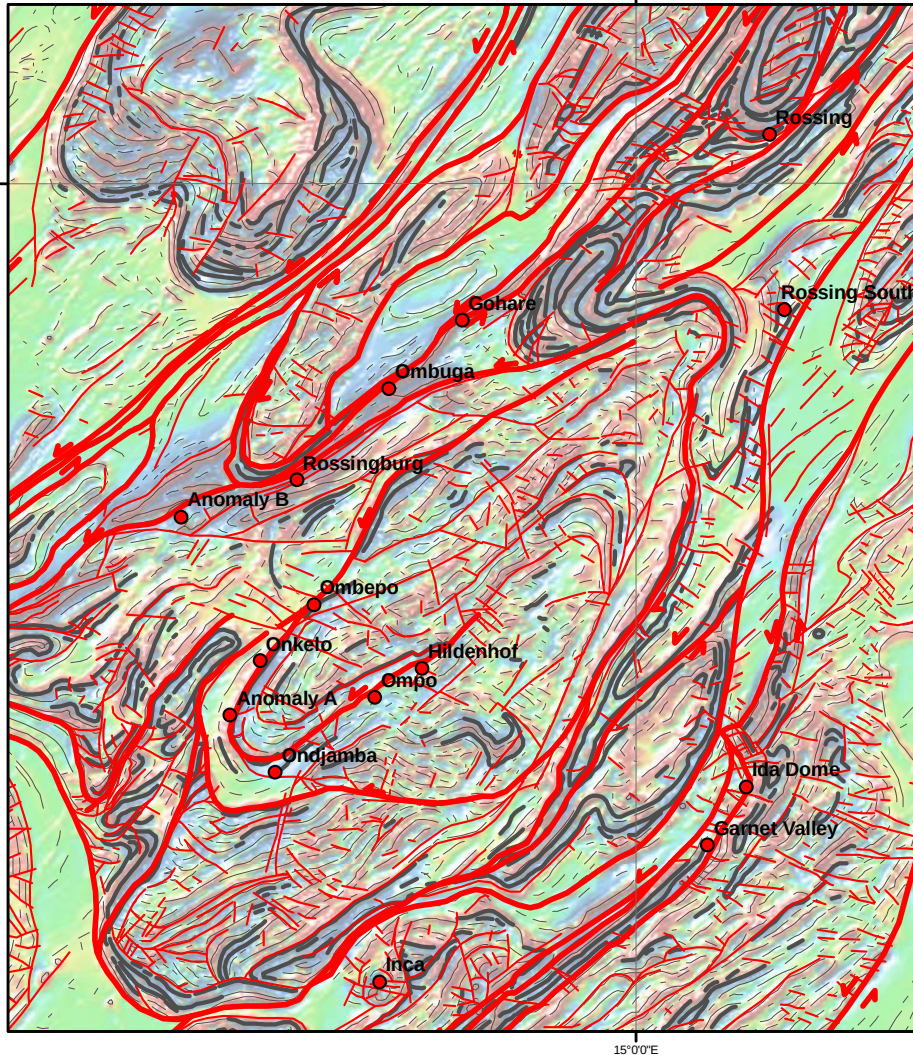
Magnetic First Vertical Derivative RTP

Minor Faults
Major Faults



Legend

- U Projects
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent
- Fault Major Magnetics
- Fault Minor Magnetics



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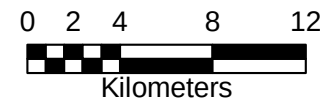
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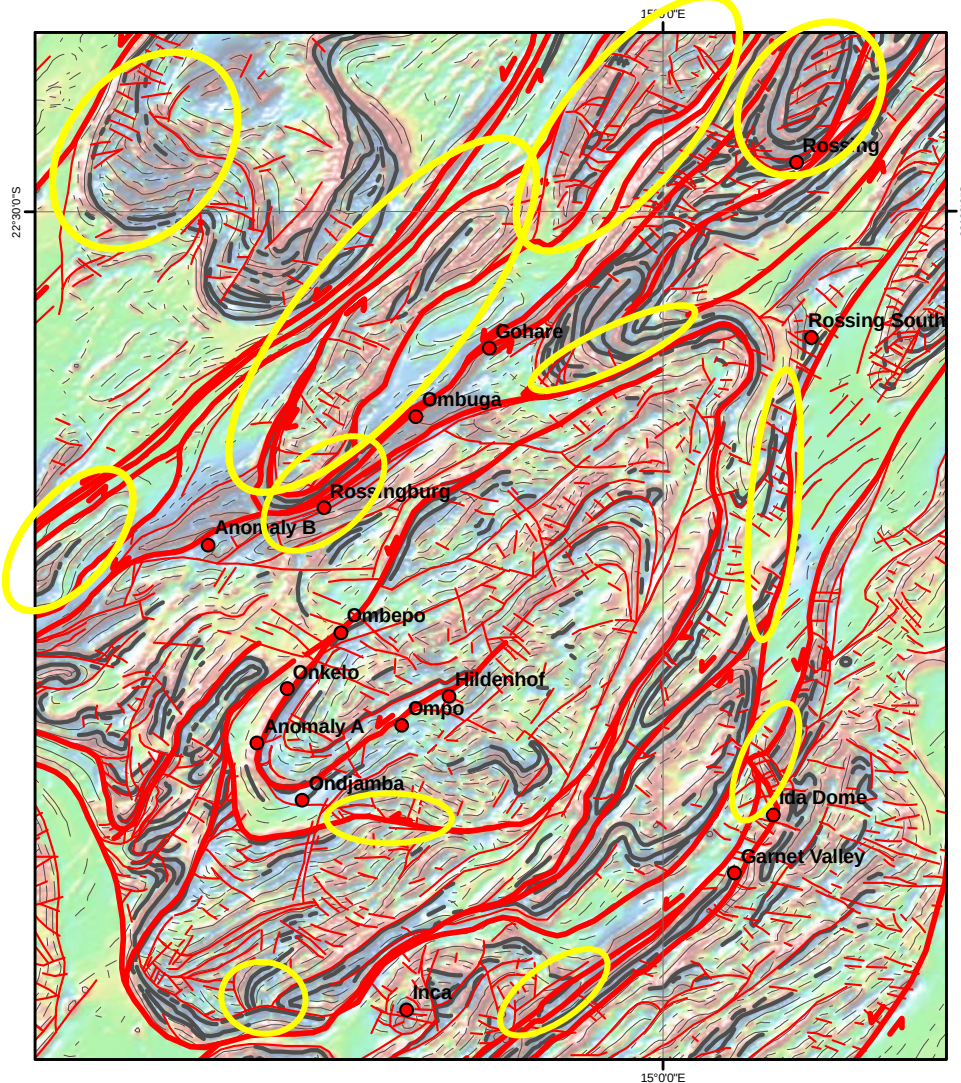
Legend

- U Projects
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent
- Fault Major Magnetics
- Fault Minor Magnetics



Minor Faults
Major Faults

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Evidence of
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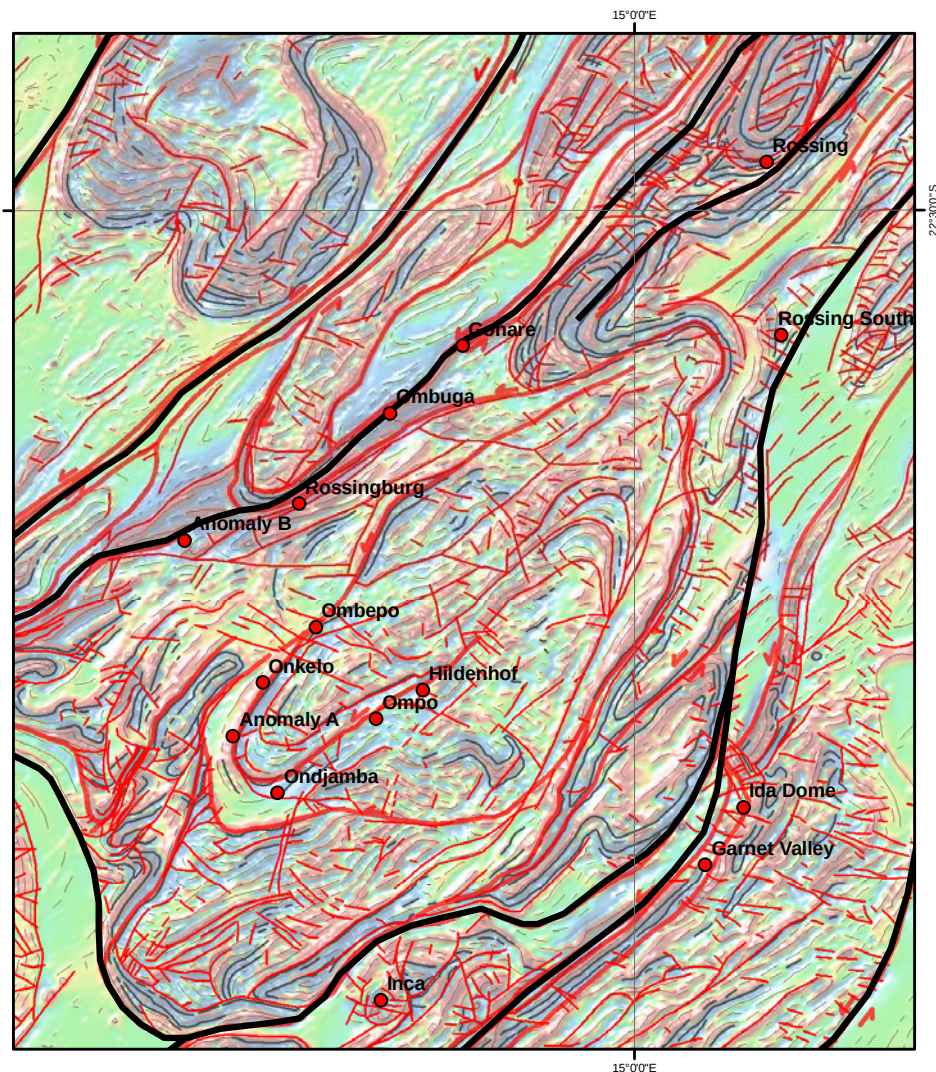


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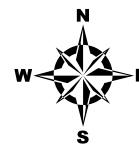
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Magnetic First Vertical Derivative RTP



Legend

- U Projects
- Fault Zone Regional
- Fault Major Magnetics
- Fault Minor Magnetics
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent



Minor Faults
Major Faults
Fault Zones

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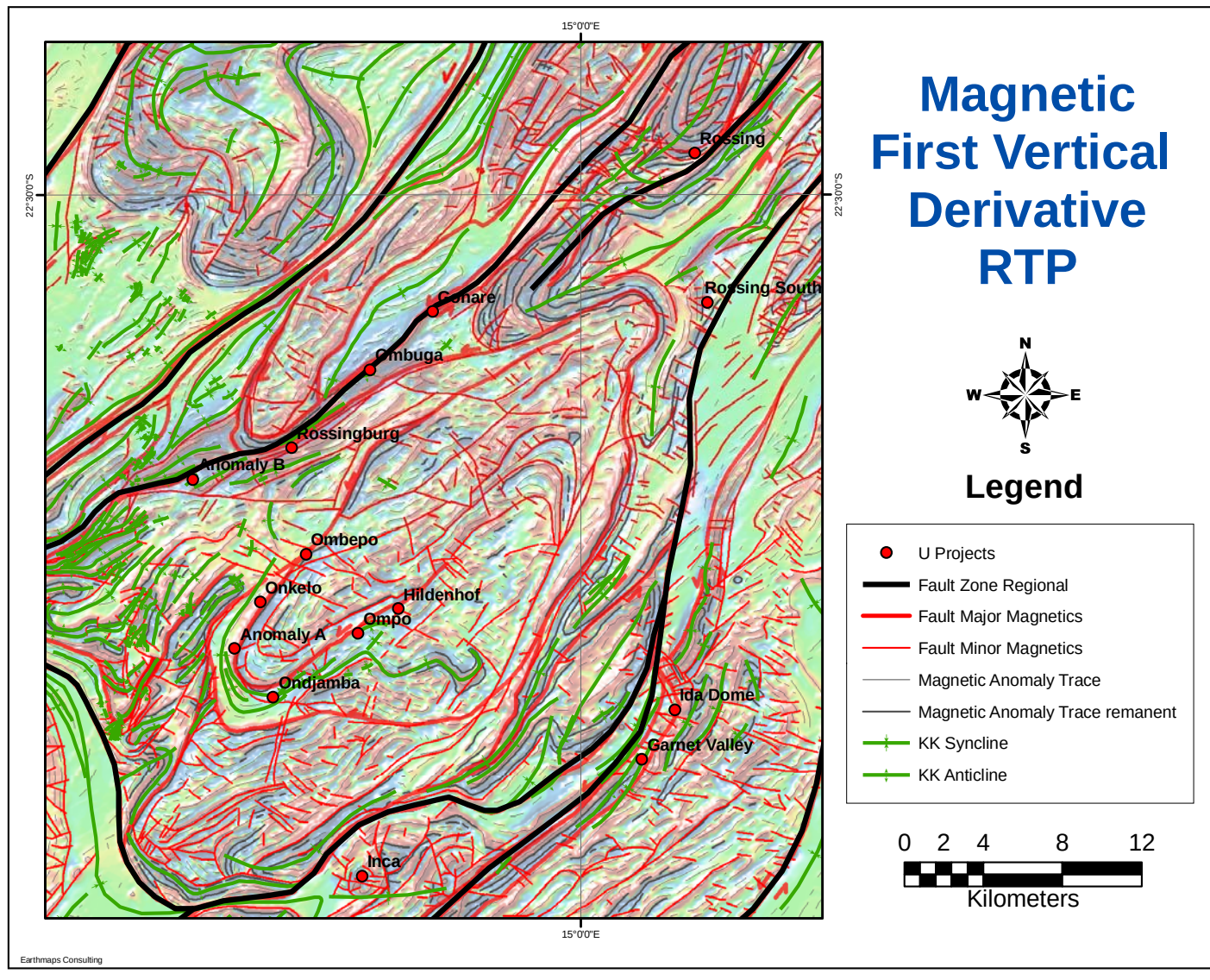


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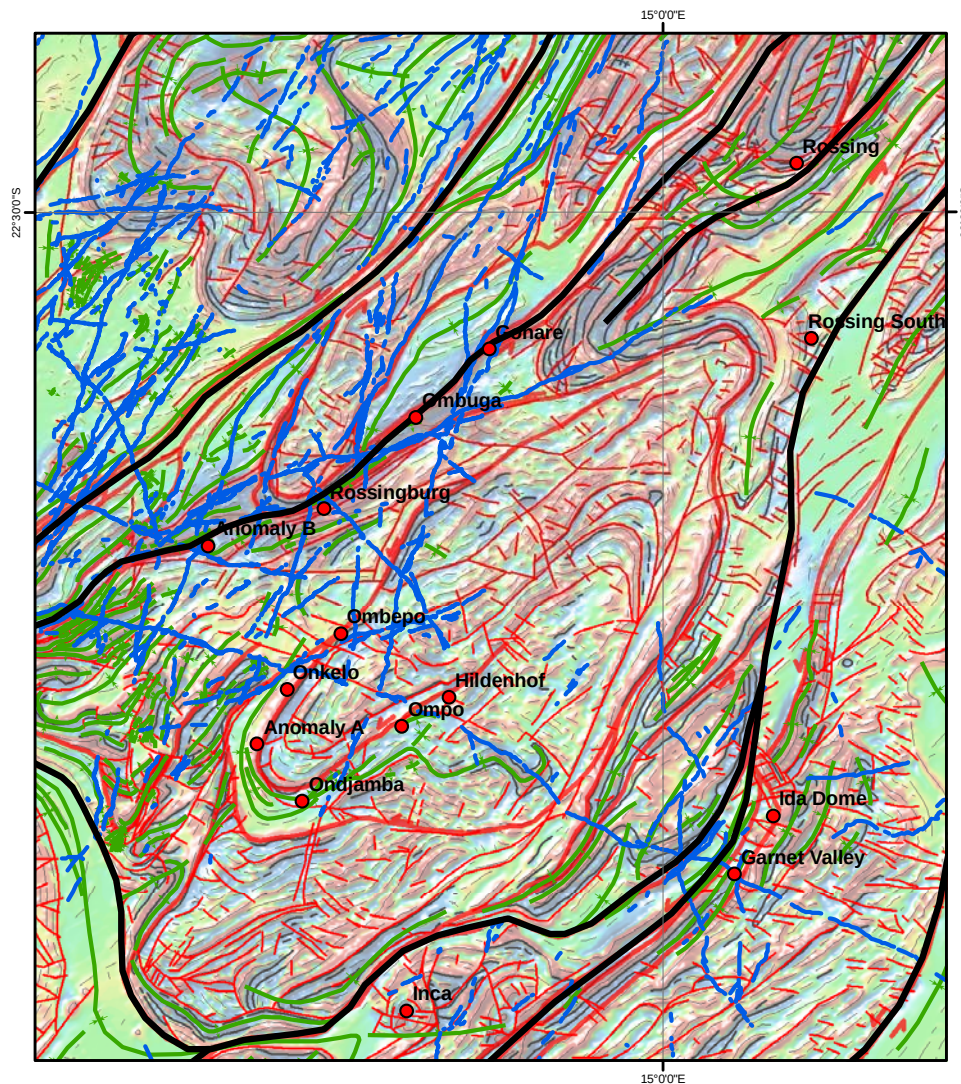
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Minor Faults
Major Faults
Fault Zones
Folds

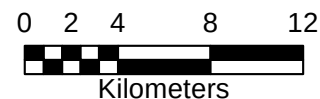


Magnetic First Vertical Derivative RTP



Legend

- U Projects
- Fault Zone Regional
- KK Syncline
- KK Anticline
- Fault Major Magnetics
- Fault Minor Magnetics
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent
- Dyke



Minor Faults
Major Faults
Fault Zones

Dykes

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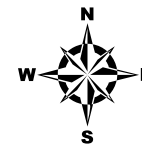
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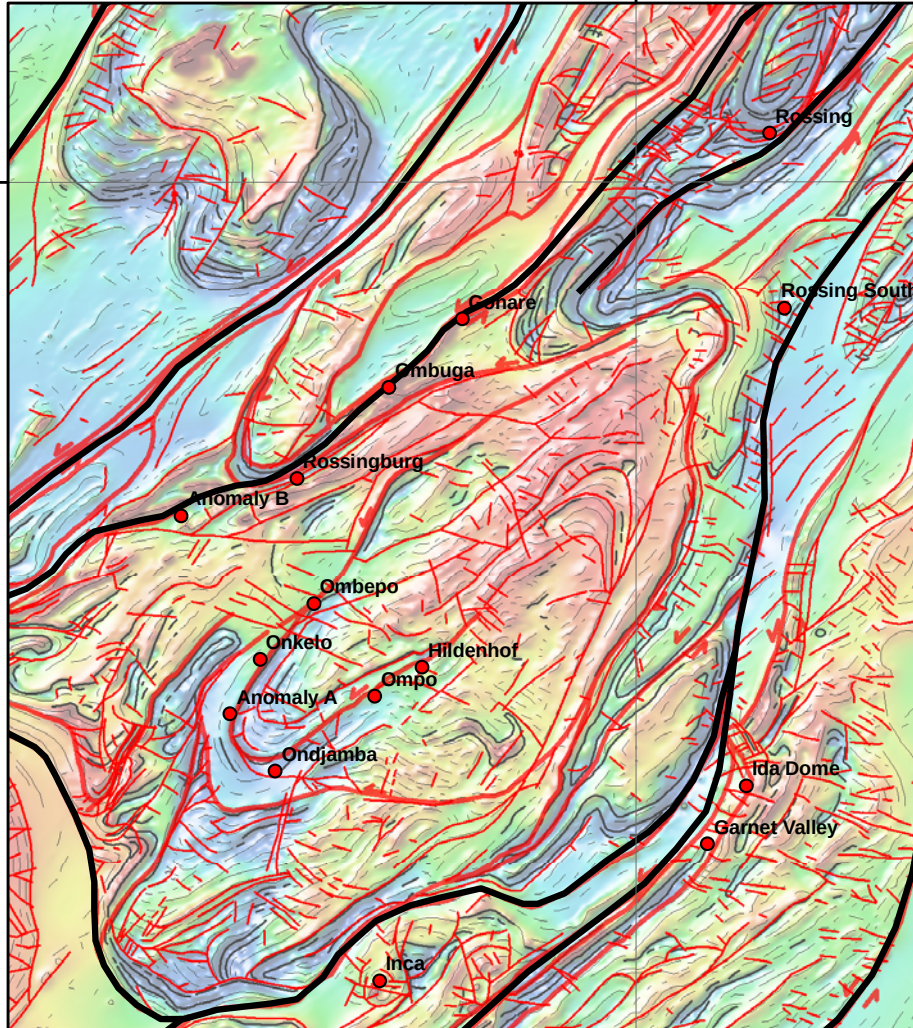
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Magnetic First Vertical Derivative RTP



Legend

- U Projects
- Fault Zone Regional
- Fault Major Magnetics
- Fault Minor Magnetics
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent



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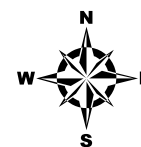


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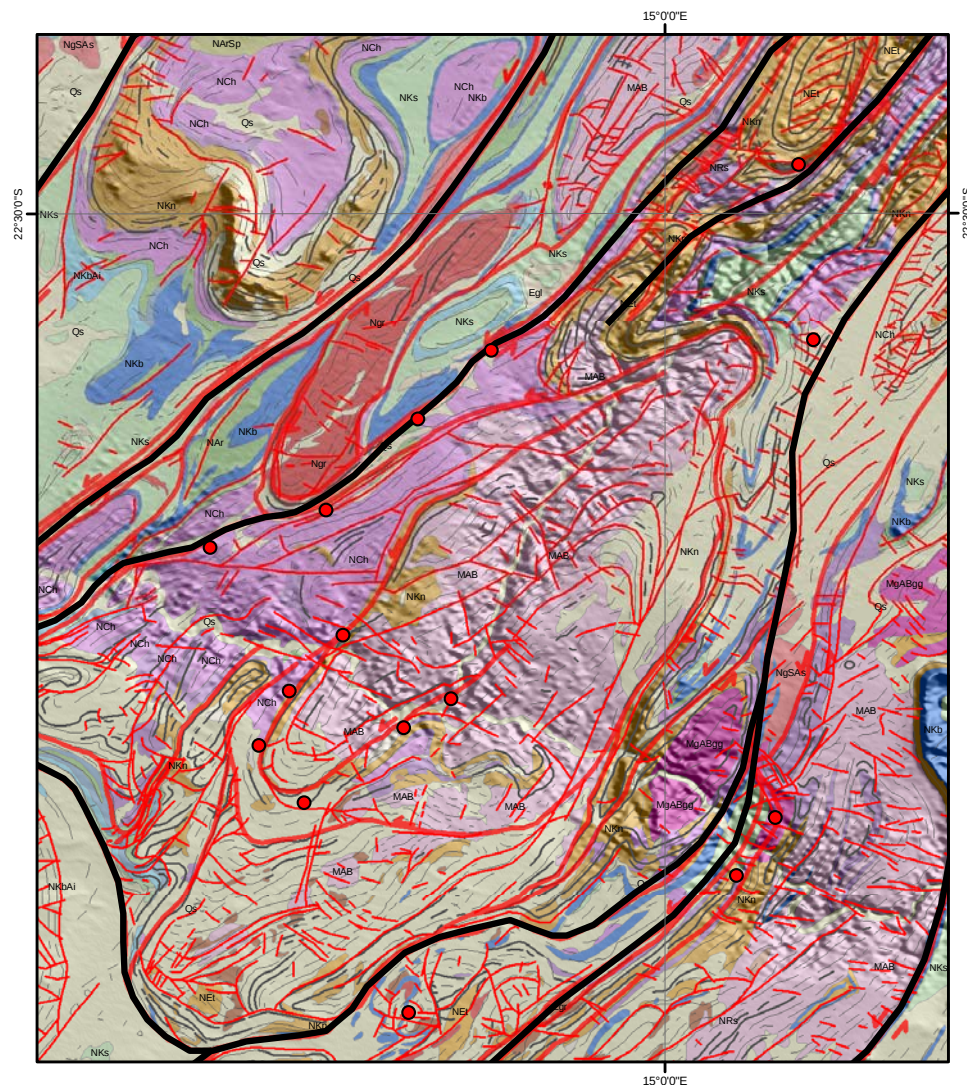
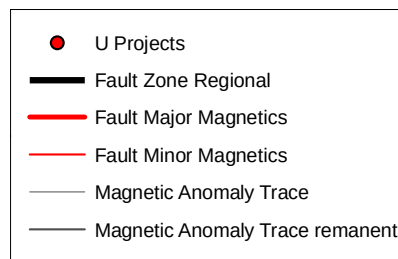
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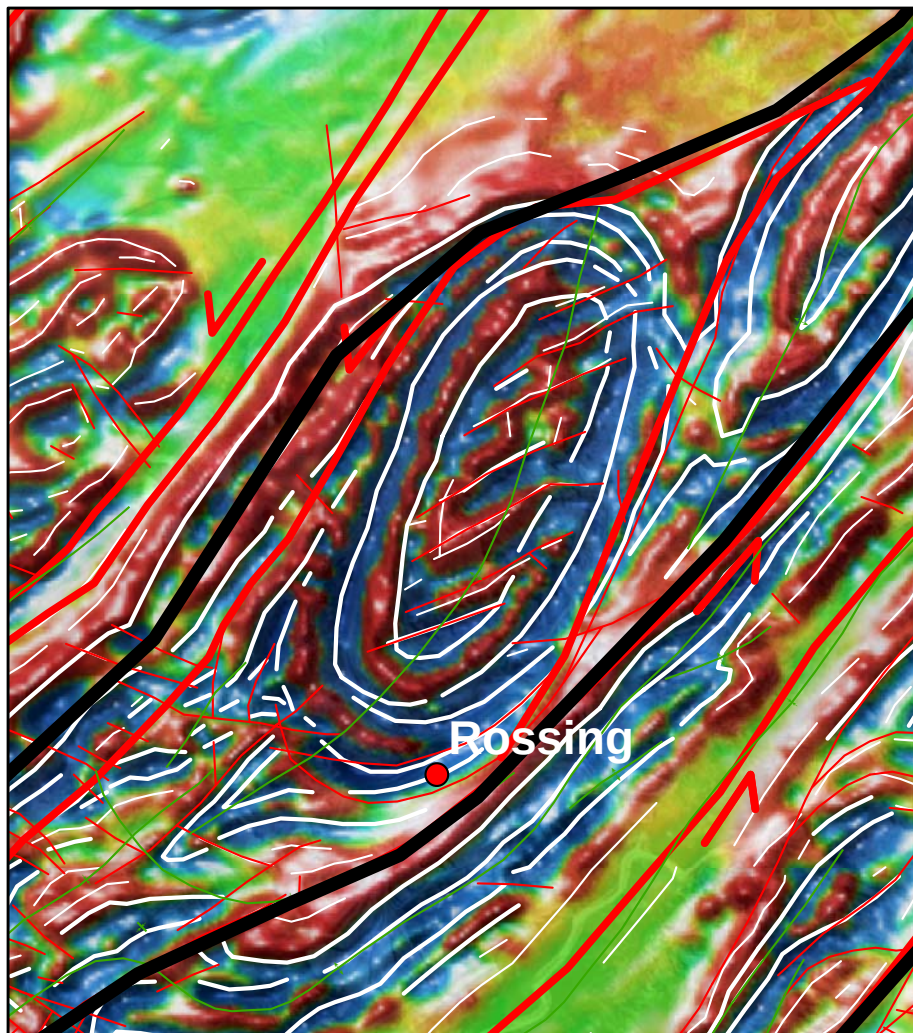


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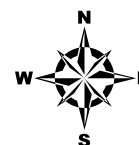


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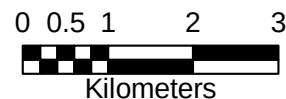


Magnetic First Vertical Derivative RTP



Legend

- U Projects
- Fault Zone Regional
- Fault Major Magnetics
- Fault Minor Magnetics
- Syncline
- Anticline
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent



Rossing
Uranium

Data Source:
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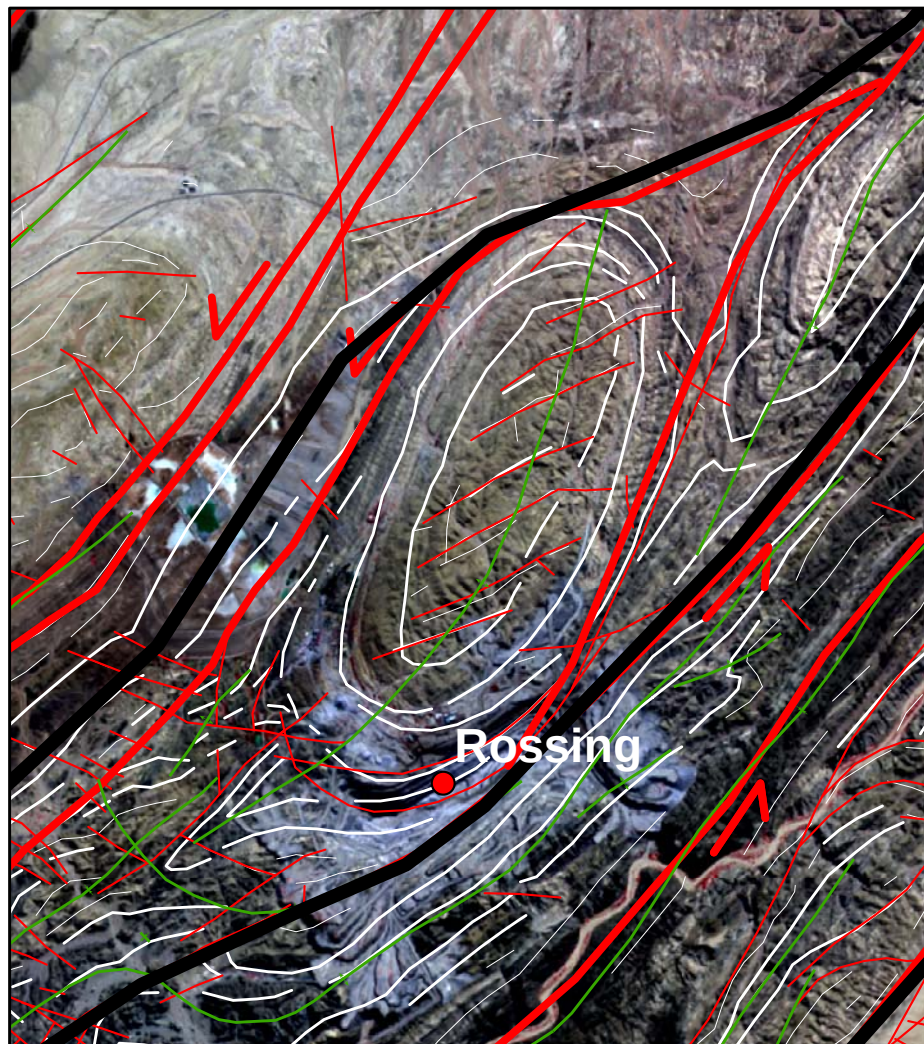


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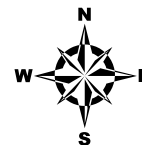
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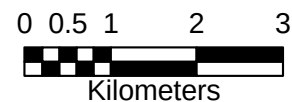


Aster



Legend

- U Projects
- Fault Zone Regional
- Fault Major Magnetics
- Fault Minor Magnetics
- Syncline
- Anticline
- Magnetic Anomaly Trace
- Magnetic Anomaly Trace remanent



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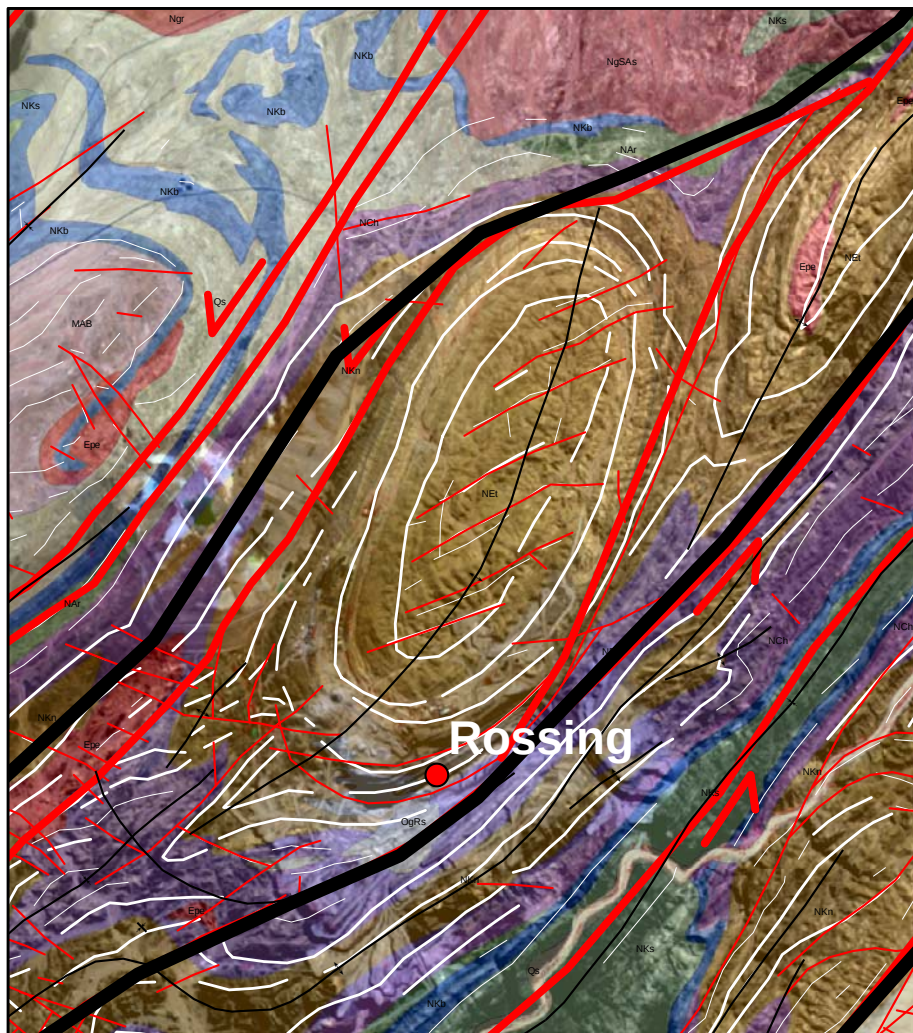


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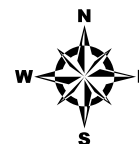
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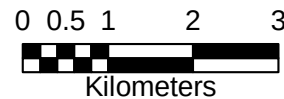


Geology
1: 250 k
over
Aster



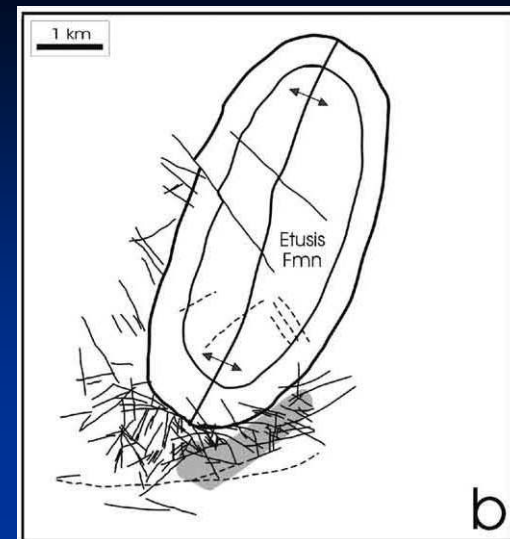
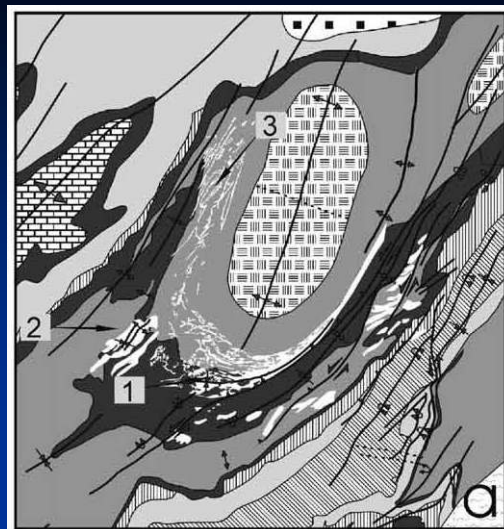
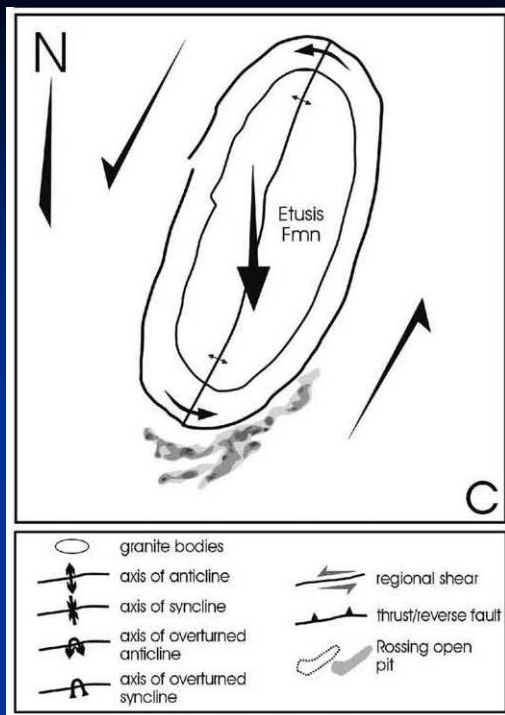
Legend

-  U Projects
 Fault Zone Regional
 Fault Major Magnetics
 Fault Minor Magnetics
 Syncline
 Anticline
 Magnetic Anomaly Trace
 Magnetic Anomaly Trace remanent



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Source: I.J. Basson & G. Greenway (2004)

Source: H. Anderson & C. Nash (1997)

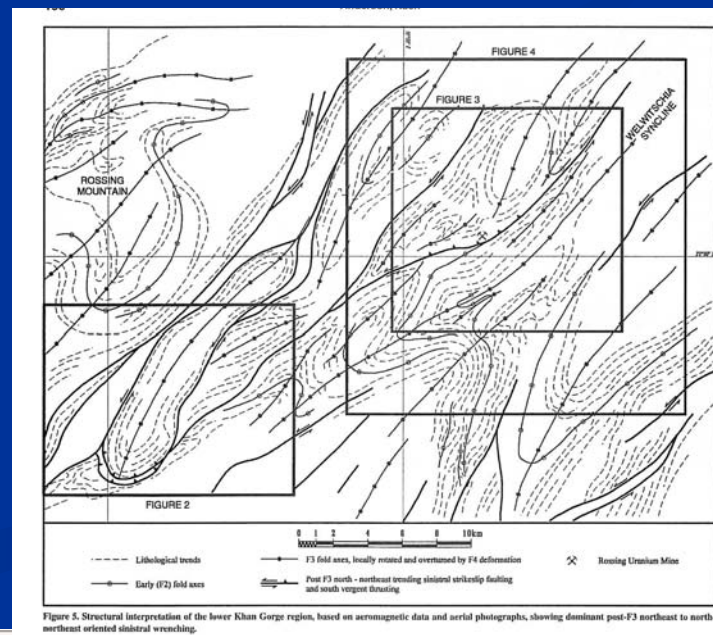
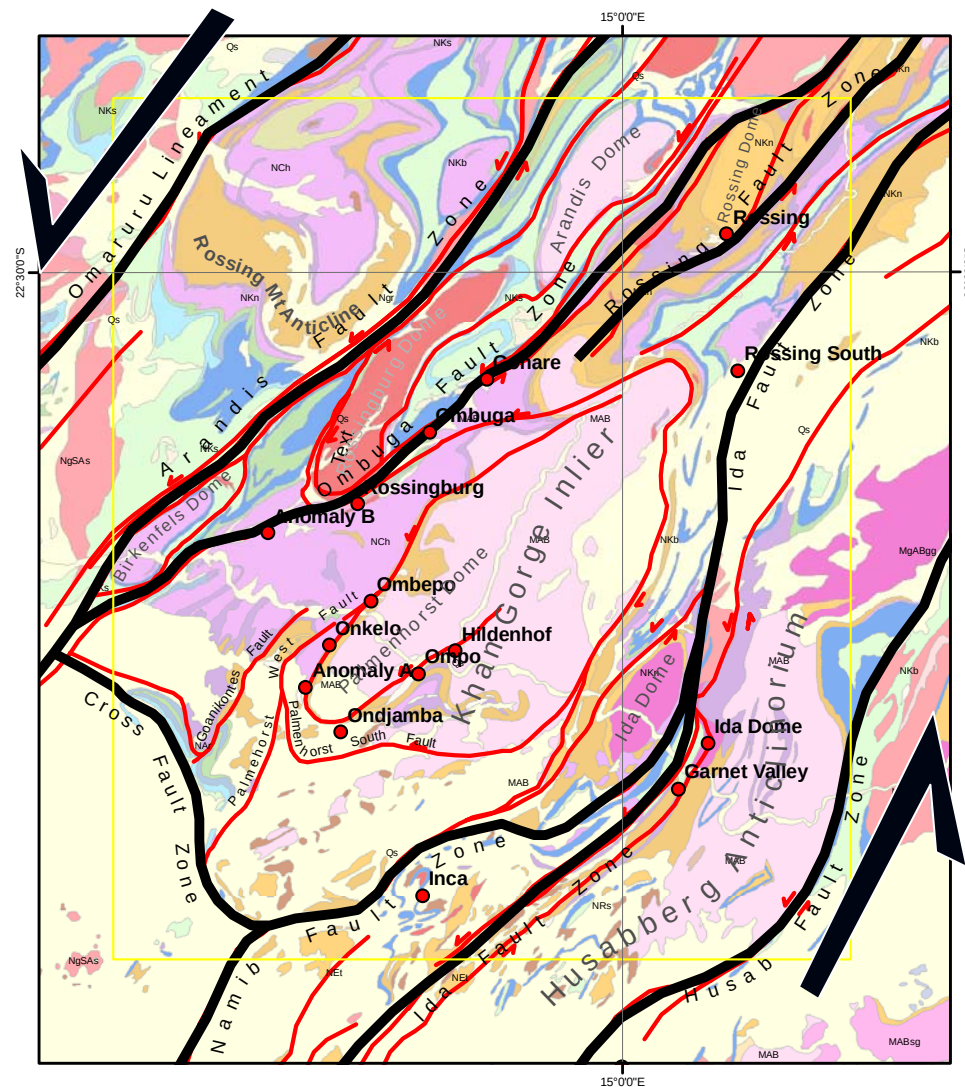
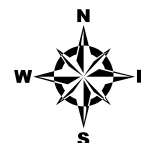


Figure 5. Structural interpretation of the lower Khan Gorge region, based on aeromagnetic data and aerial photographs, showing dominant post-F3 northeast to north-northeast oriented sinistral wrenching.

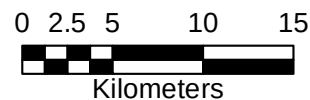
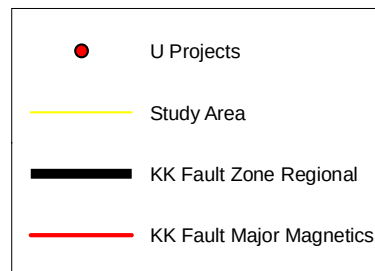


Geology

1: 250 000



Legend



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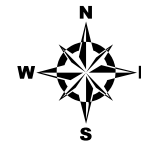
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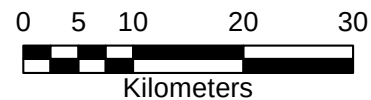
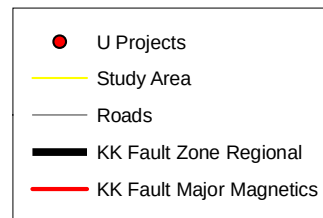
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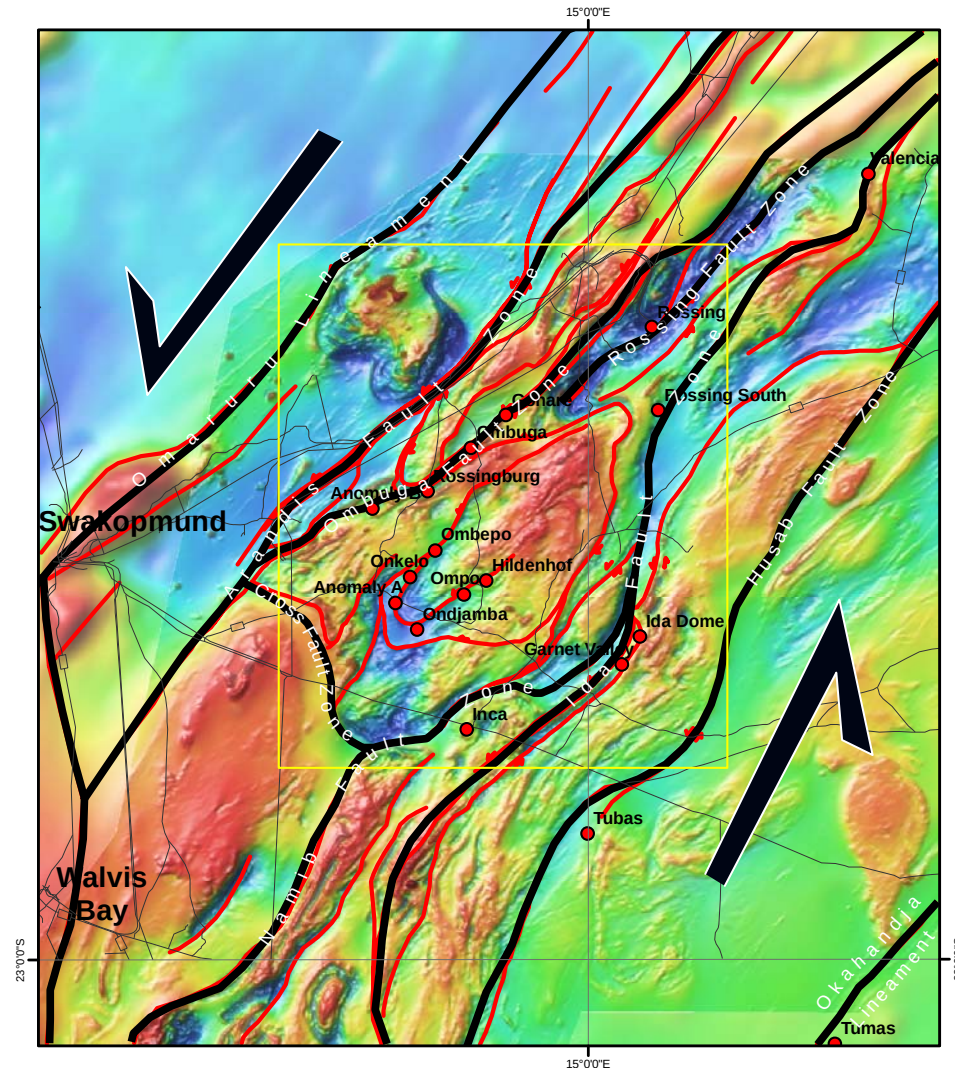
Magnetic Total Field RTP



Legend



Data Source:
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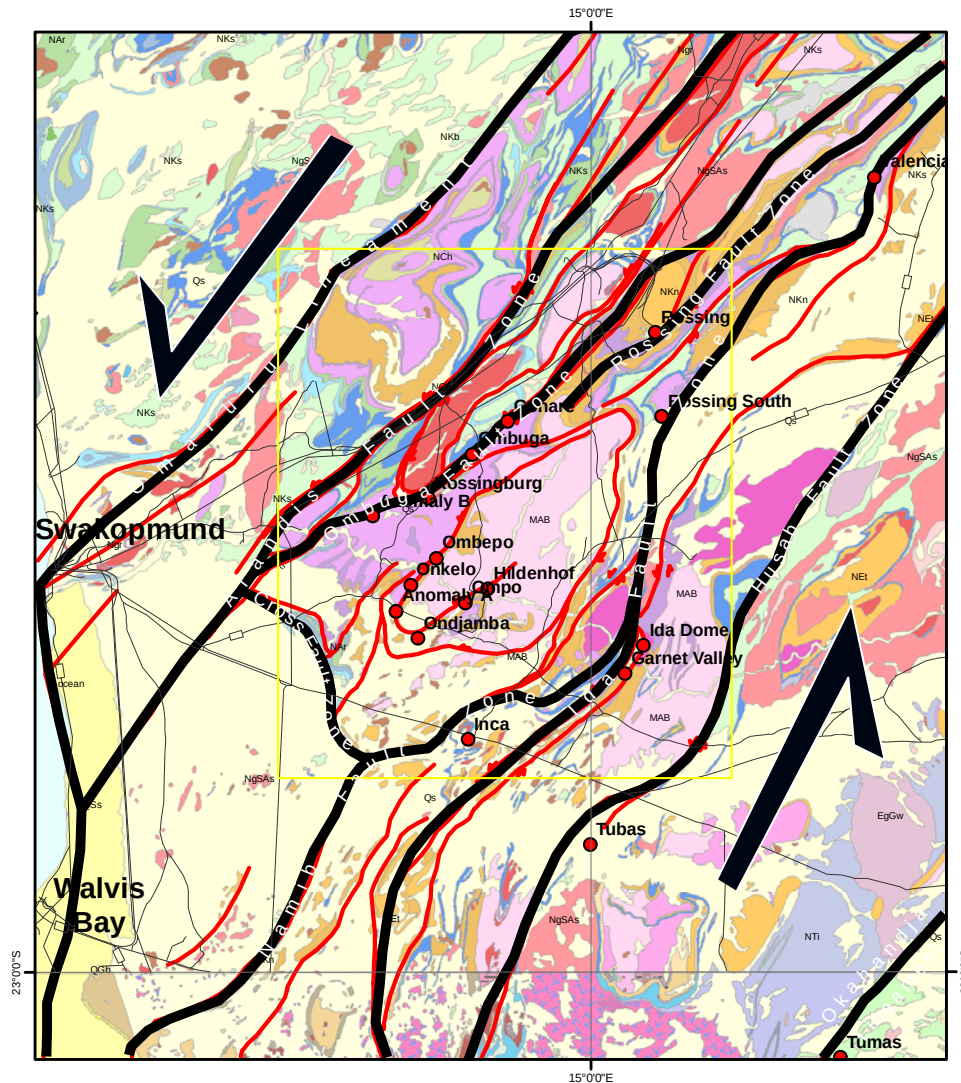
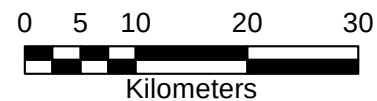
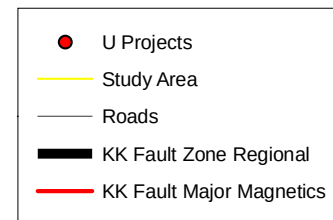
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Geology

1: 250 000



Legend



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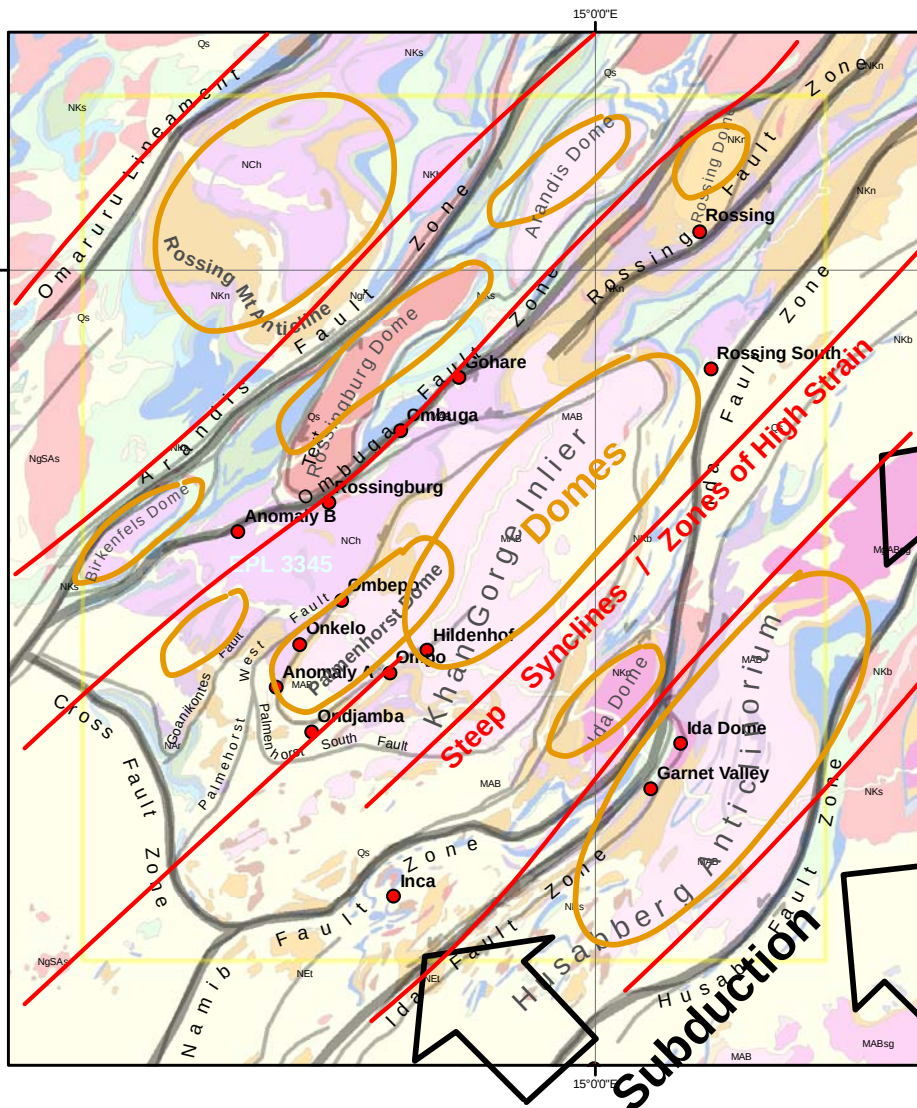
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How do we explain

- ***this deformation ?***
- ***the emplacement of late leucogranites?***



D4 Deformation

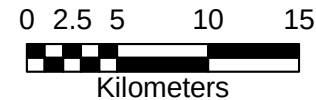
D3 Deformation



542 – 526 Ma
(I.J. Basson et al 2004)

Legend

- U Projects
- Study Area
- KK Fault Zone Regional
- KK Fault Major Magnetics



Direction

Subduction

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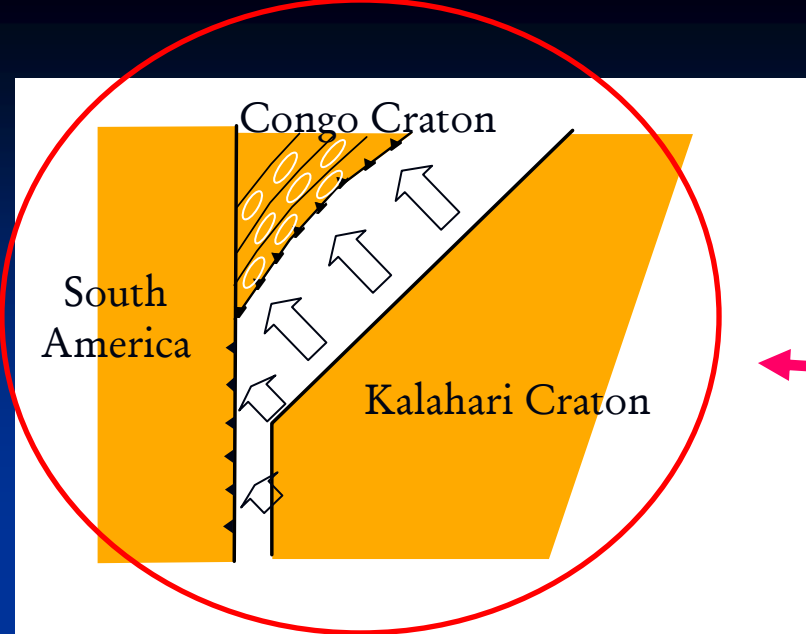
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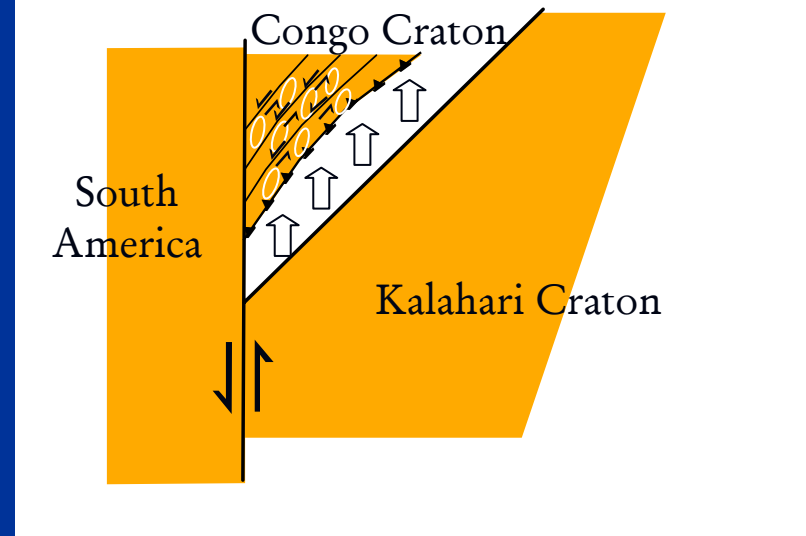
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Structural Evolution (schematic)



D3 Deformation
in sCZ

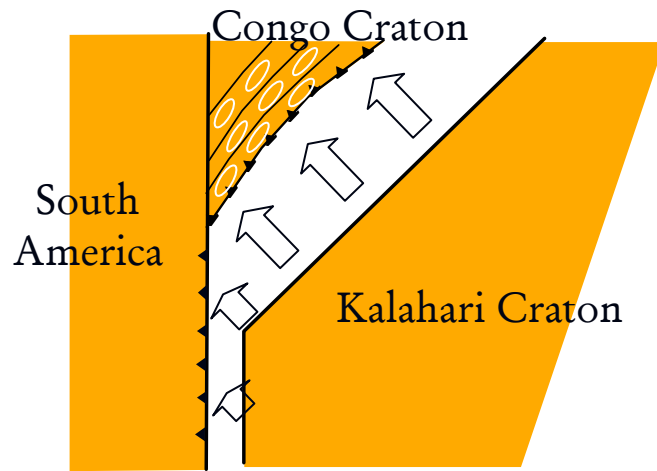
542 – 526 Ma
(I.J. Basson et al 2004)



D4

Structural Evolution (schematic)

D3

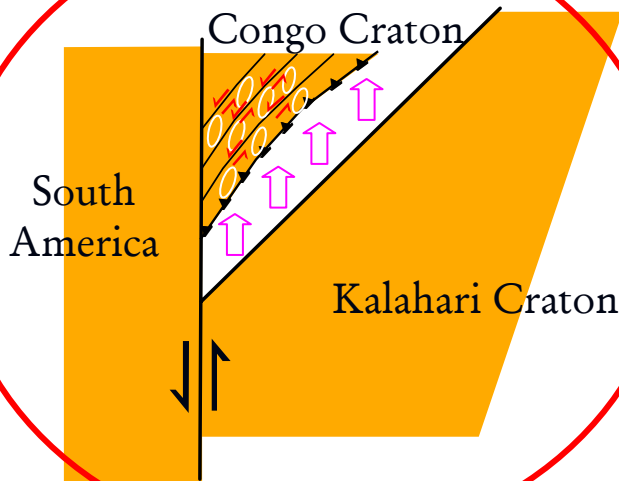


D4 Deformation in sCZ

516 - 505 Ma

(I.J. Basson et al 2004)

495 Ma: Subduction Plate Detachment
(R.McG. Miller 2008)



Uraniferous leucogranite emplacement:
510 - 467 Ma (I.J. Basson et al 2004)
540 - 510 Ma (R.McG. Miller 2008)

Refinement

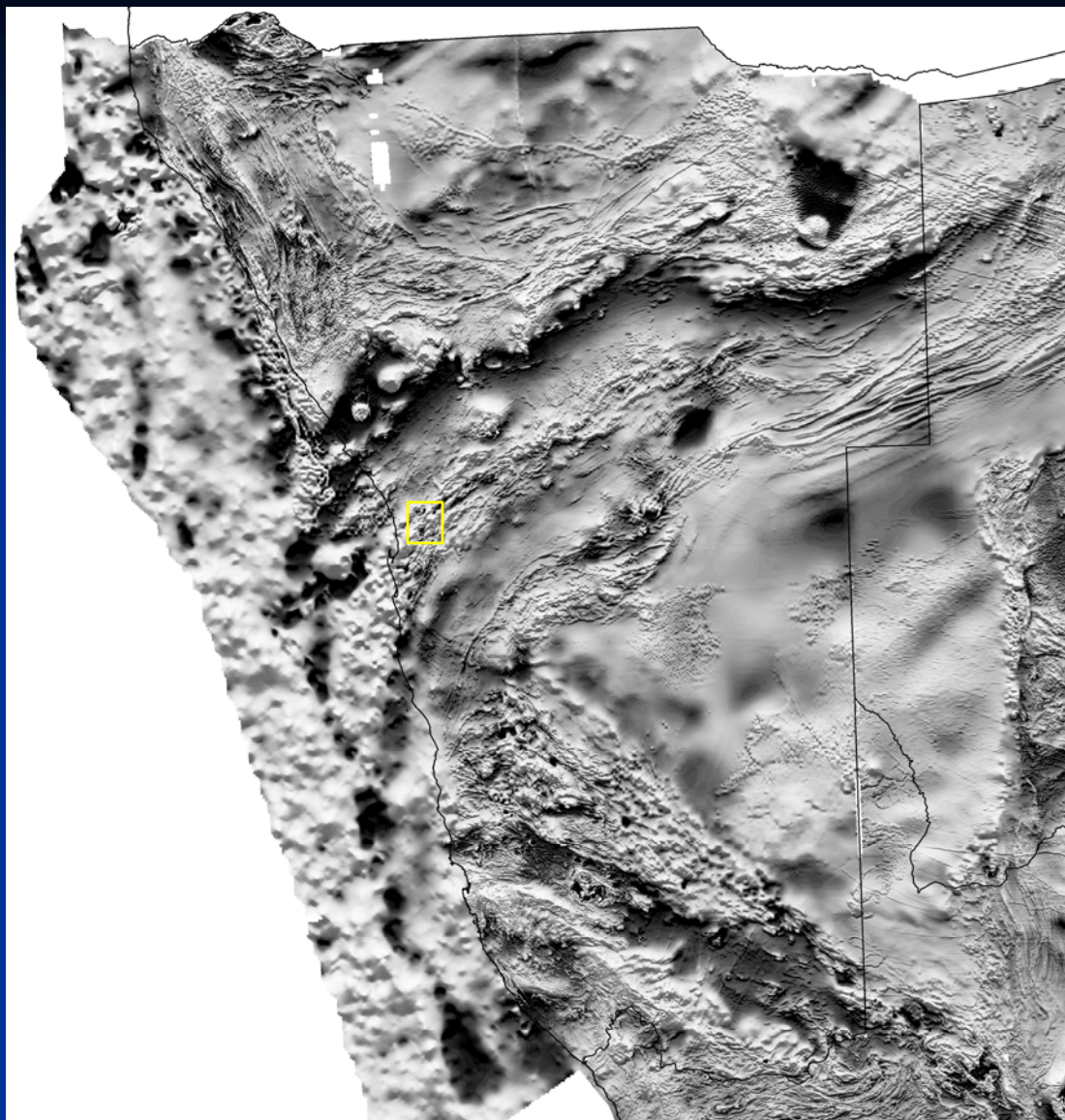
Of the

Welwitschia Lineament Zone

(B. Corner 1983)

Spatially coincident:

- **Zone of Magnetically Remanent Nosib Group**
Established at peak of M2 (570 °C):
535 Ma
(R.McG. Miller 2008)
- **NNE-SSW Zone of LL strike slip and Dome Rotation**
During D4:
516-505 Ma
(I.J. Basson et al 2004)



Magnetic Total Field

(B. Corner)

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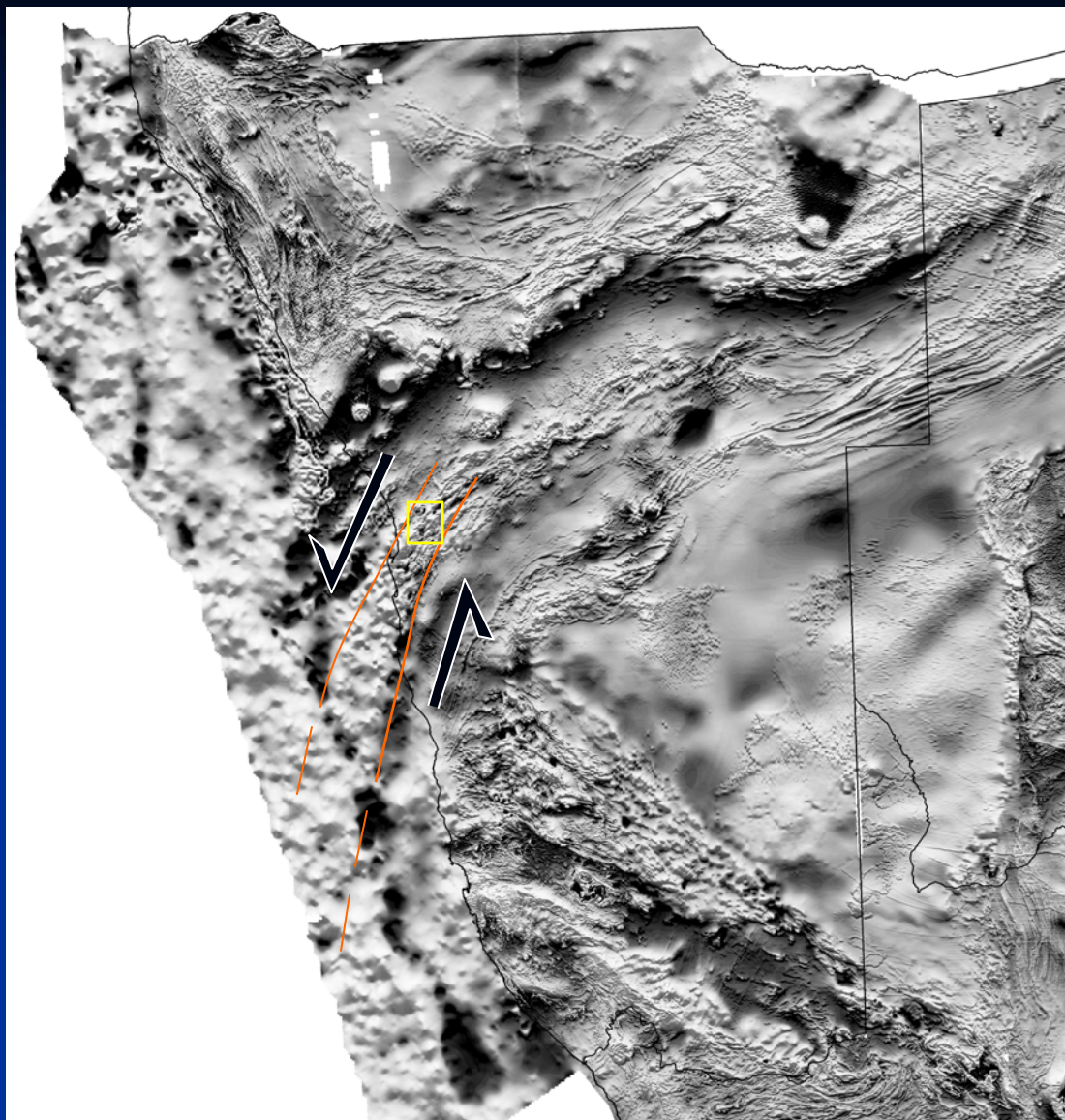
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Magnetic Total Field

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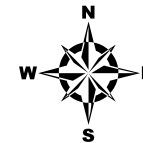


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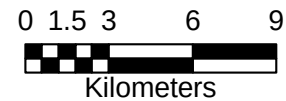
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Radiometrics: Uranium

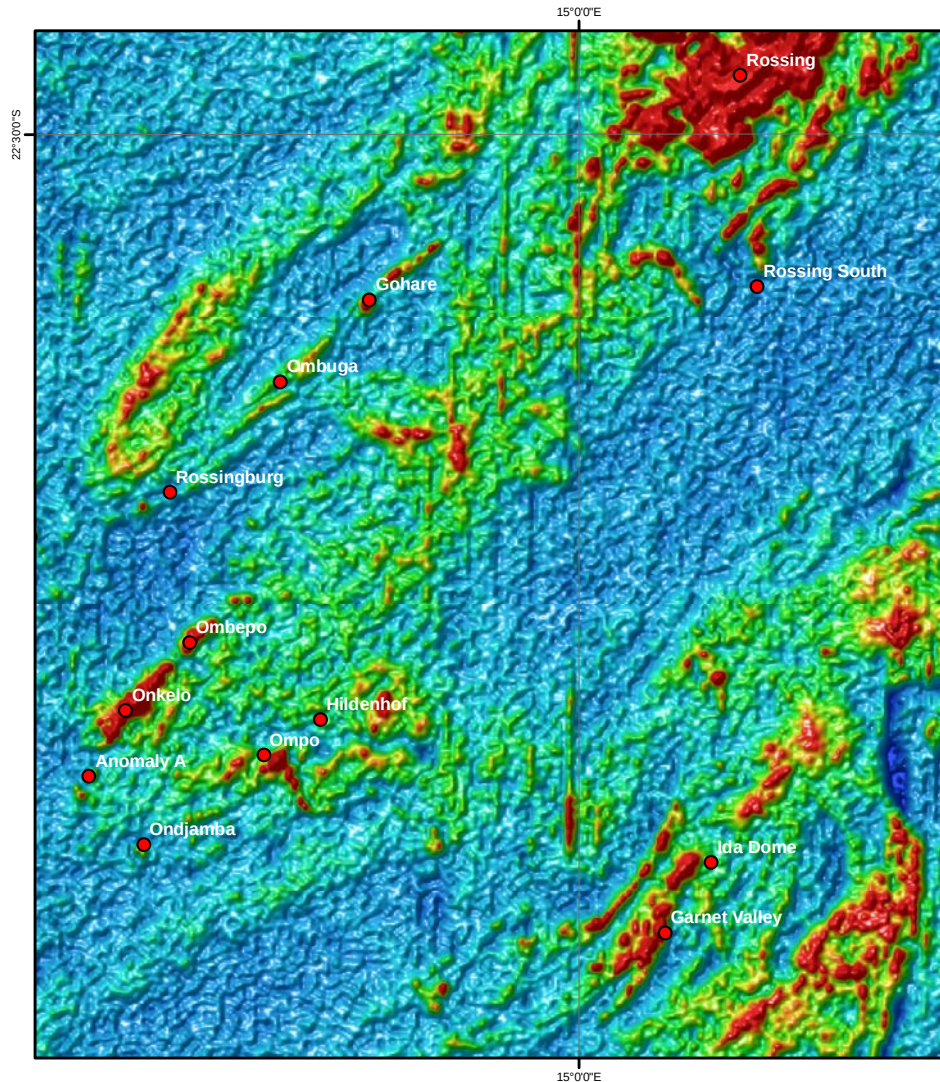


Legend

● U Projects



Data Source:
GSN



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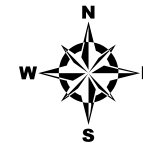
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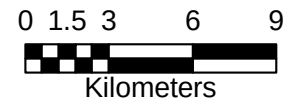
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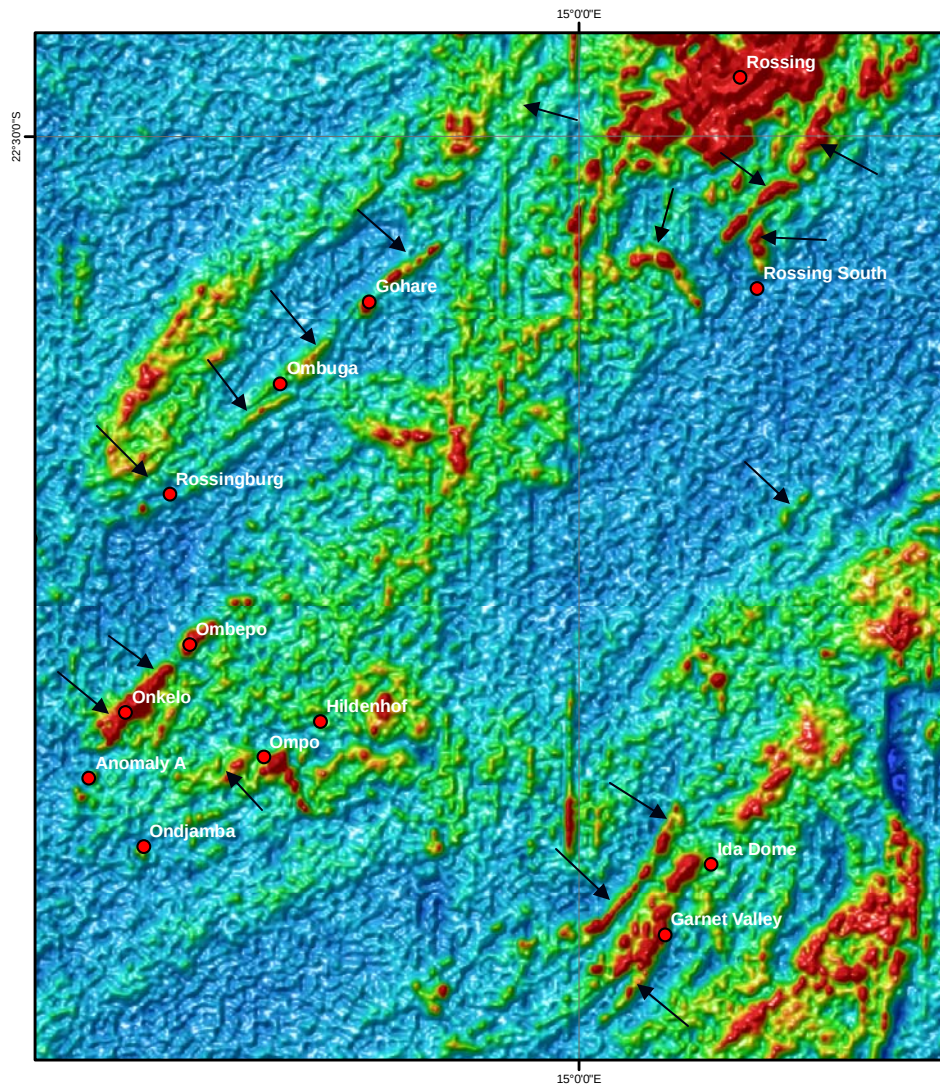


Legend

● U Projects



Data Source:
GSN



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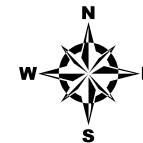
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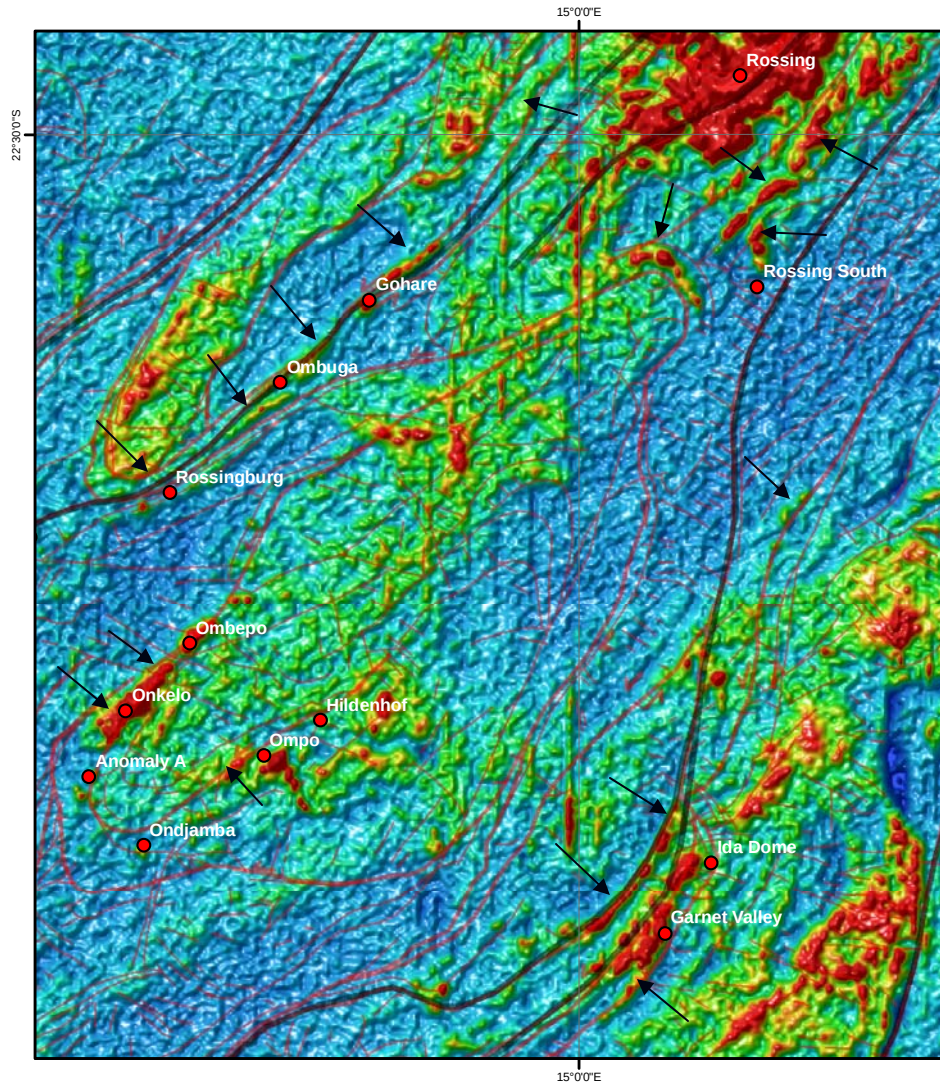


Legend

- U Projects
- Fault Zone Regional
- Fault Major Magnetics
- Fault Minor Magnetics



Data Source:
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