



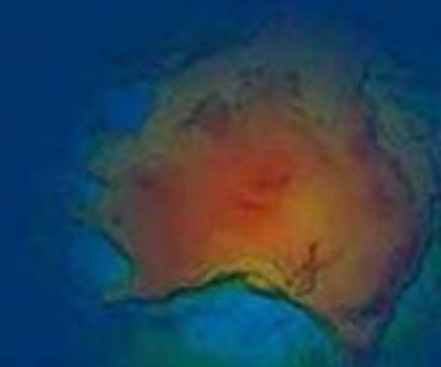
Australian Government

Geoscience Australia

Crustal structure of the Olympic Dam region

Constraints from deep seismic reflection profiles

Gawler Minerals Promotion Project



CONTRIBUTORS

PIRSA

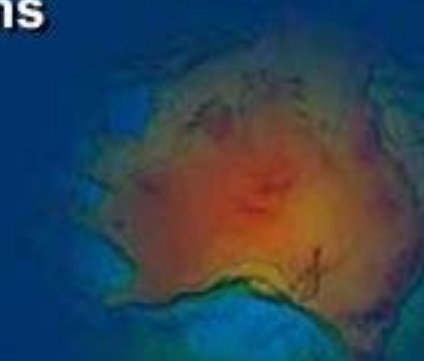
M. Fairclough M. Schwarz A. Shearer W. Preiss

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N. Direen

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**B. Drummond B. Goleby L. Jones
J. Totterdell R. Korsch R. Skirrow P. Lyons**





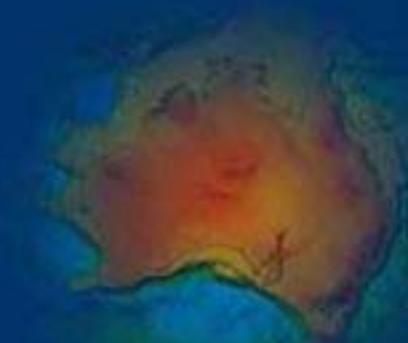
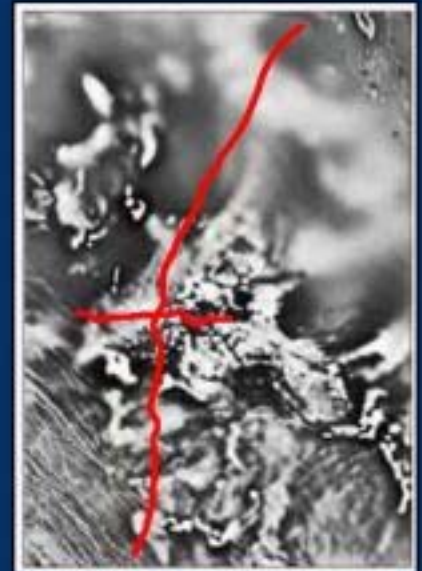
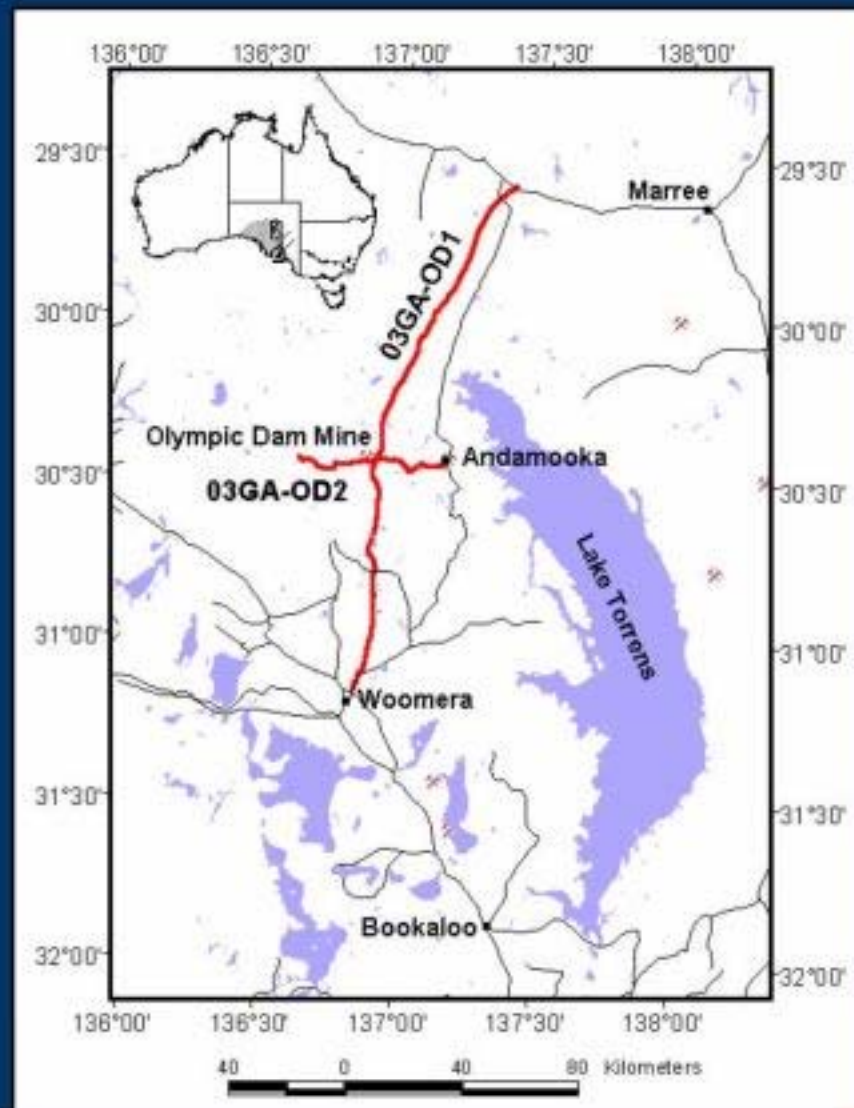
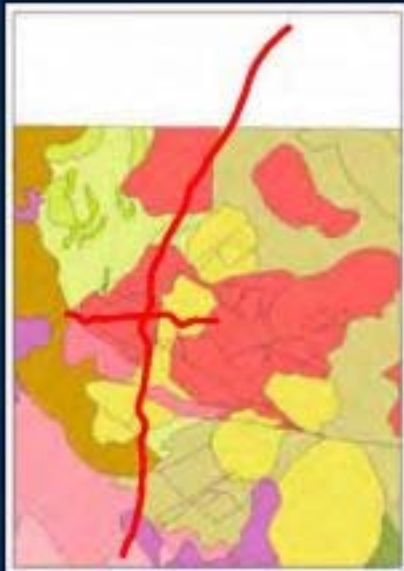
Olympic Cu-Au Province

Prominent Hill

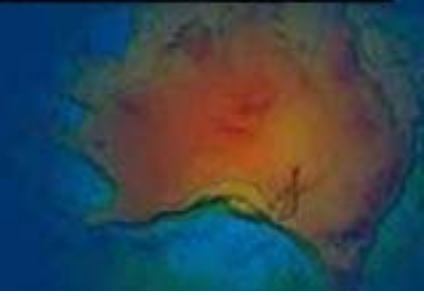
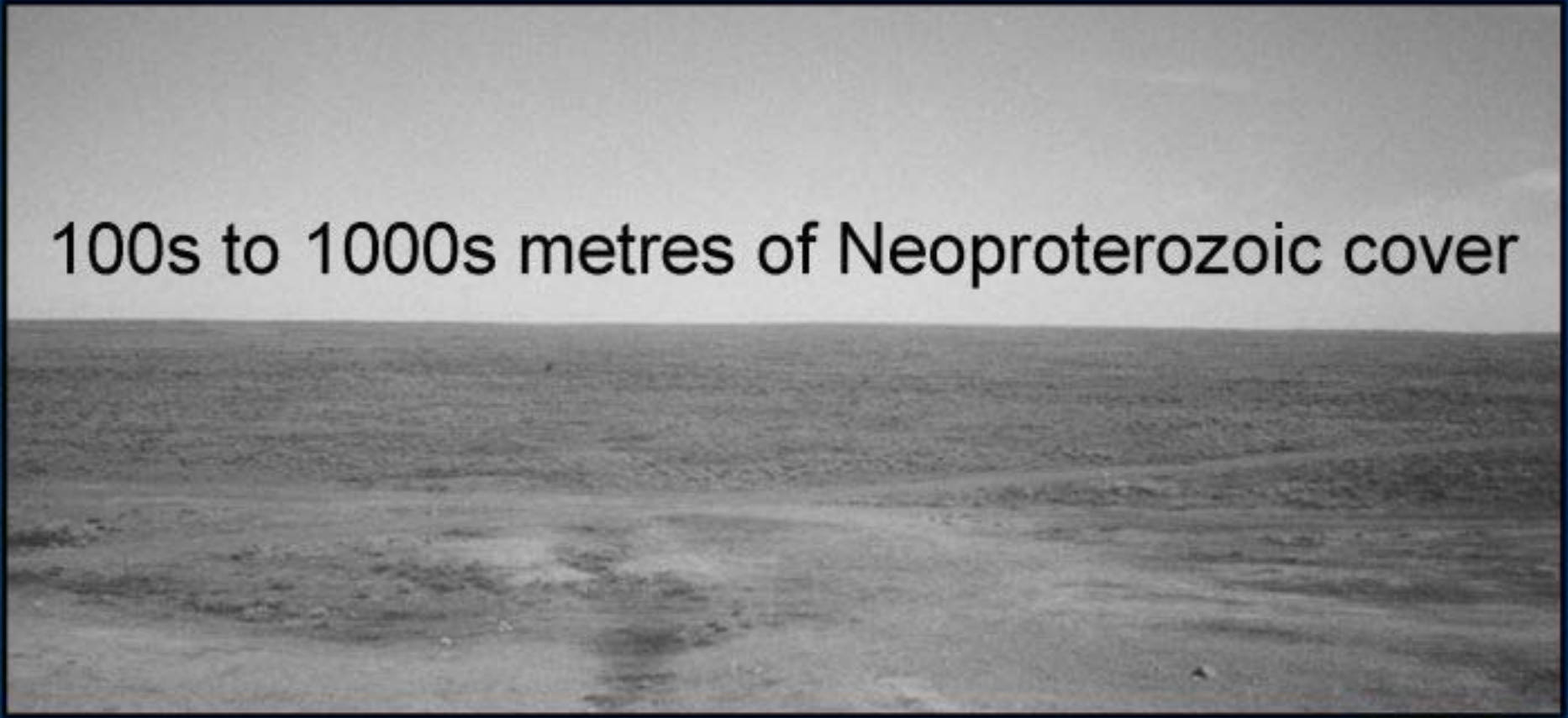
Olympic Dam

Moonta-Wallaroo

SEISMIC LINES

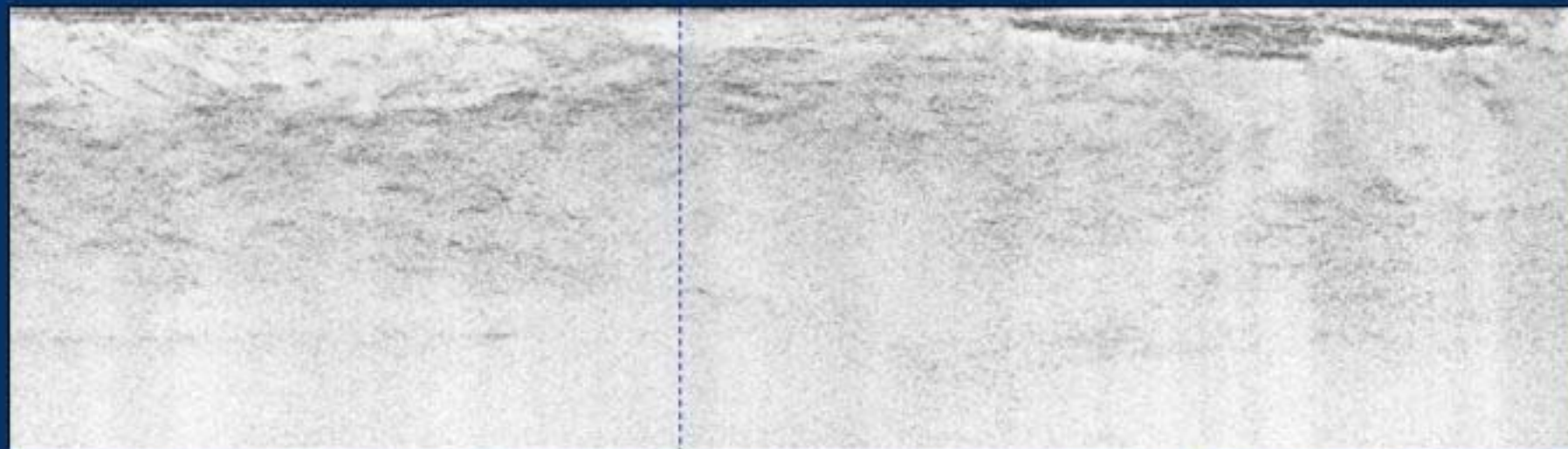


100s to 1000s metres of Neoproterozoic cover

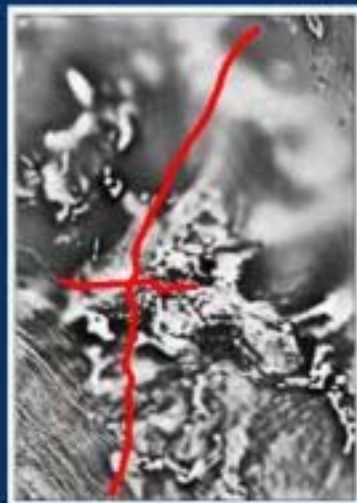


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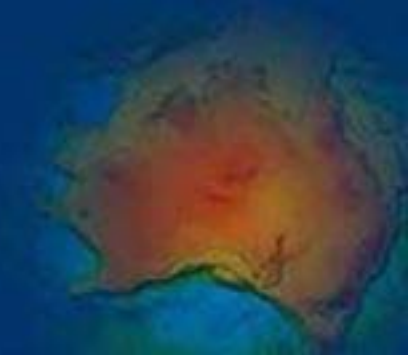
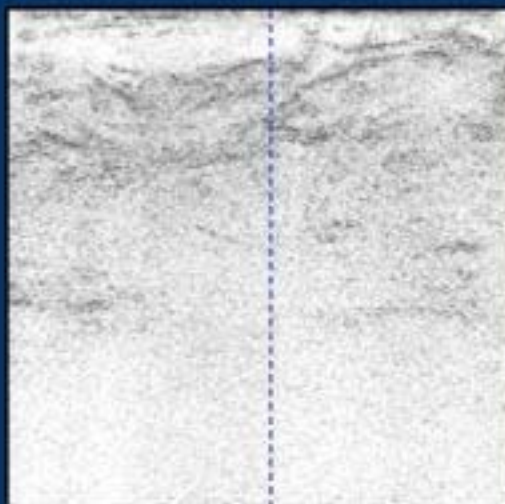


50 km



W

E

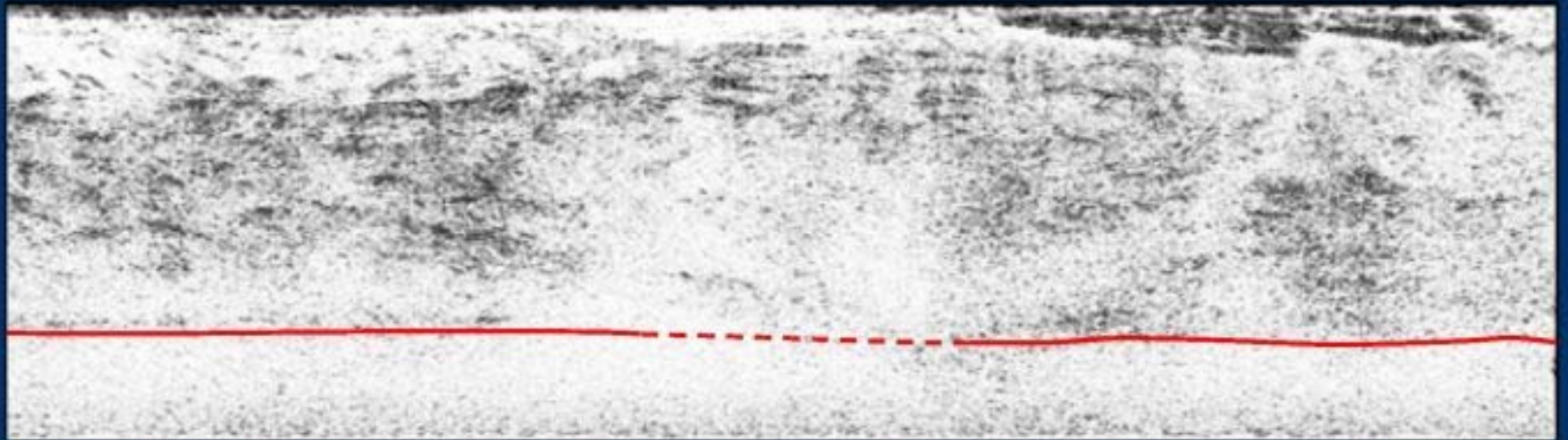


MOHOROVIČIĆ DISCONTINUITY

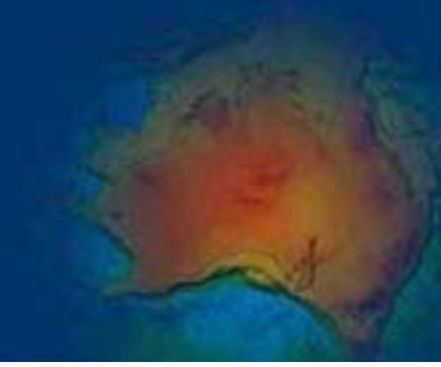
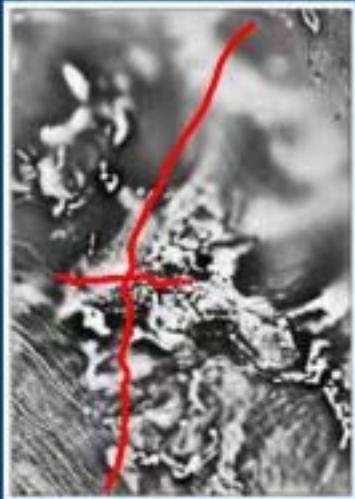
~40 km depth

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50 km

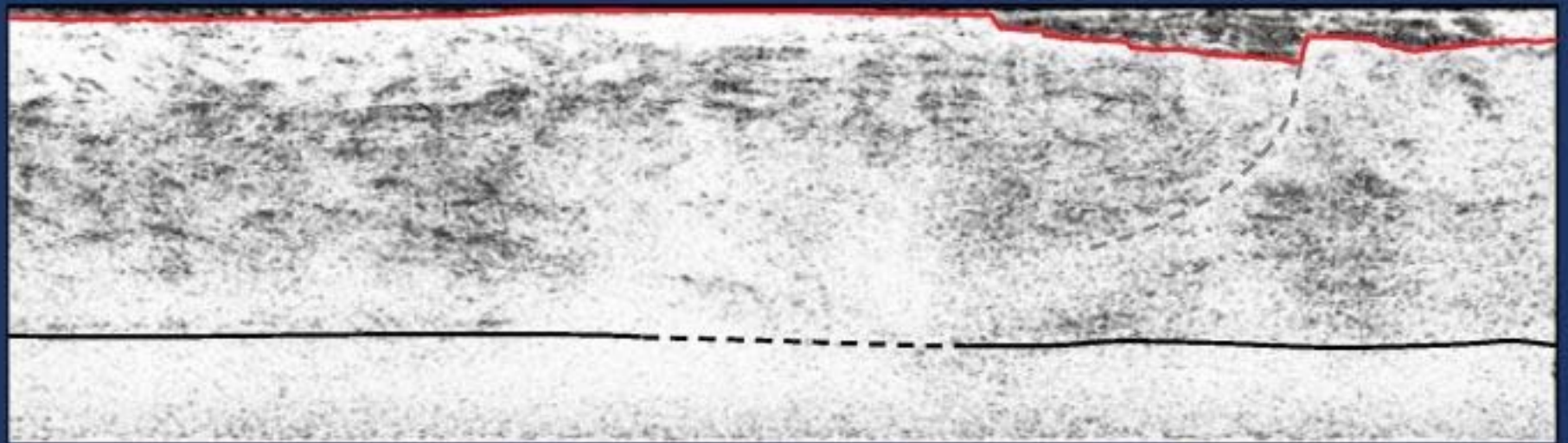


NEOPROTEROZOIC COVER

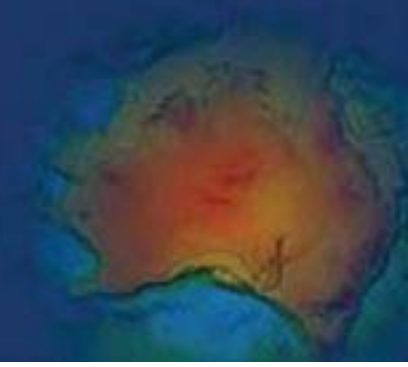
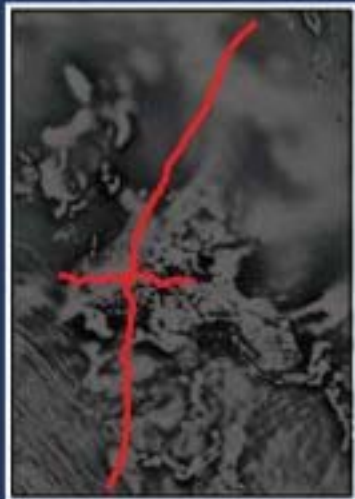
300 m to 6 km thick

S

N



50 km

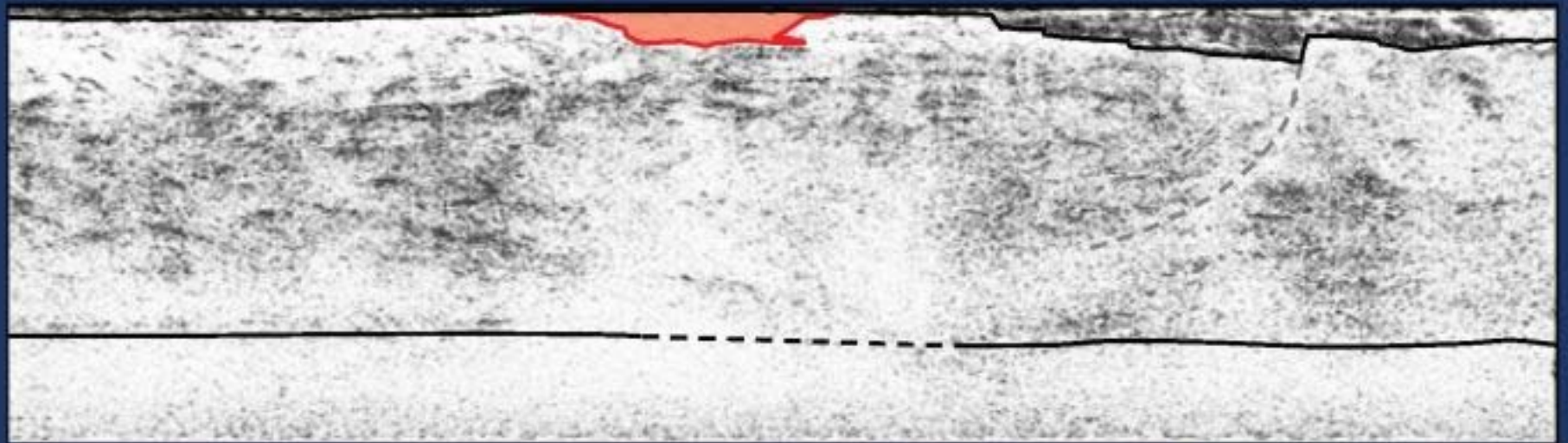


BURGOYNE BATHOLITH

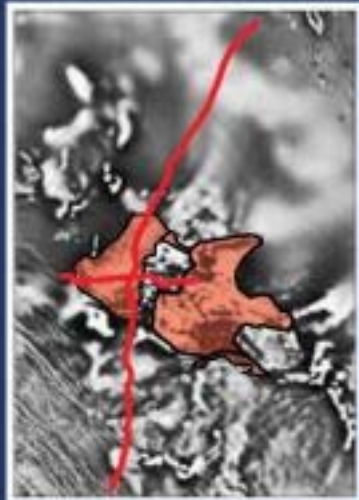
5 km thick

S

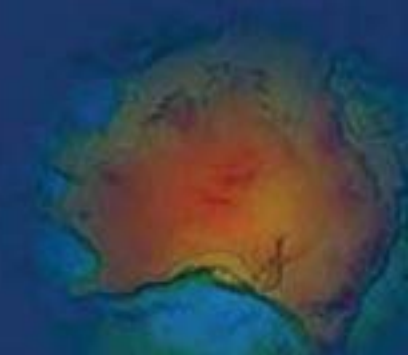
N



50 km



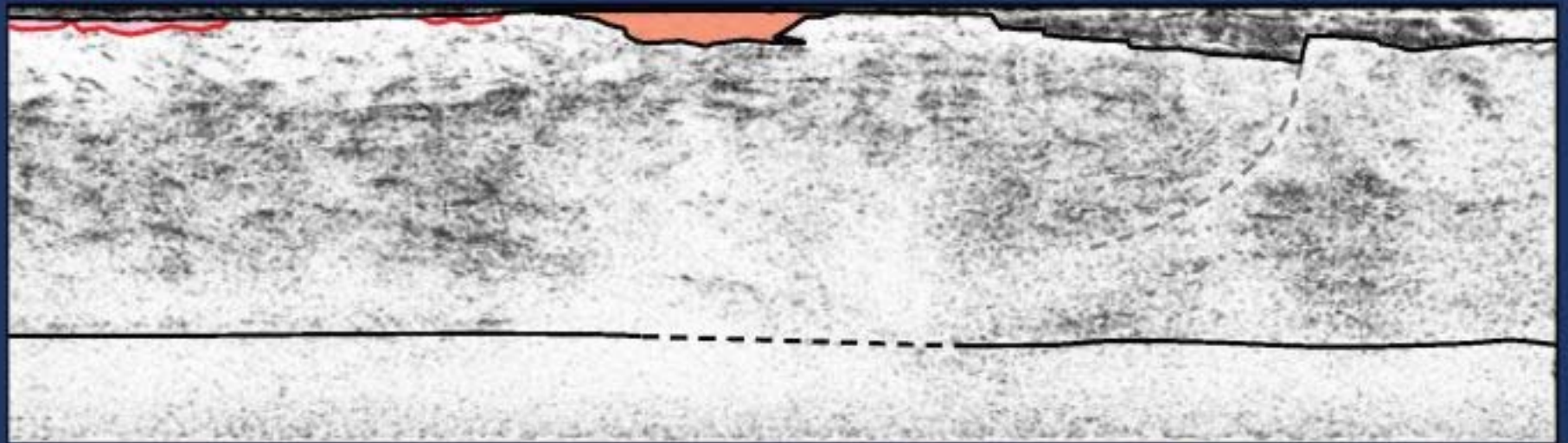
1590 Ma



GAWLER RANGE VOLCANICS

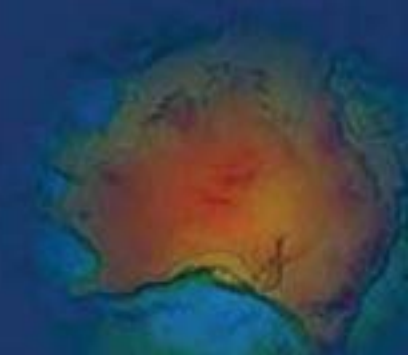
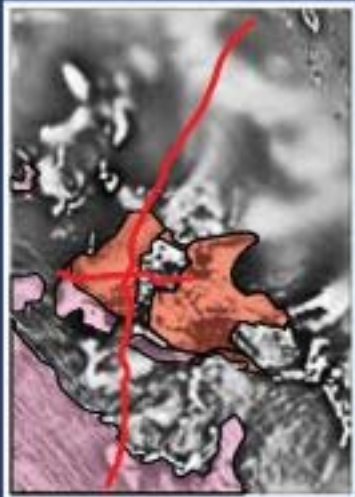
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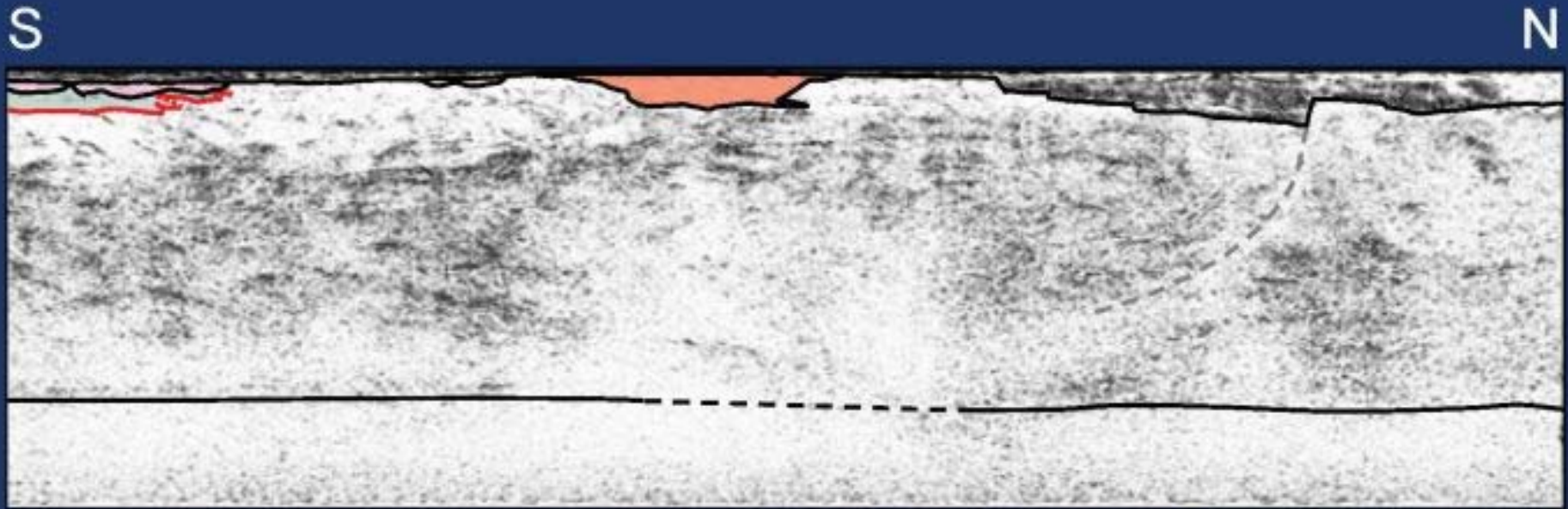


50 km

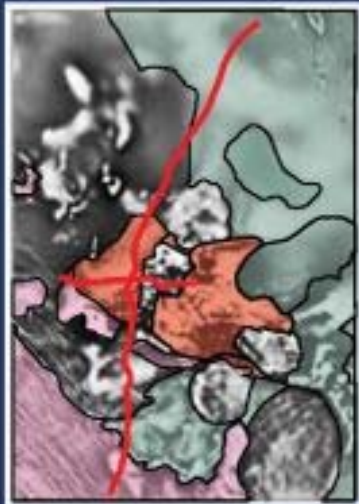
1590 Ma



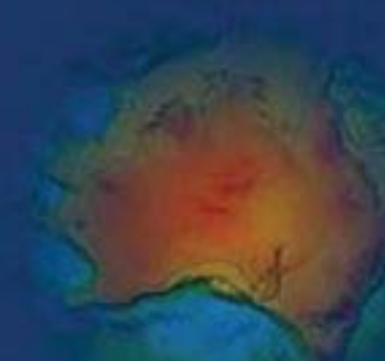
WALLAROO GROUP



50 km



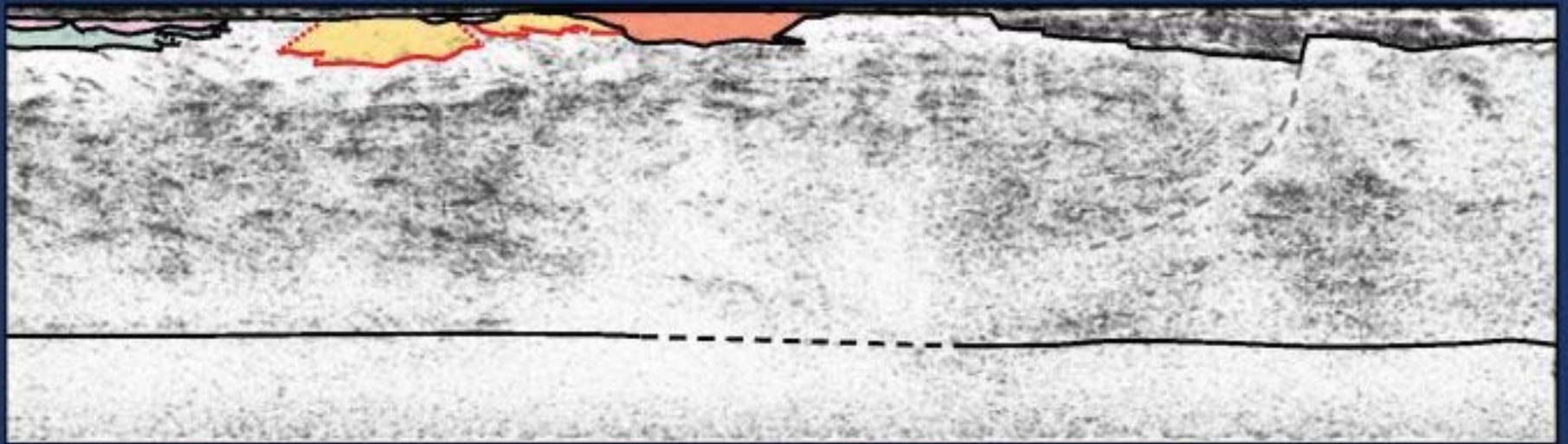
1760 Ma – 1720 Ma



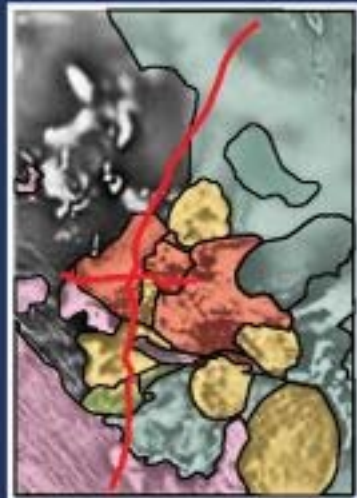
DONINGTON SUITE

S

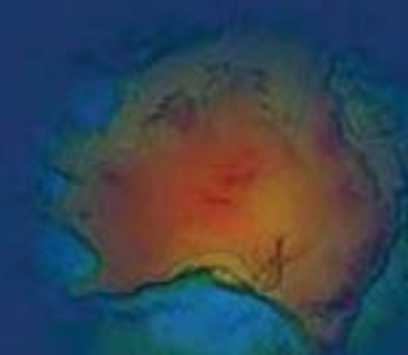
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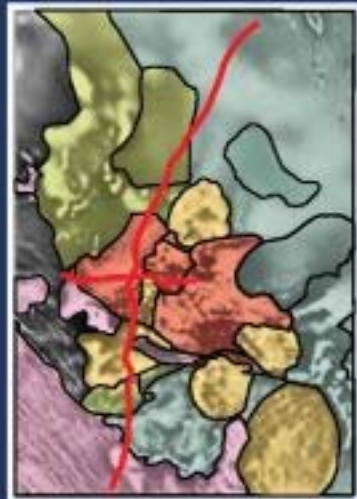
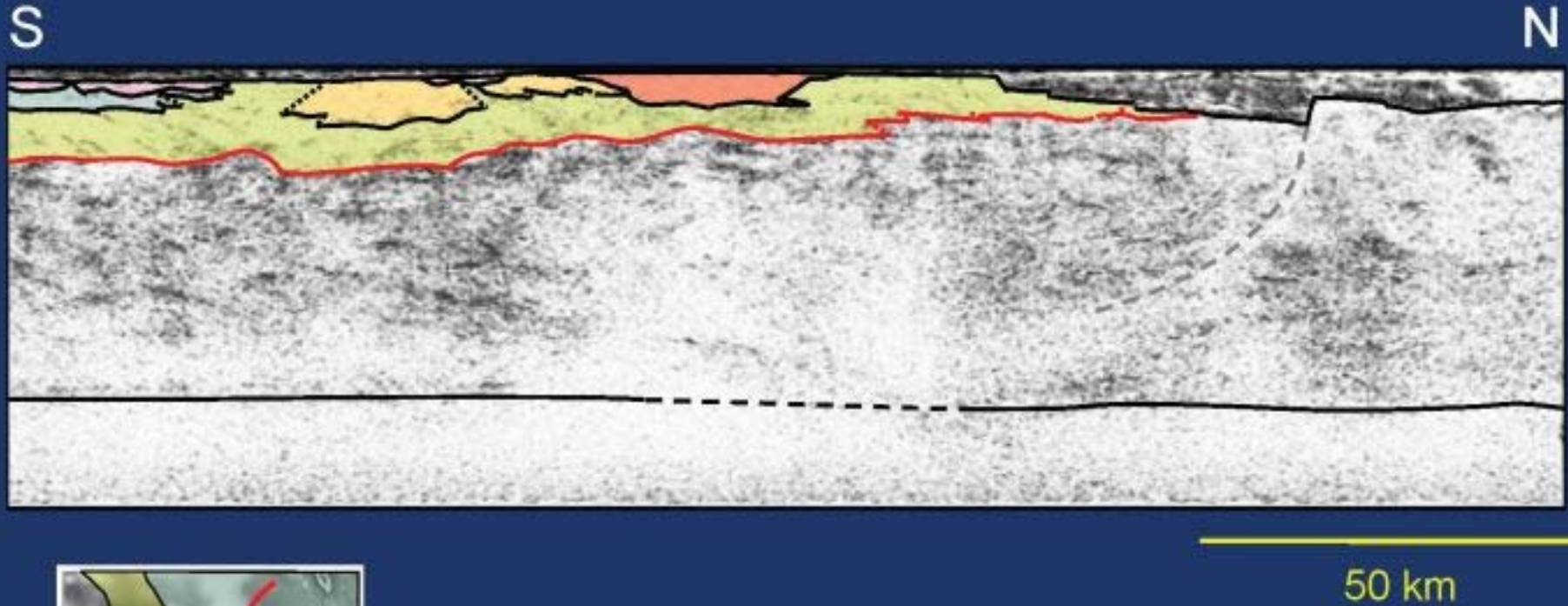
50 km



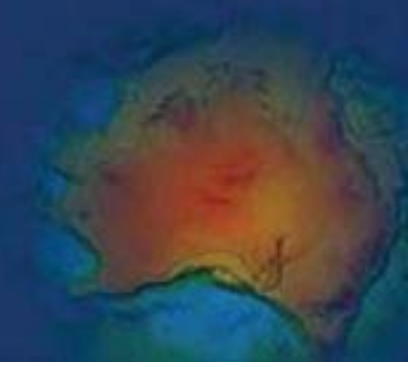
1850 Ma



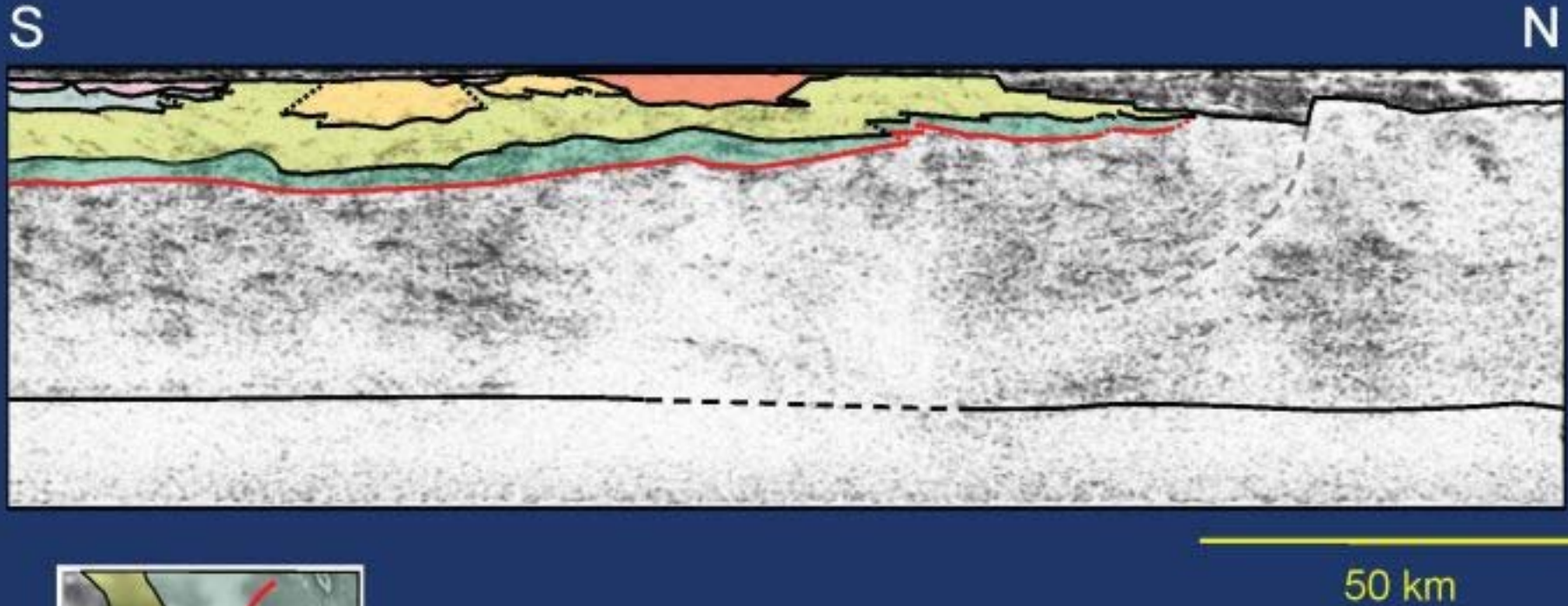
?HUTCHISON GROUP



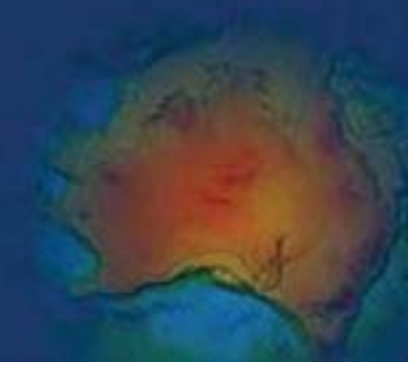
2000 Ma – 1850 Ma



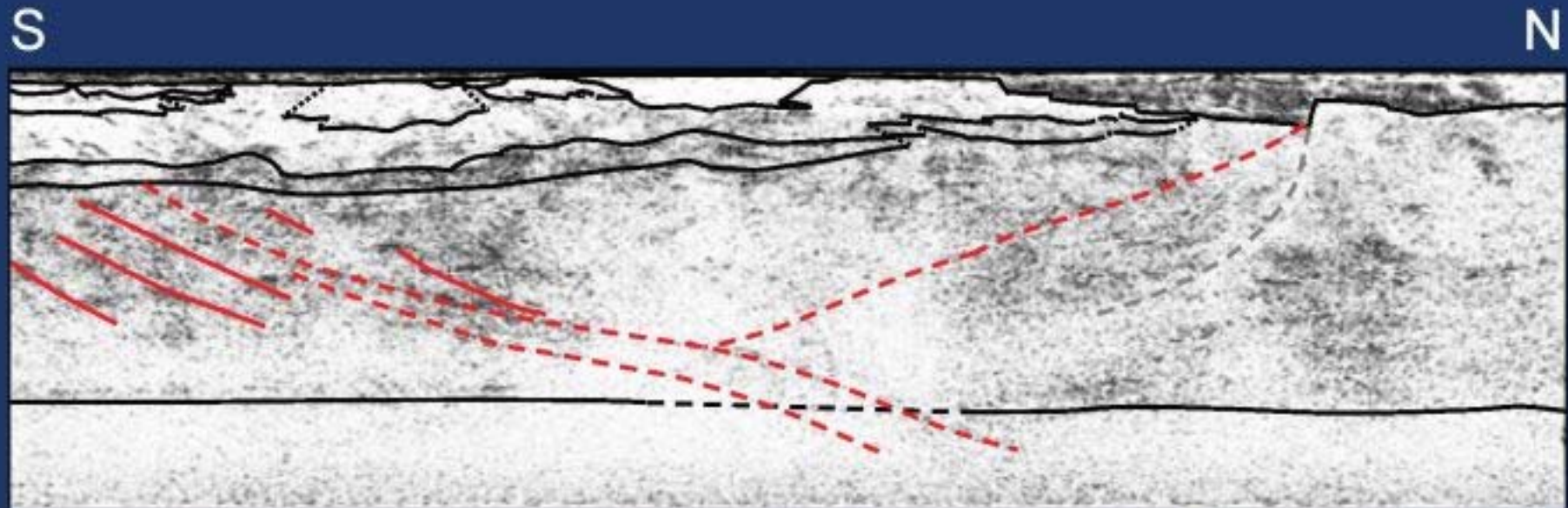
MID-CRUSTAL LAYER



>2000 Ma

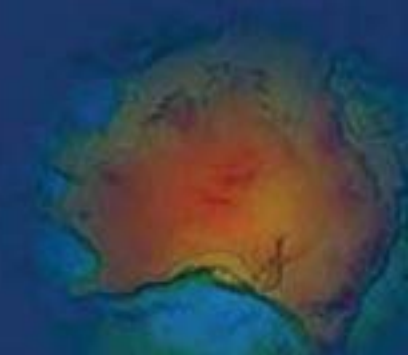


DEEP CRUSTAL STRUCTURE

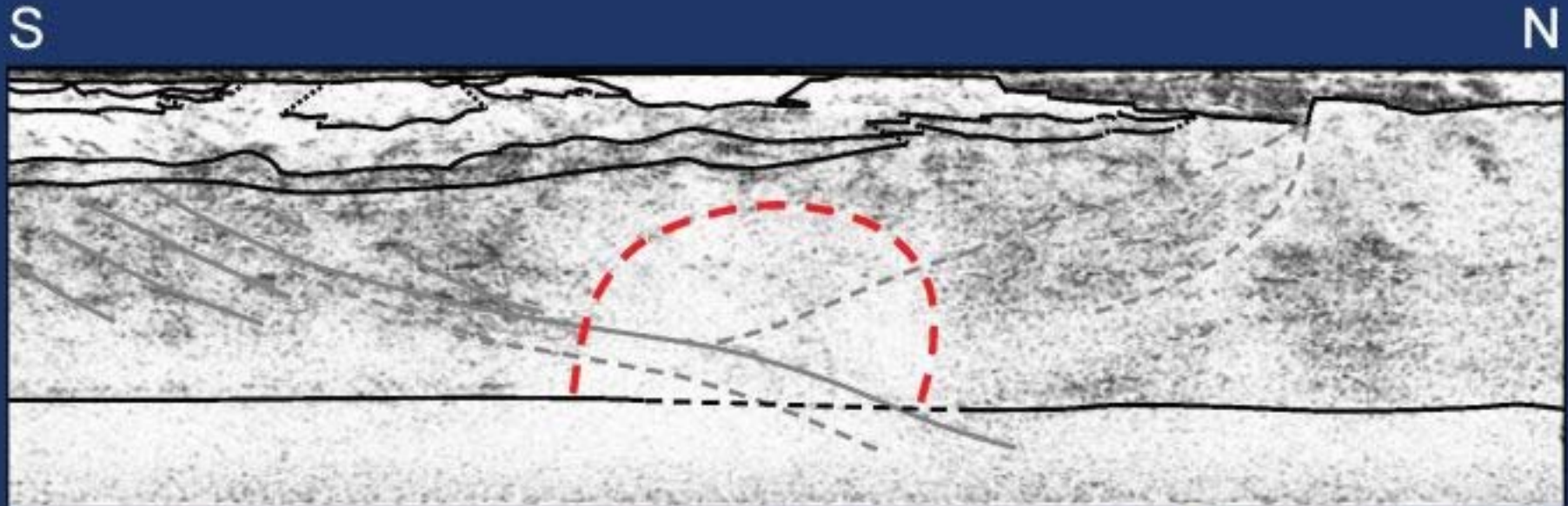


50 km

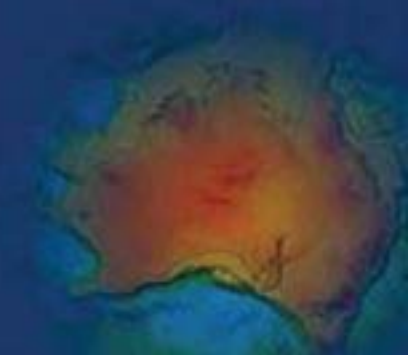
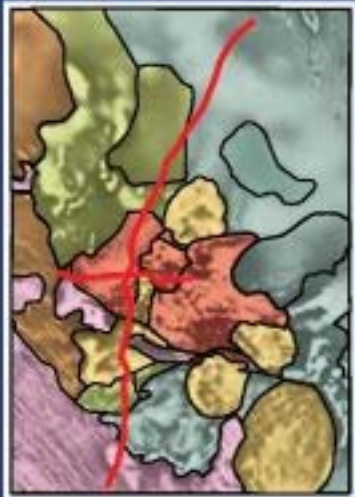
>2000 Ma?



BLAND ZONE



50 km



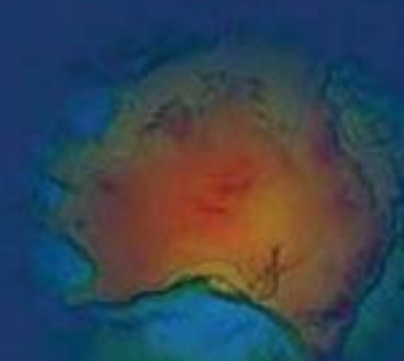


W

E



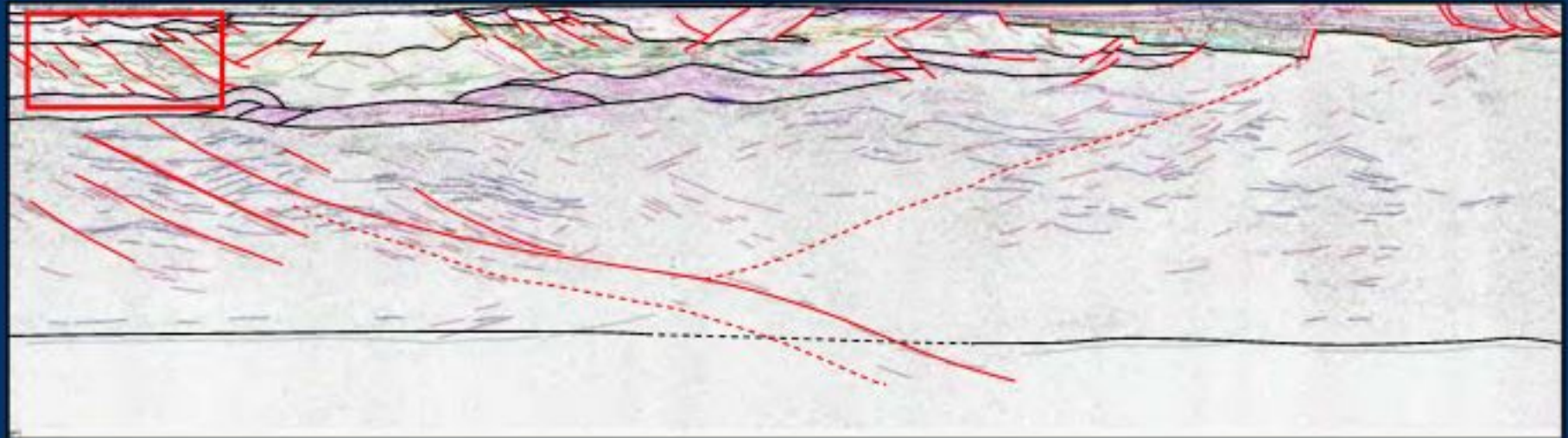
15 km



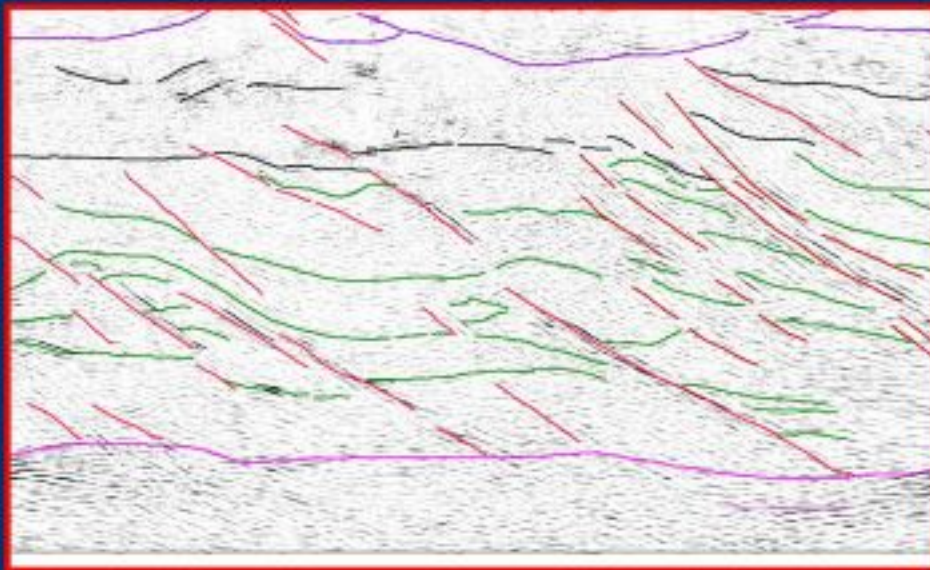
ELIZABETH CREEK FAULT COMPLEX

S

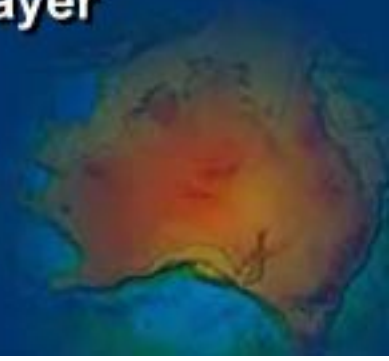
N



50 km



1720 Ma thrusts in
?Hutchison & Wallaroo
Groups detaching on mid-
crustal layer

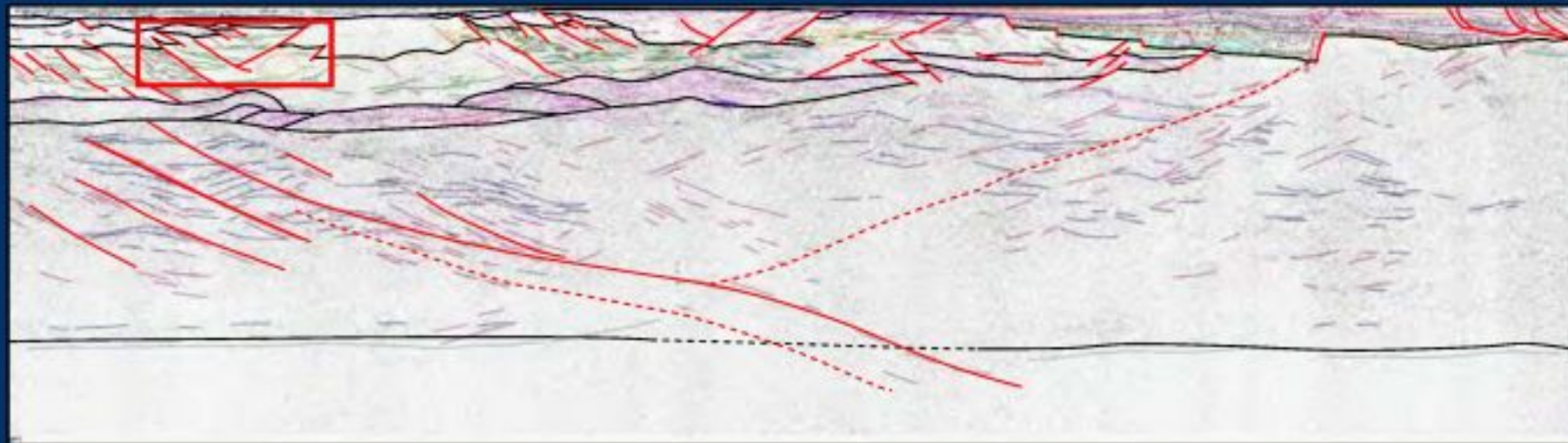




ELIZABETH CREEK FAULT COMPLEX

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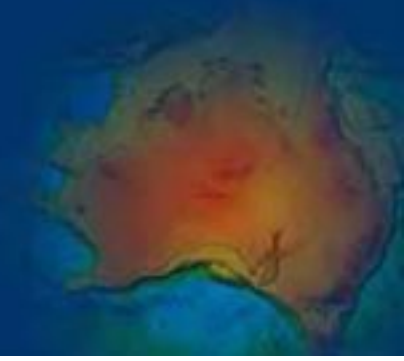
N



50 km



**Back-thrust
of fault complex**

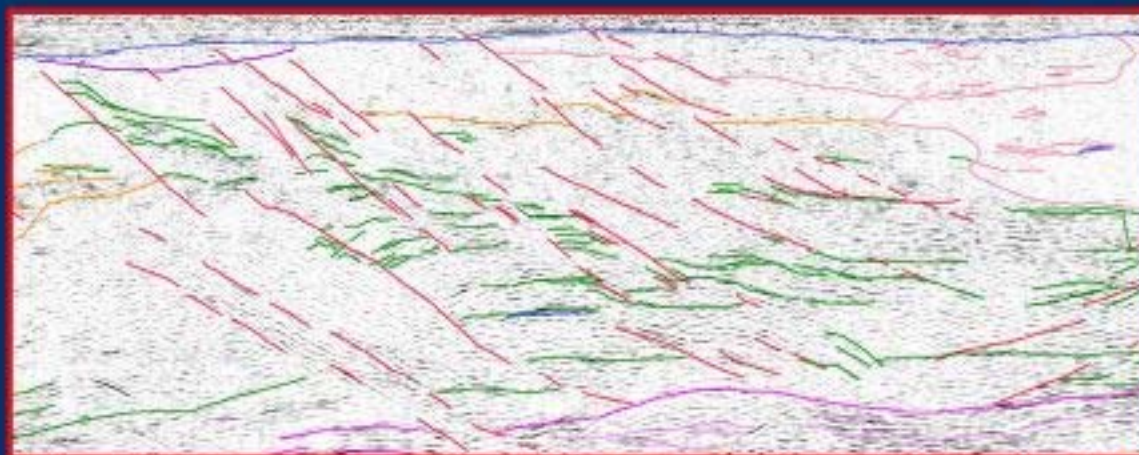
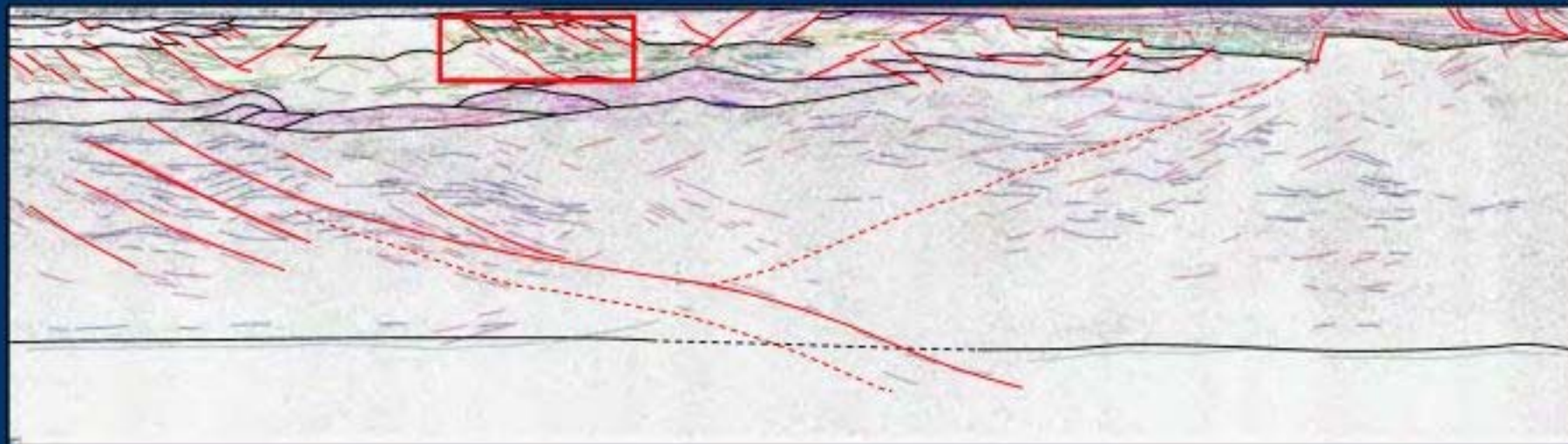




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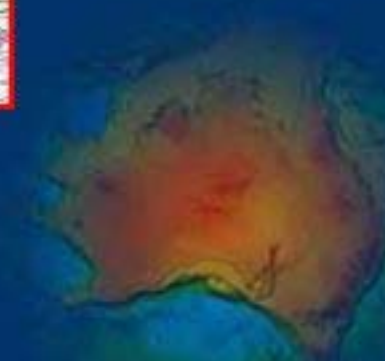
WIRRDA FAULT COMPLEX

N



50 km

Thrusts detaching on
mid-crustal layer

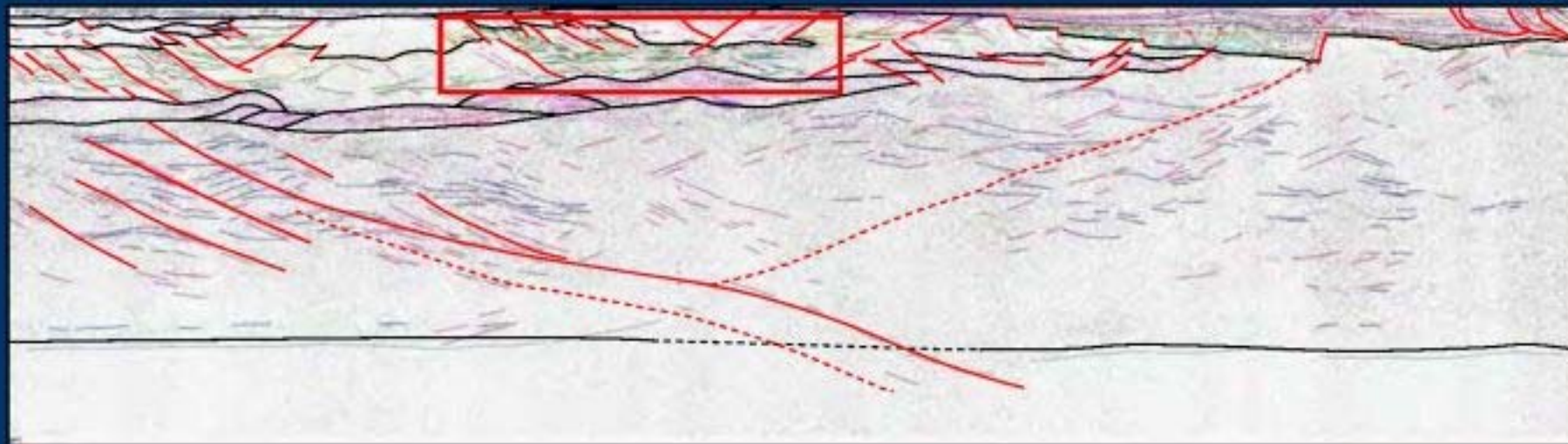




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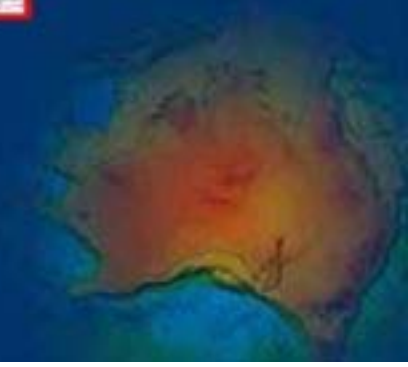
WIRRDA FAULT COMPLEX

N



50 km

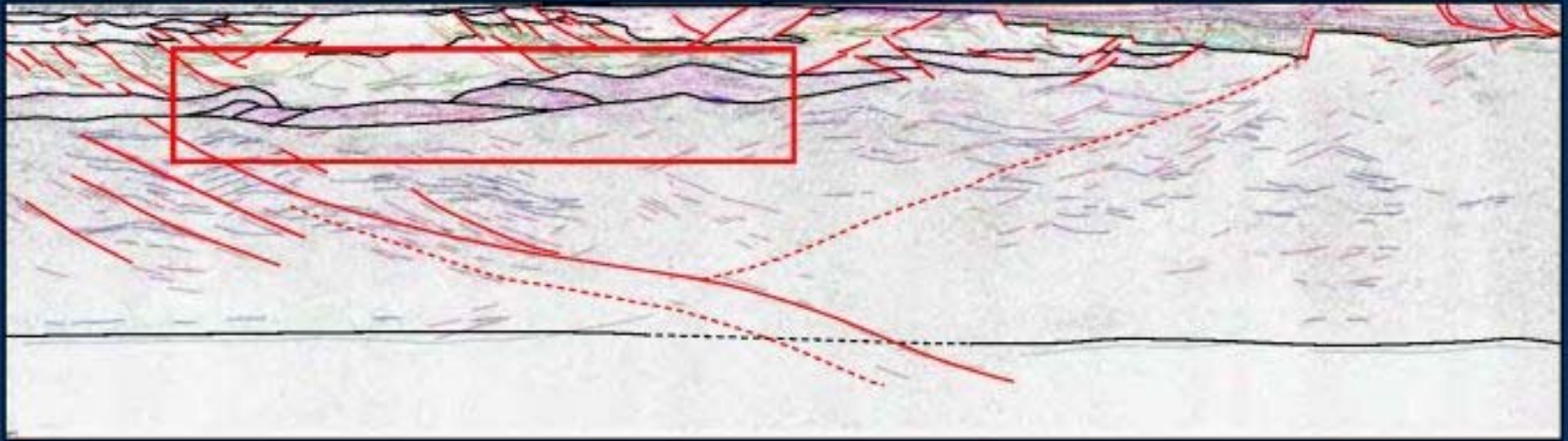
**Possible back-thrusts
cutting host granite of
Olympic Dam**



DUPLEXES IN MID-CRUSTAL LAYER

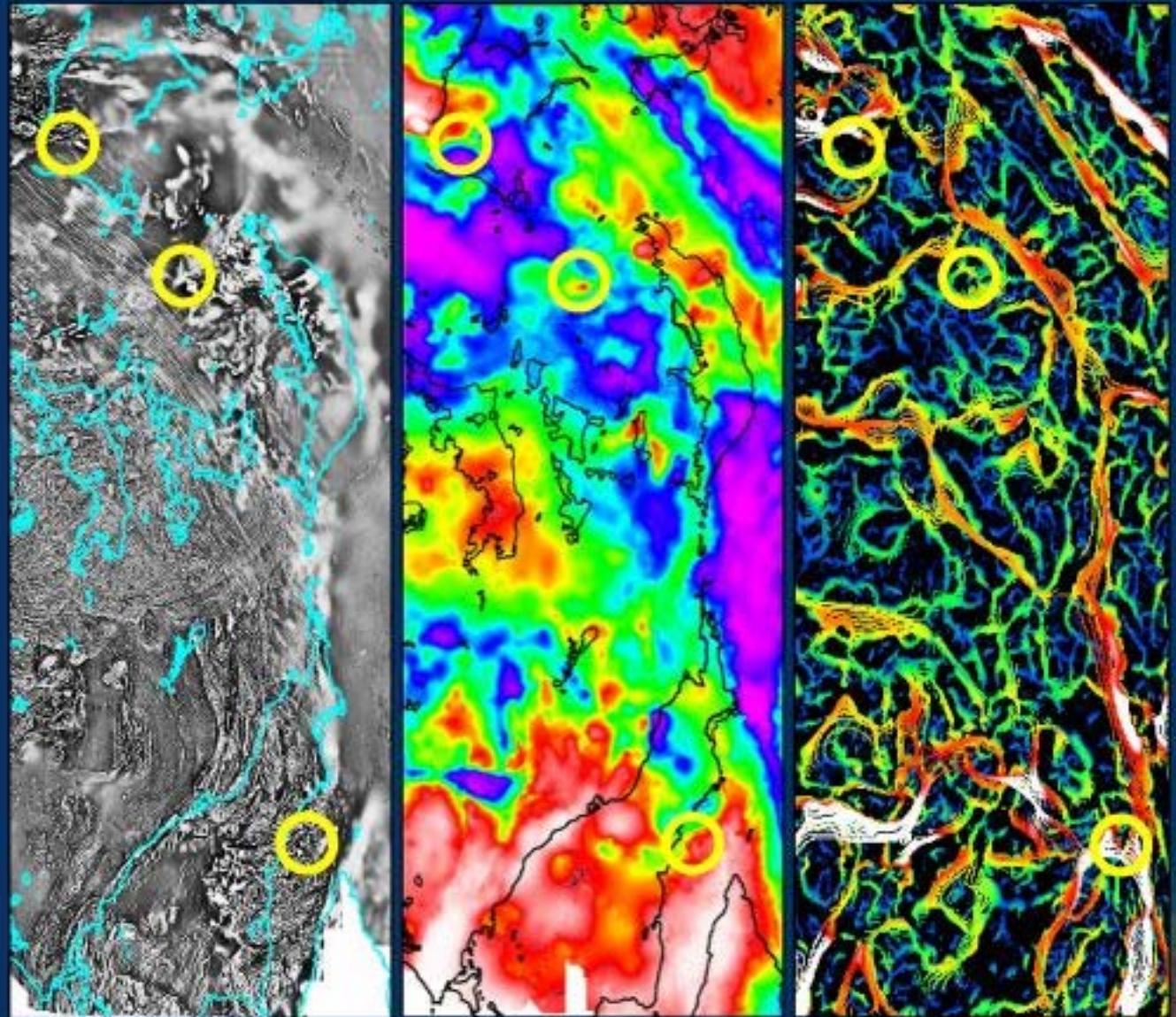
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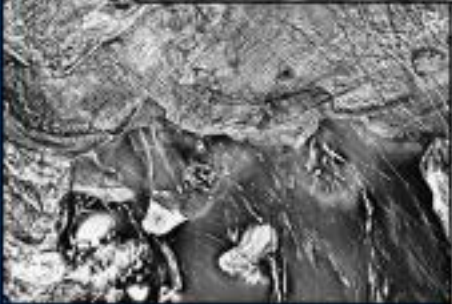
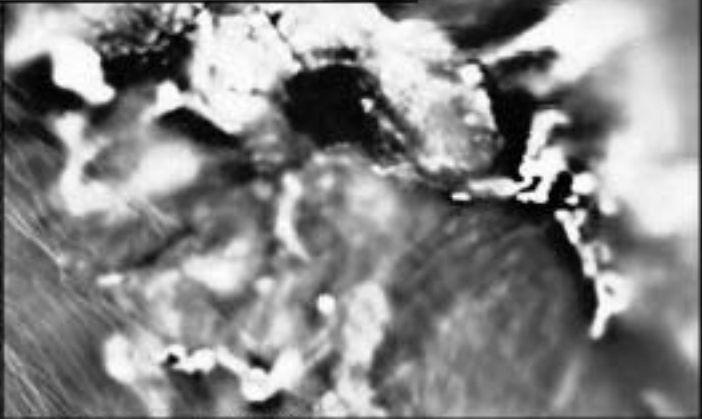
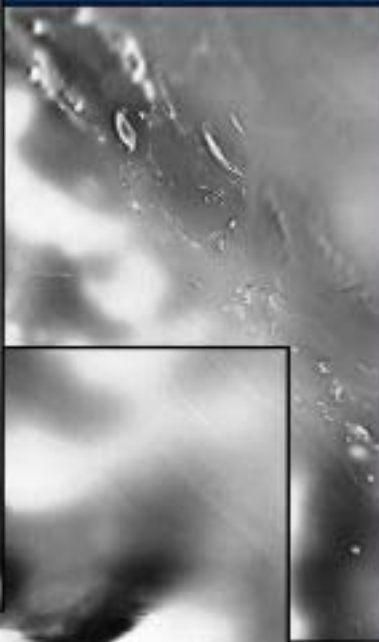
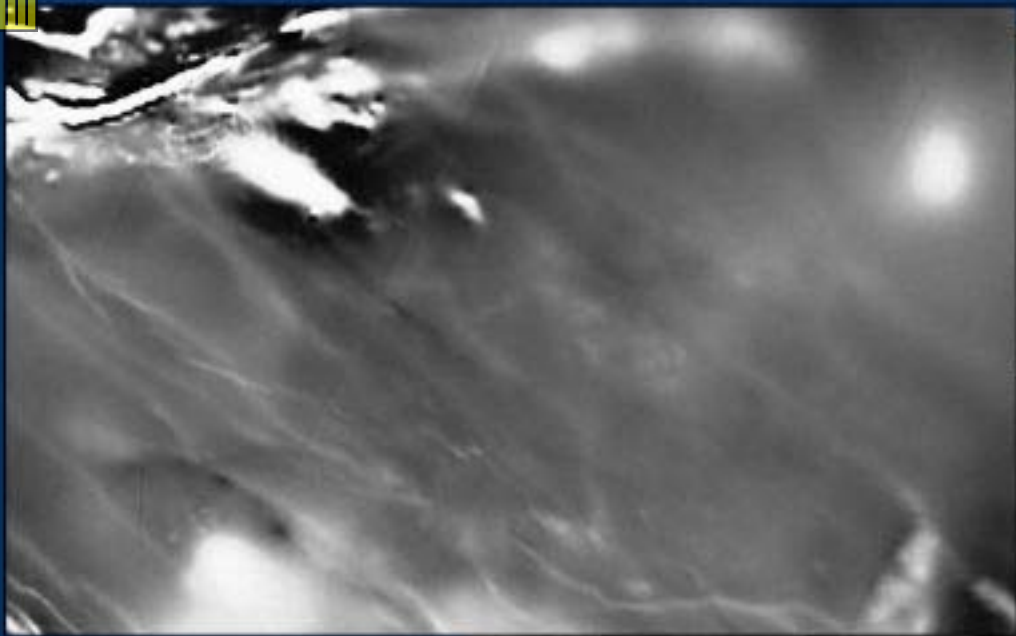
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50 km



MAGNETICS**GRAVITY****GRAV STRINGS****Prominent Hill****Olympic Dam****Moonta-Wallaroo****200 km**

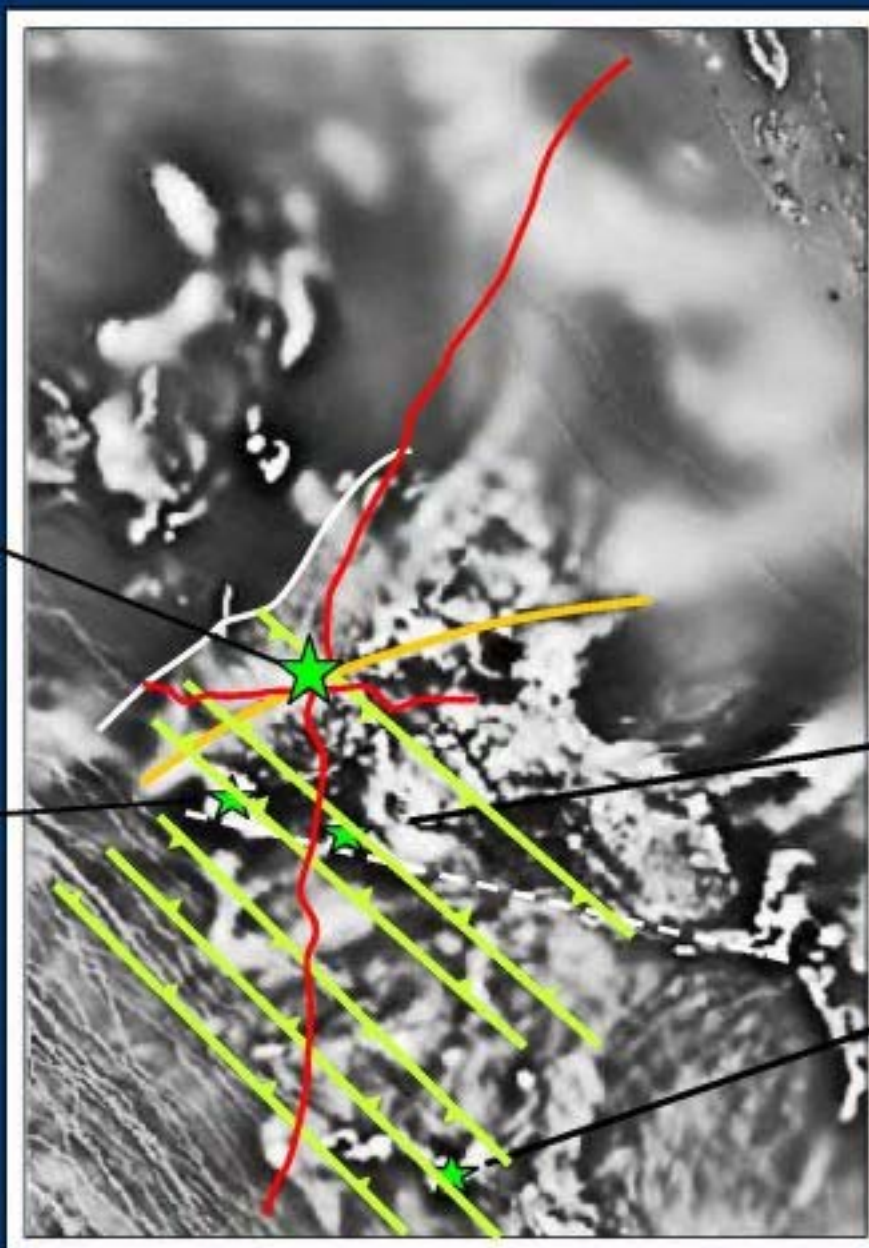


Olympic Dam

Acropolis

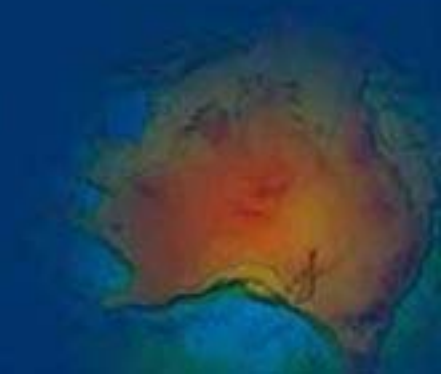
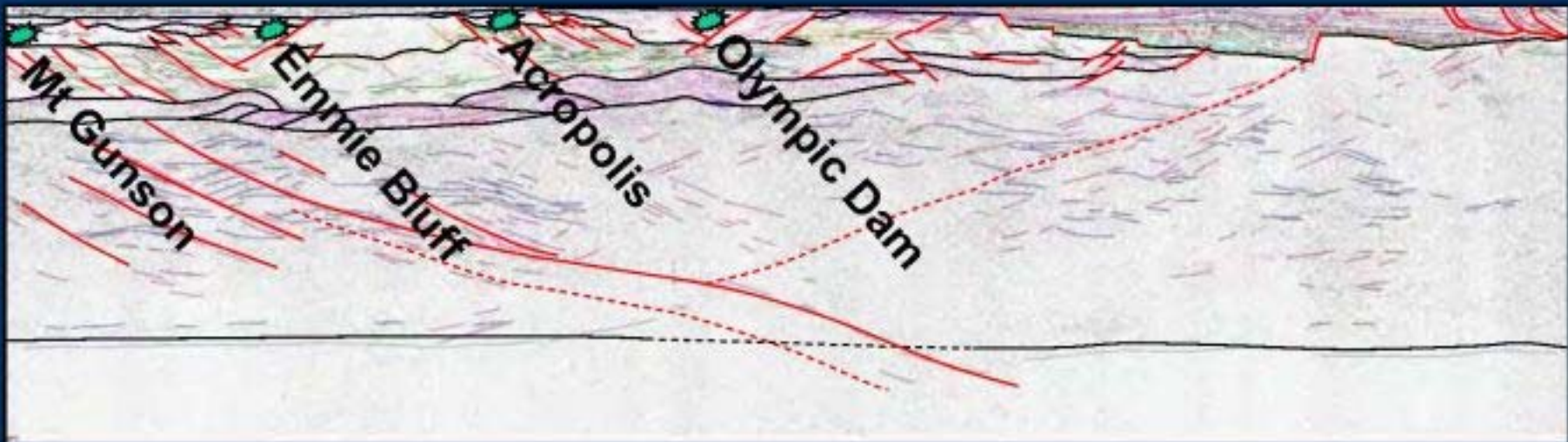
Wirrda Well

Emmie Bluff



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CONCLUSIONS

The Gawler seismic profiles show crustal structure, providing geometric and spatial constraints for interpreting other geophysical datasets

Locations of Fe oxide bodies are structurally controlled

The crustal structure derives from multiple events occurring from 2.5 Ga to 1.6 Ga

Fault geometry of the basement was formed by contractional deformation

No large mafic intrusions are imaged in the seismic sections

