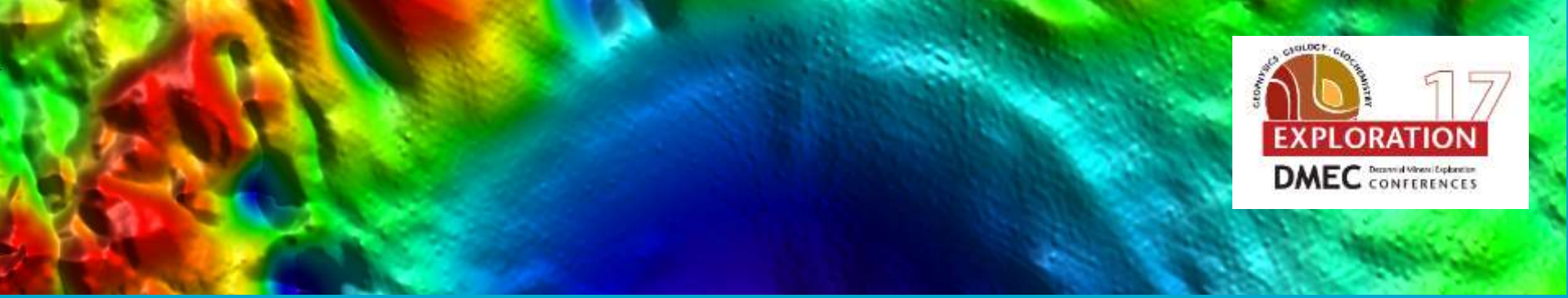


Mapping remanent magnetizations at regional scales

Clive Foss

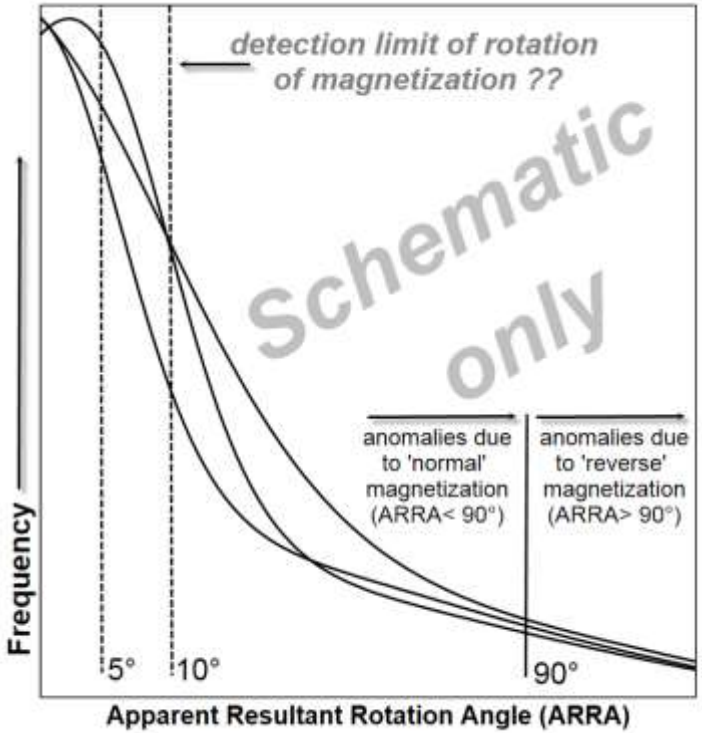
12 October 2017

CSIRO MINERAL RESOURCES
www.csiro.au

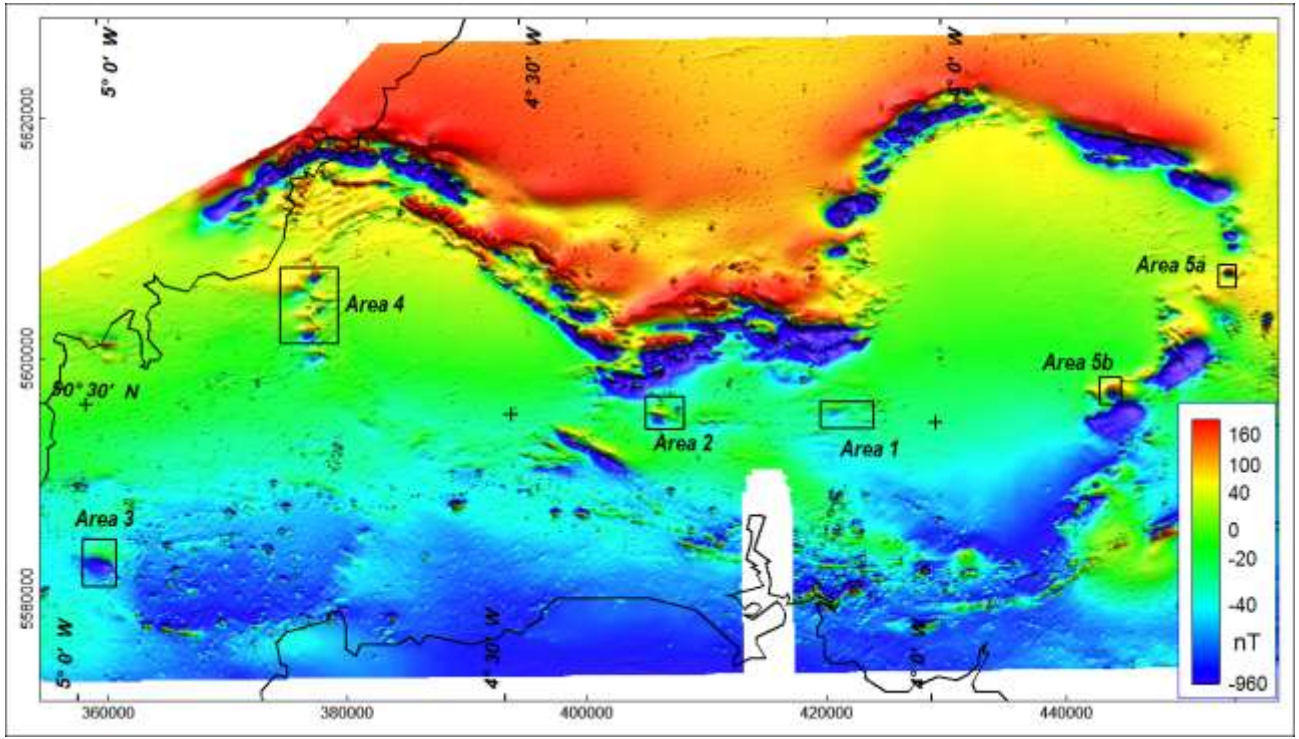
Outline

- Remanently magnetized magnetic anomaly sources
- Case study – remanence expression in magnetic field data in the Tellus SW survey, southwest England
- Australian remanent anomaly database
- Conclusions

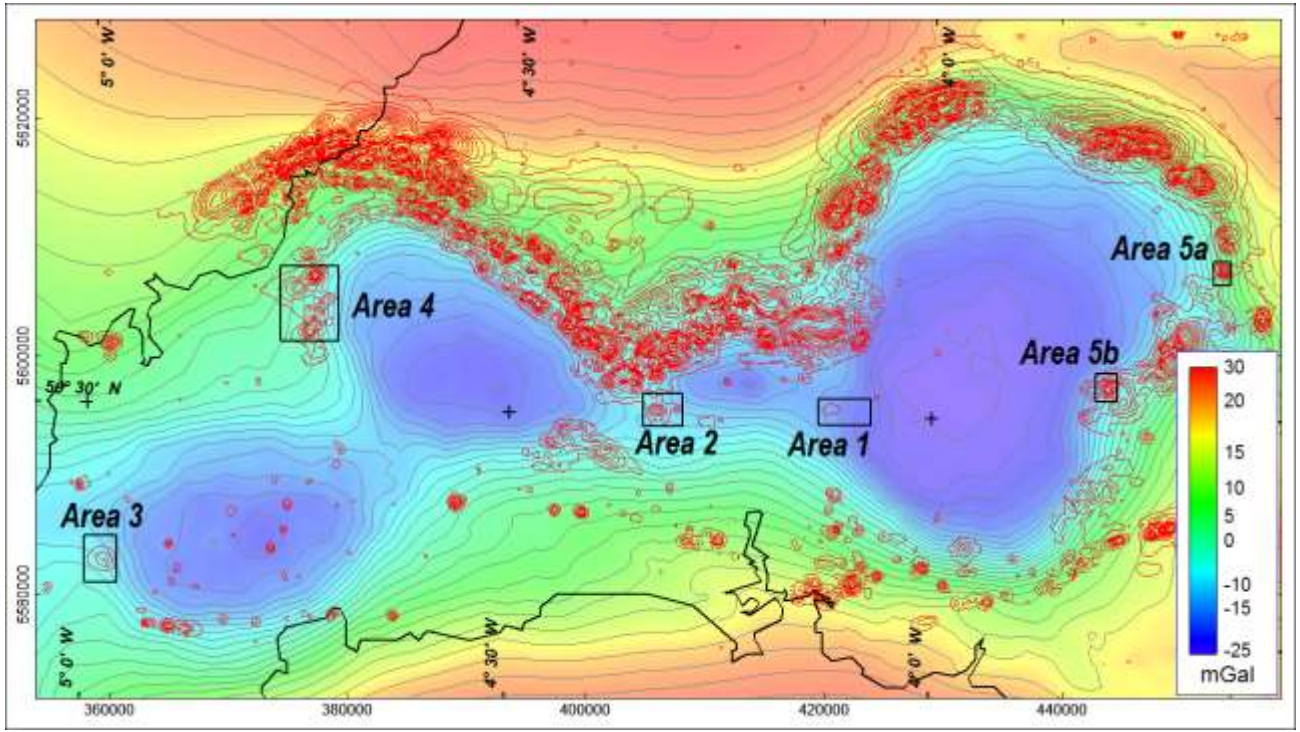
Anomaly Source Magnetization Directions



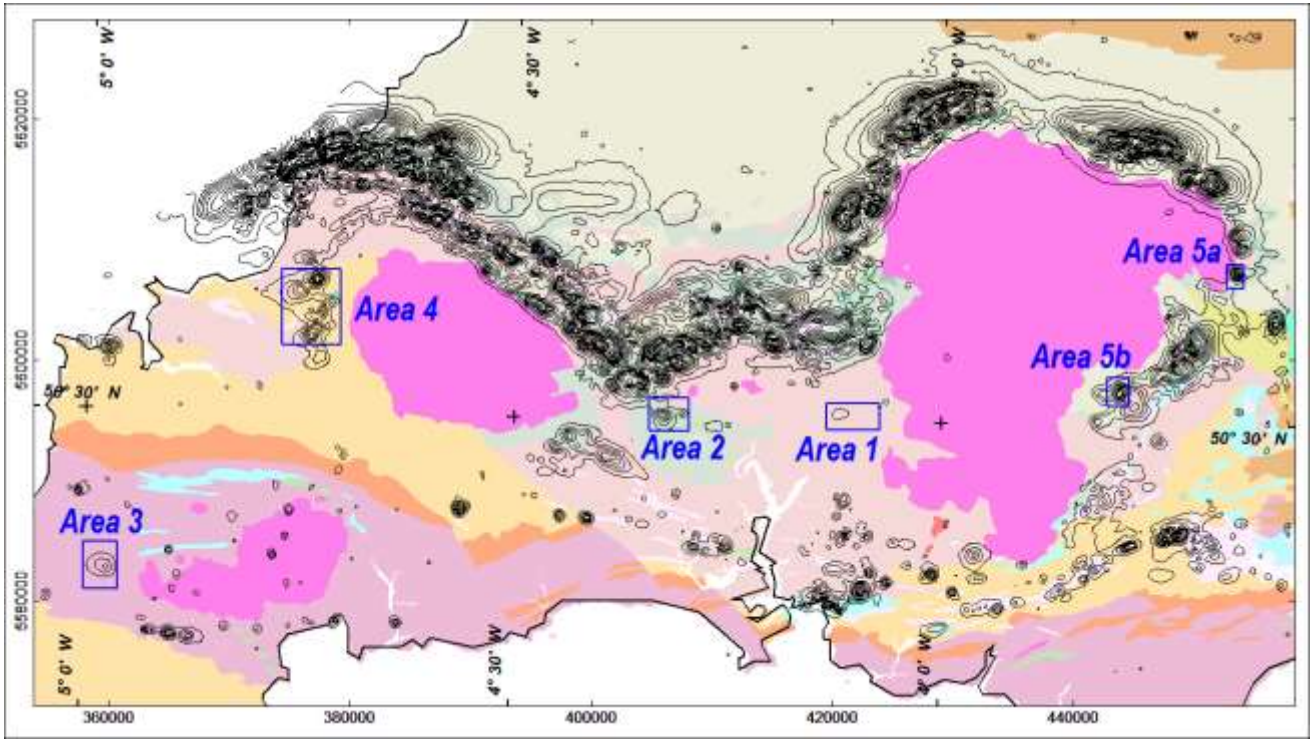
Tellus SW TMI



Total gradient of TMI contours on Bouguer Gravity

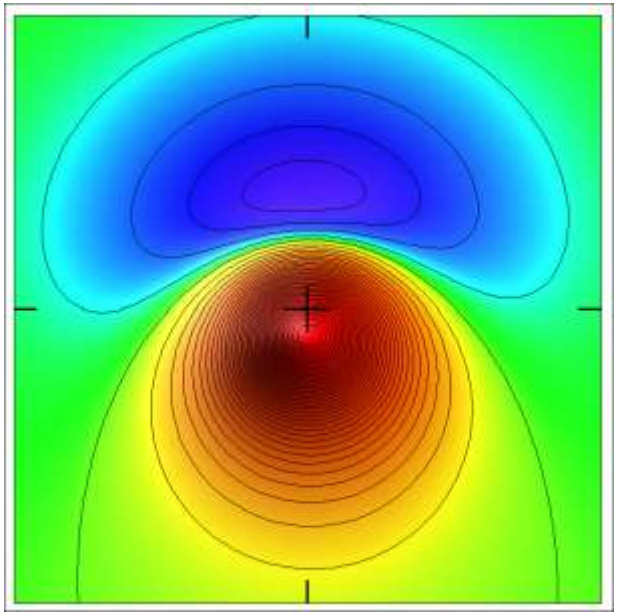


Total gradient of TMI contours over Geology

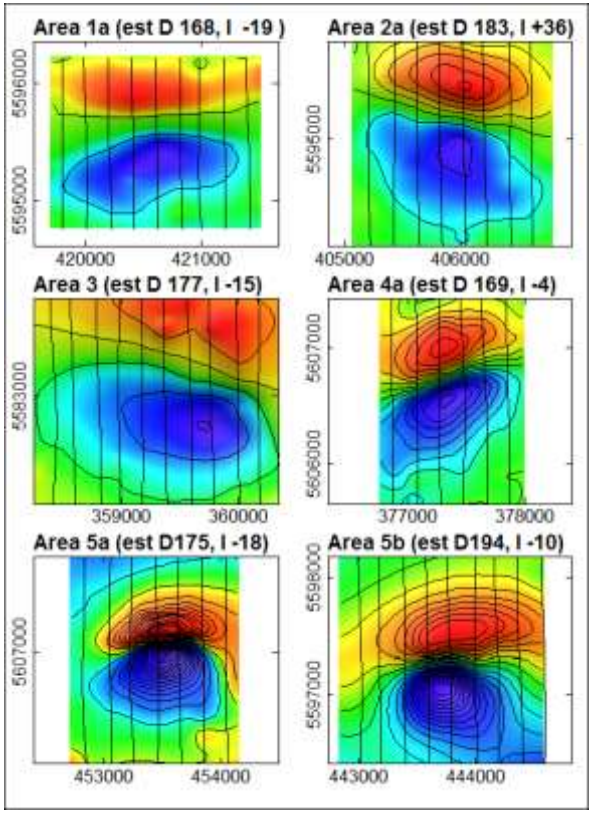


TMI maps

Induced anomaly

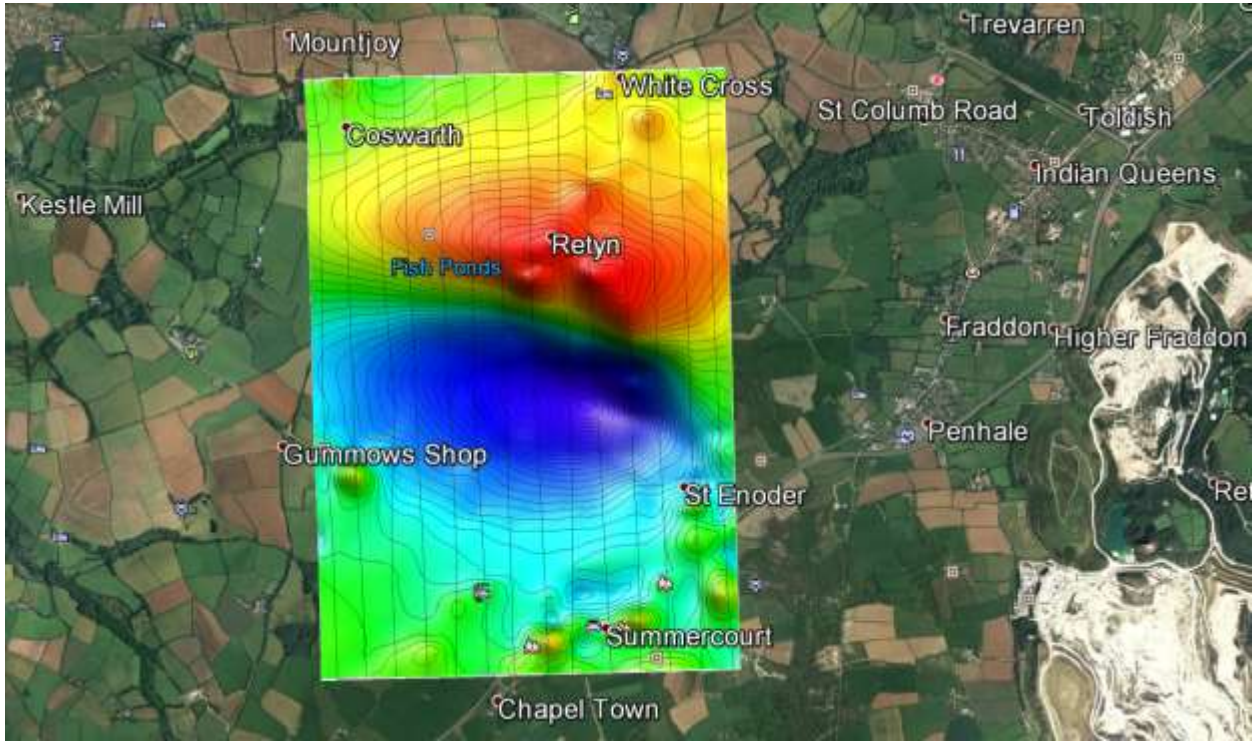


Selected anomalies due to reverse remanent magnetization

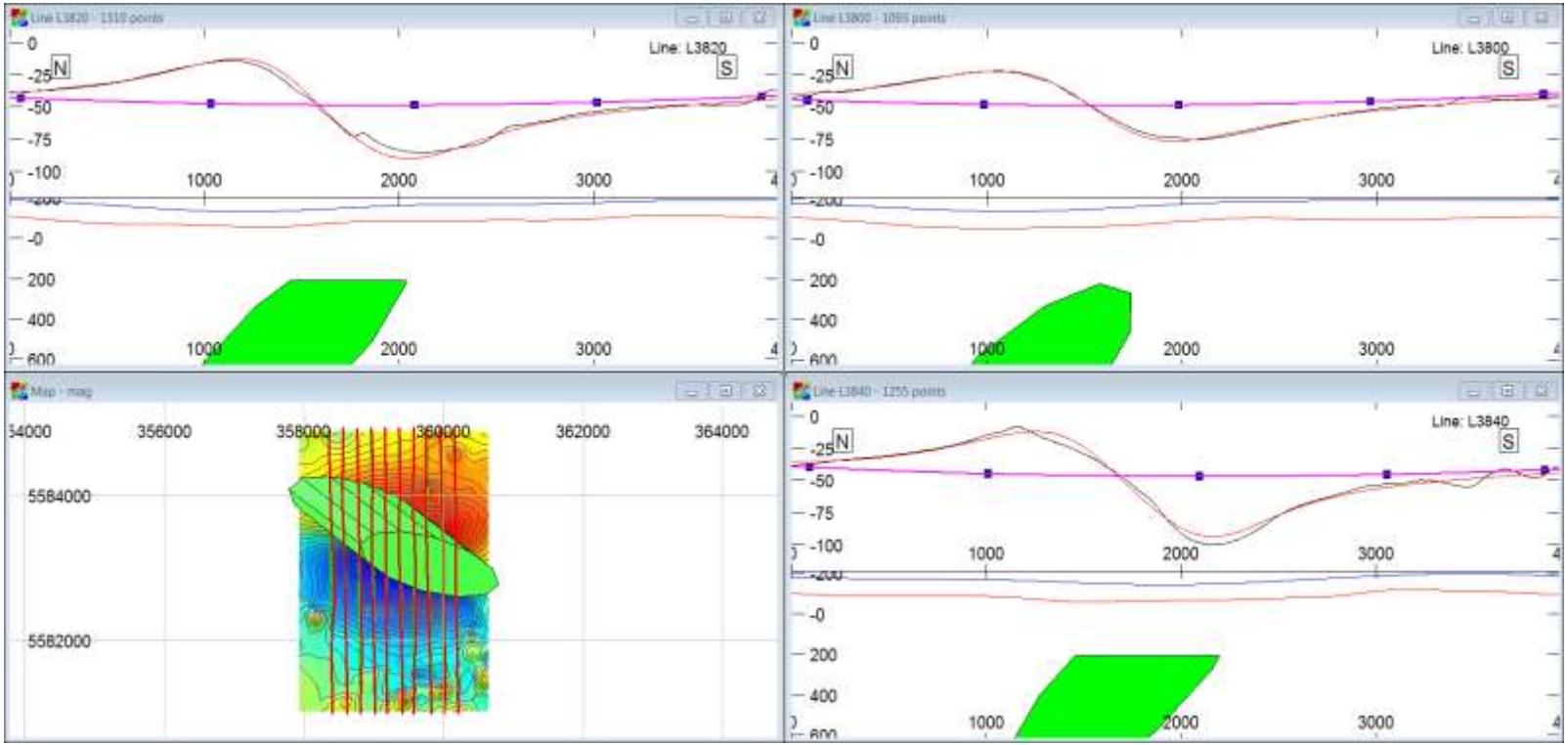


CSIRO

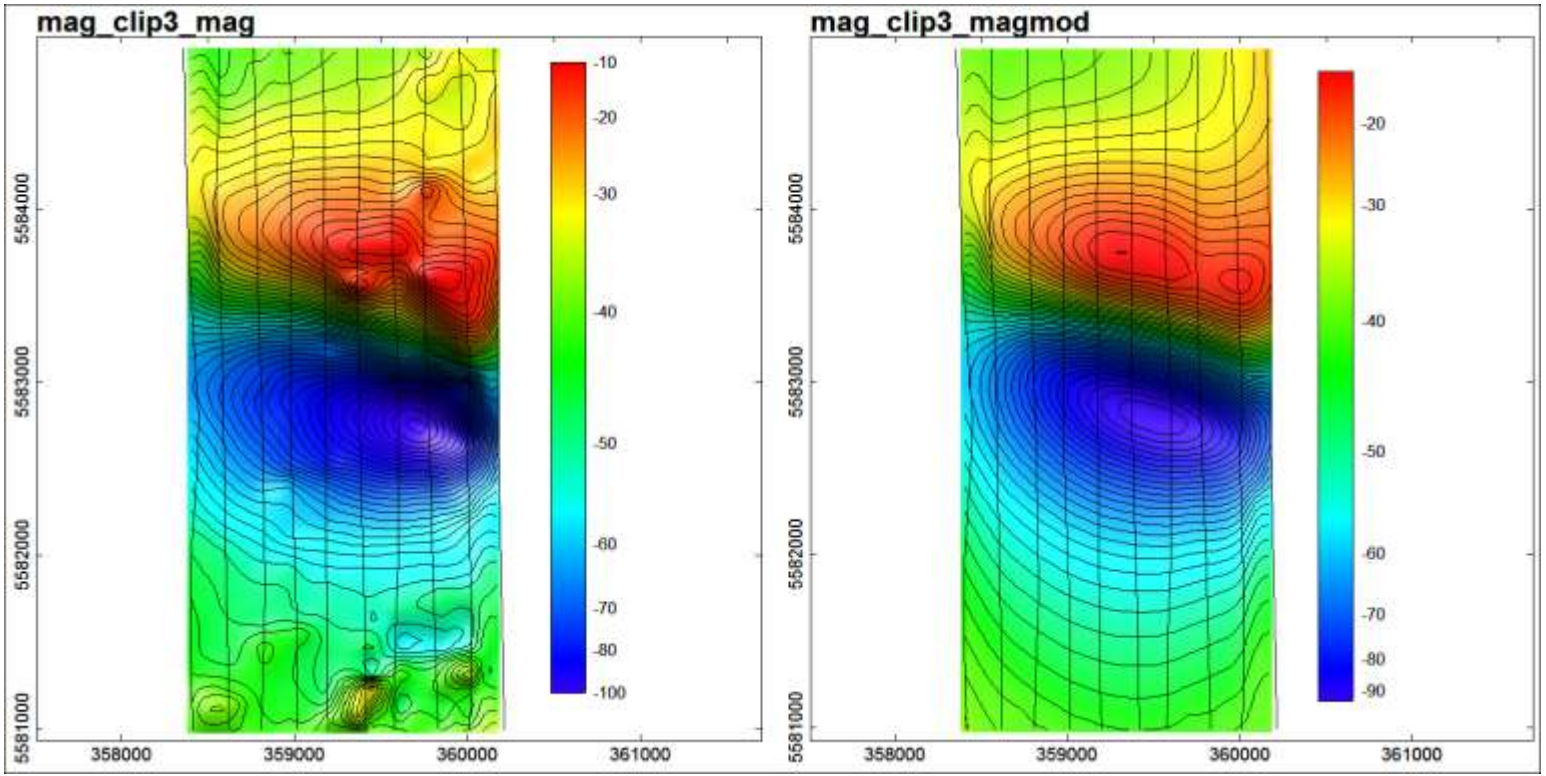
Area 3


Mountjoy
White Cross
Trevarren
St Columb Road
Coswarth
Toldish
Indian Queens
Kestle Mill
Retyn
Fish Ponds
Fraddon
Higher Fraddon
Penhale
Gummows Shop
St Enoder
Summercourt
Chapel Town

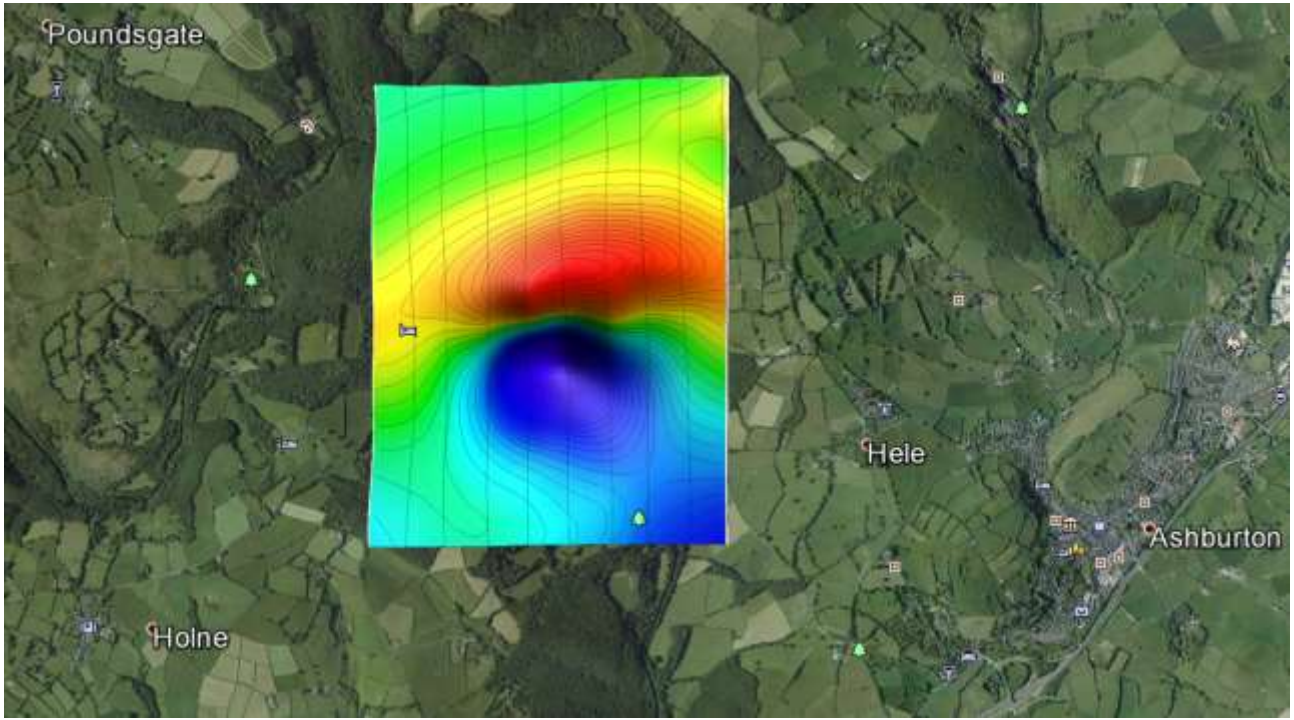
Area 3 example model sections



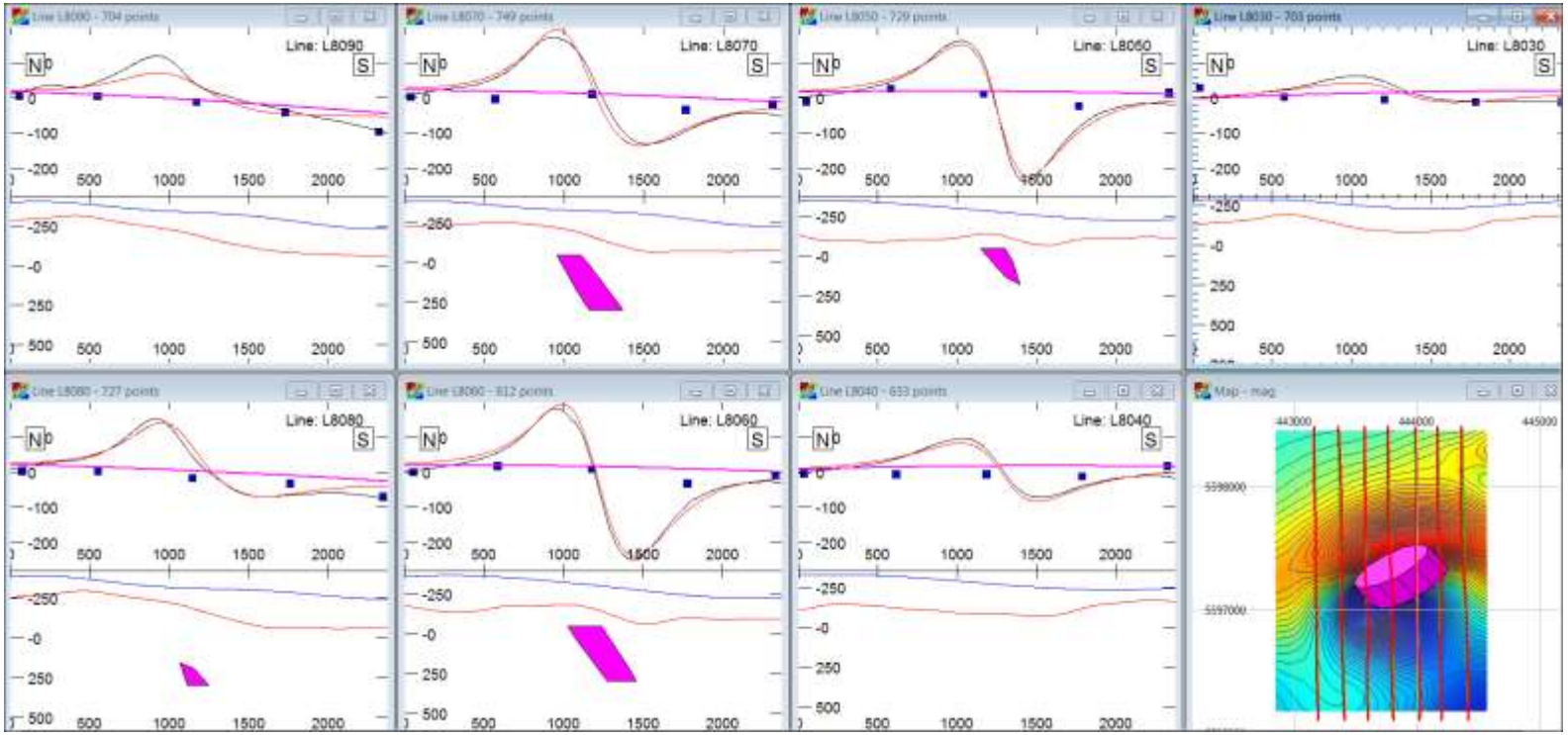
Area 3 measured and computed TMI



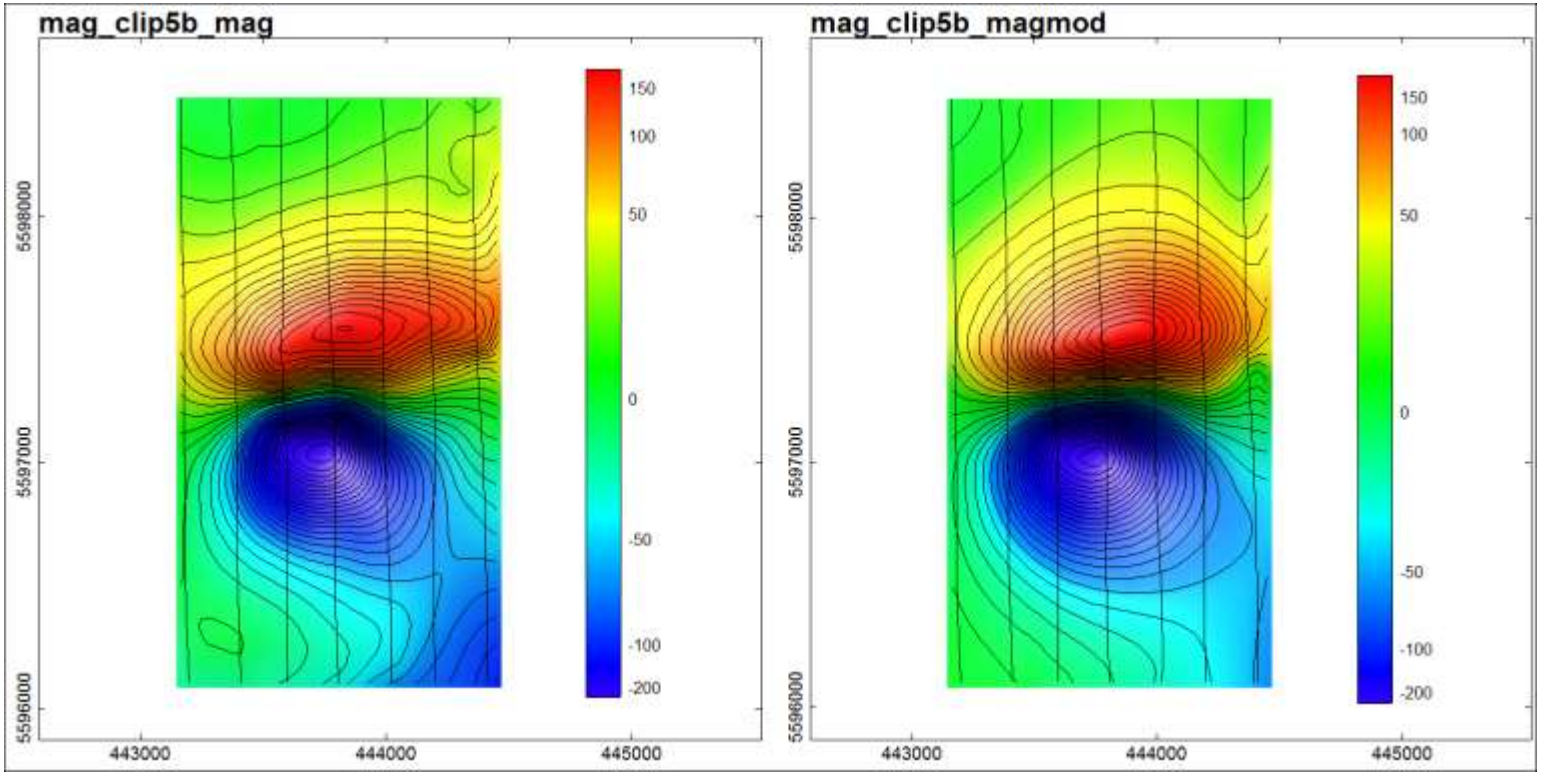
Area 5b



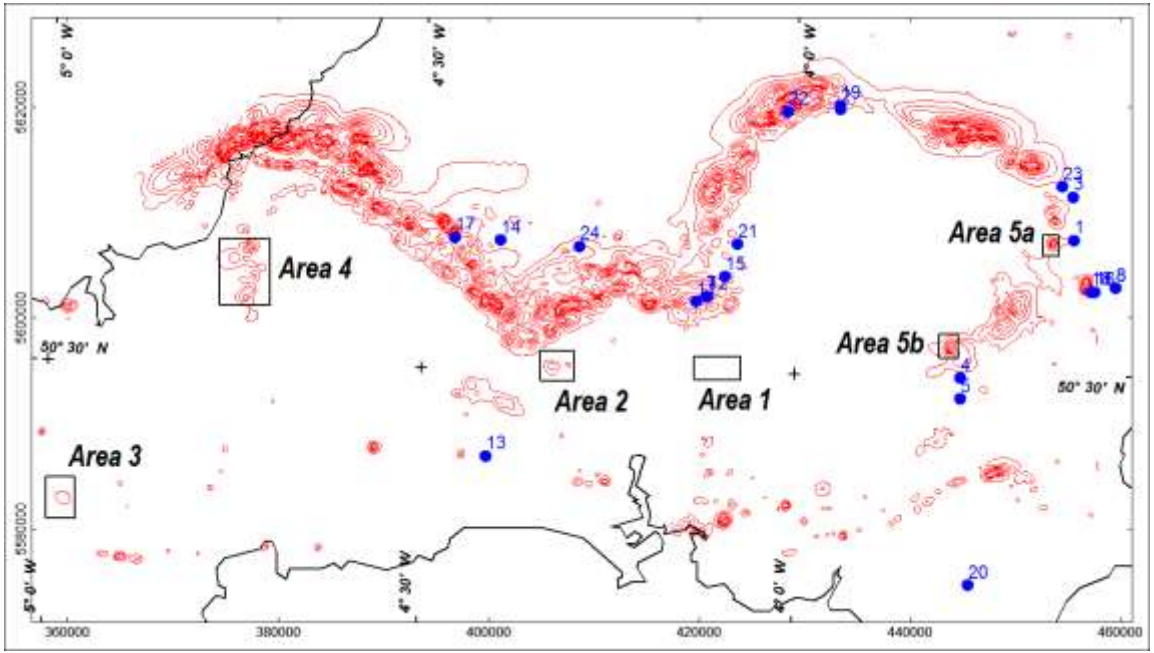
Area 5b example model sections



Area 5b measured and computed TMI



Total gradient of TMI contours (red) with palaeomagnetic sample sites (blue)

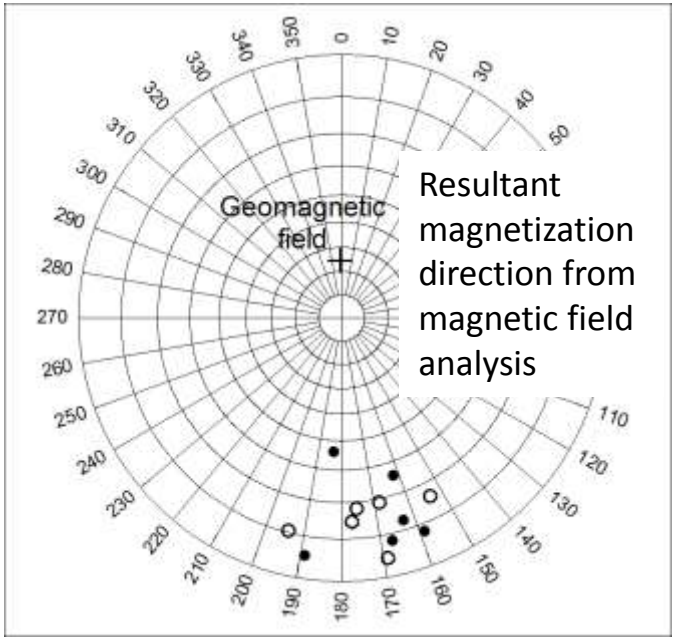


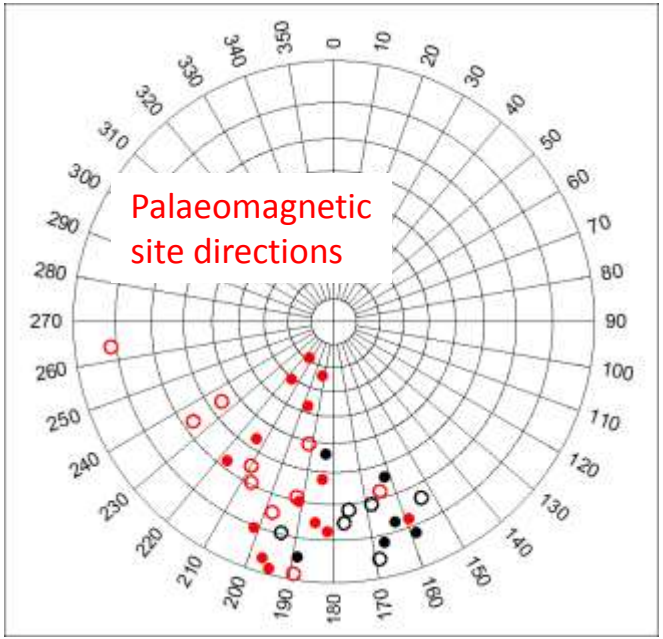
Creer, K.M., 1966, Palaeomagnetic studies on basic dykes and sills from S.W. England, Geophys, J. R. astr. Soc., 11, 415-422

Resultant Magnetizations from TMI Inversions and Remanent Magnetizations from Palaeomagnetism

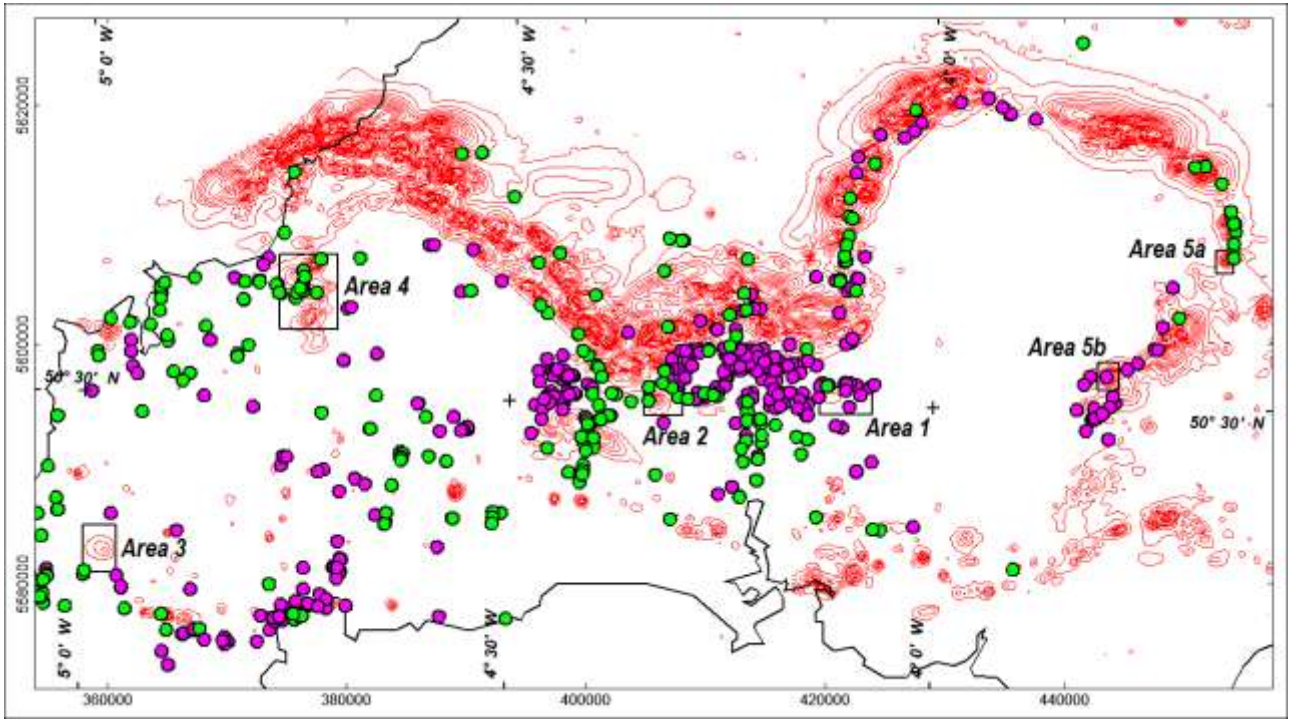
Filled symbols
+ve inclination

Open symbols
-ve inclination





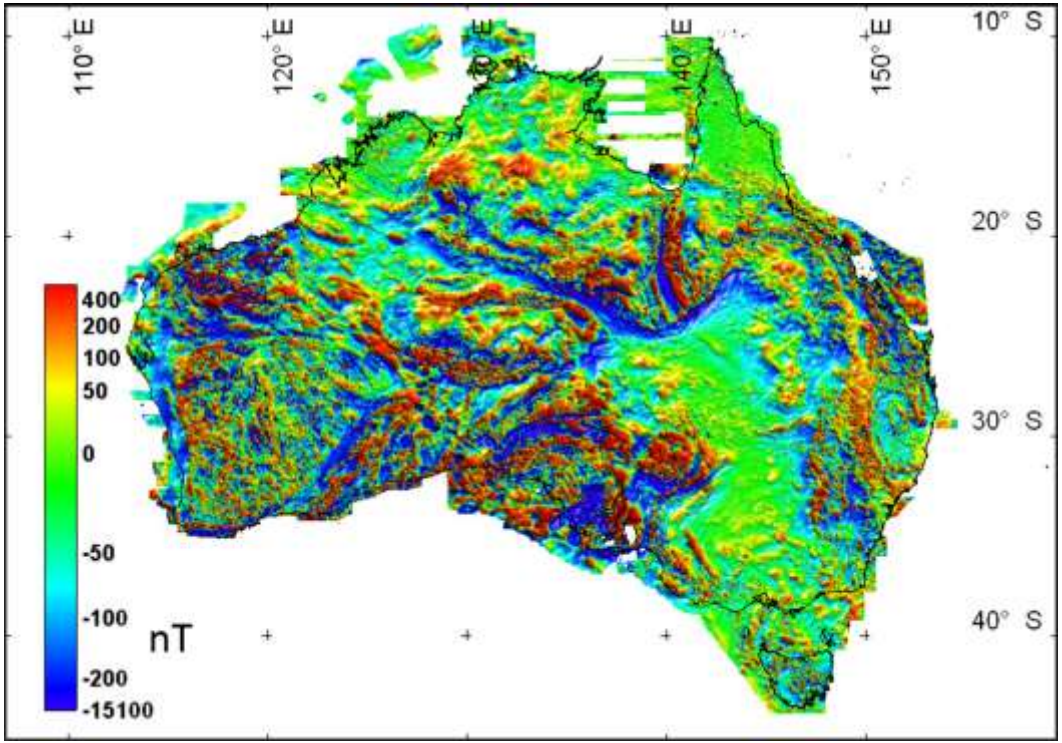
Total gradient contours with selected mine sites



- Lead mines
- Copper mines

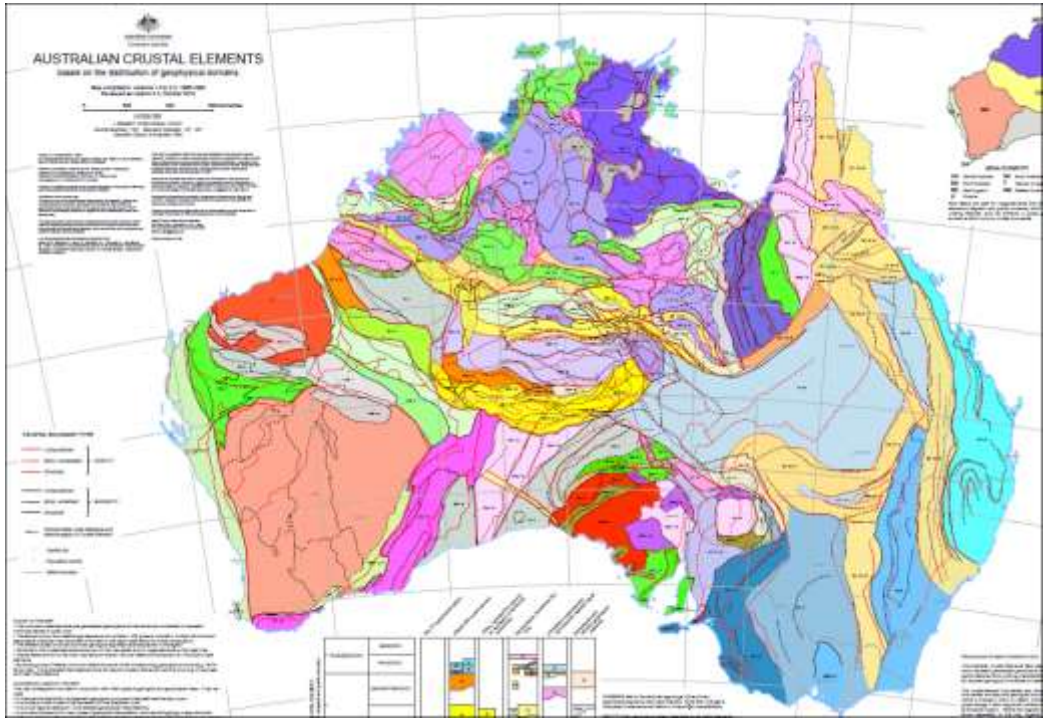
I would like to thank Mike Gill, recorder of the Northern Mine Research Society http://http//www.nmrs.org.uk/ for supply of the Devon and Cornwall mine location database.

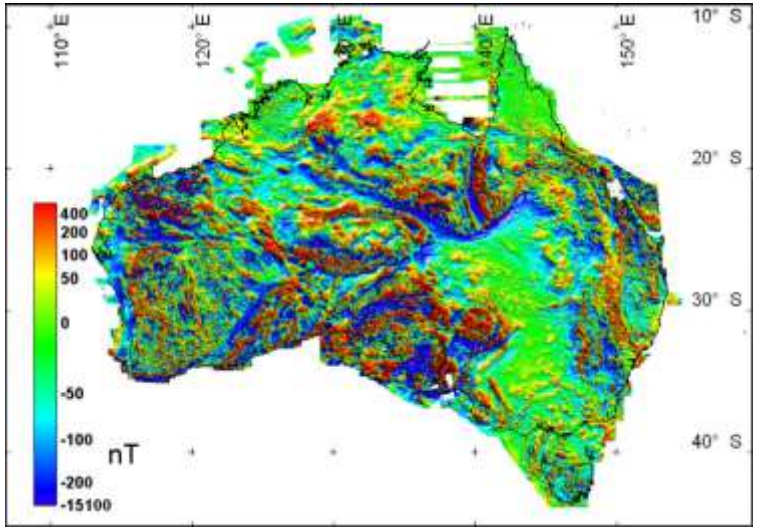
TMI Image of Australia



Data courtesy of Geoscience Australia

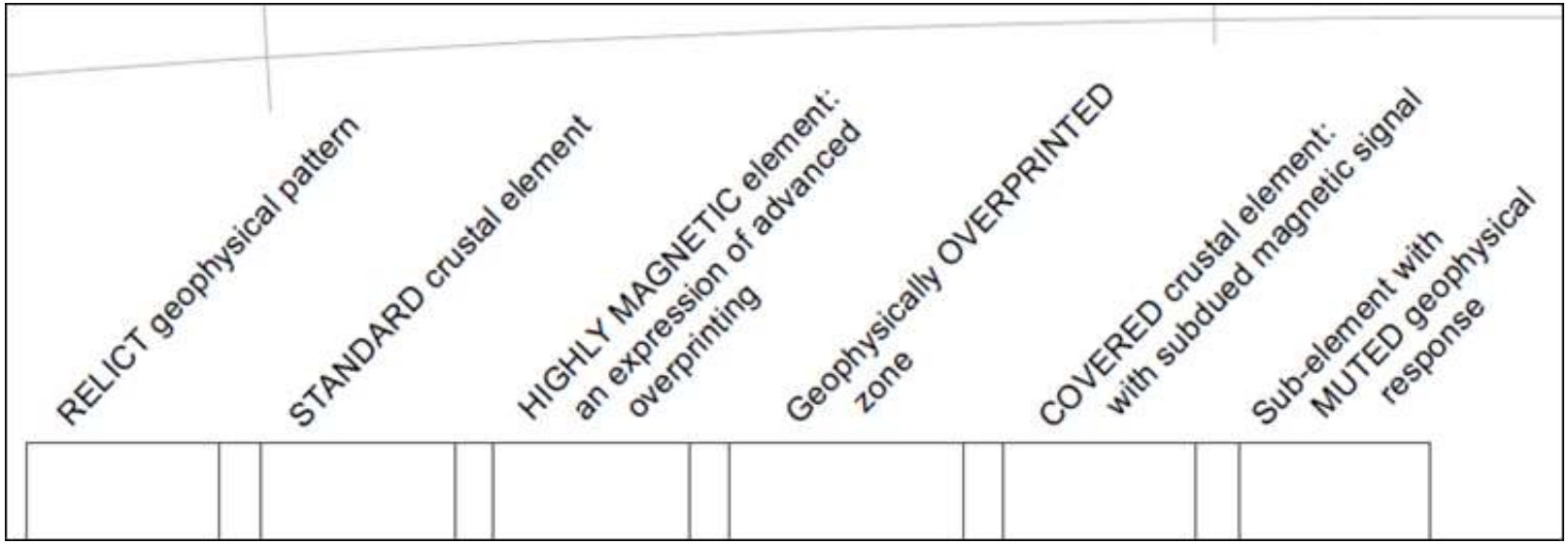
Australian Crustal Elements Map





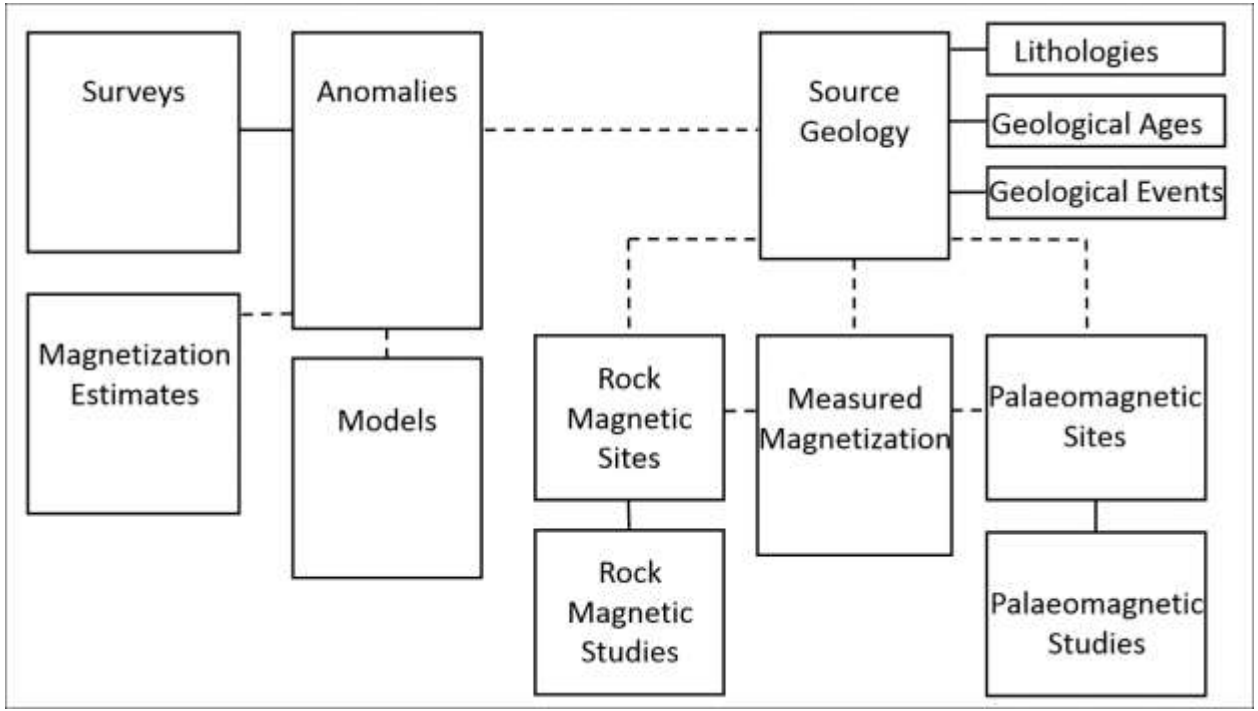
Data courtesy of
Geoscience Australia

Australian Lithology Classification

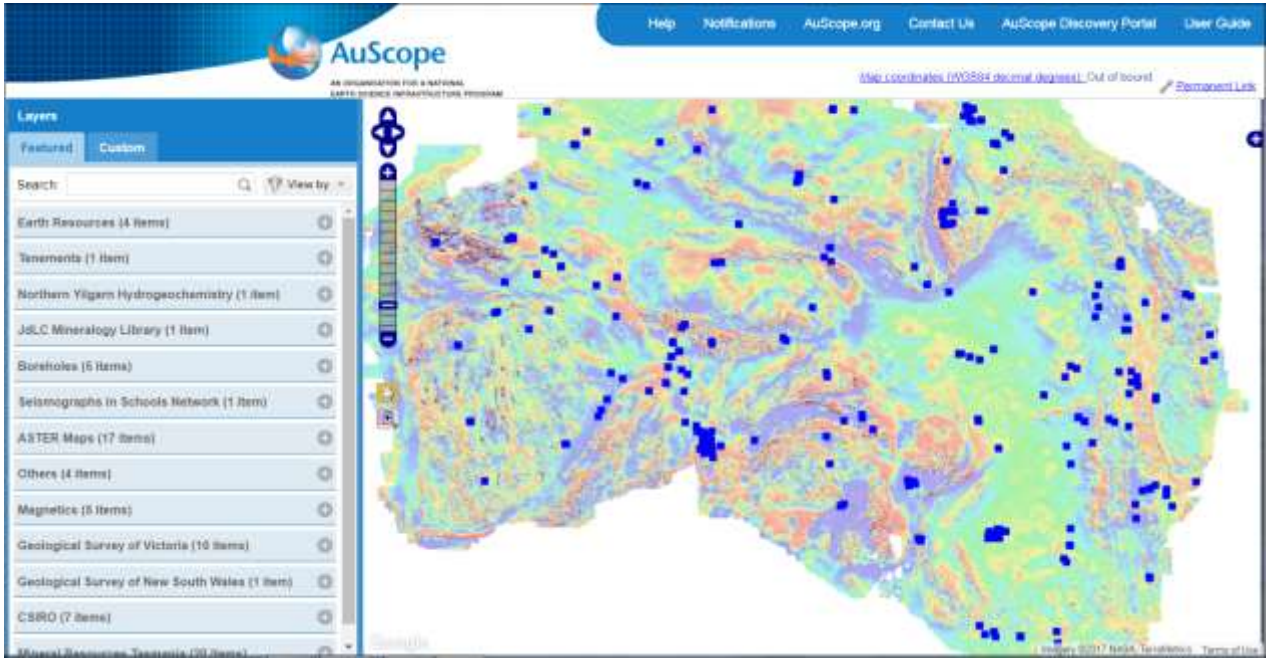


Data courtesy of Geoscience Australia

Remanent Anomalies Database Structure

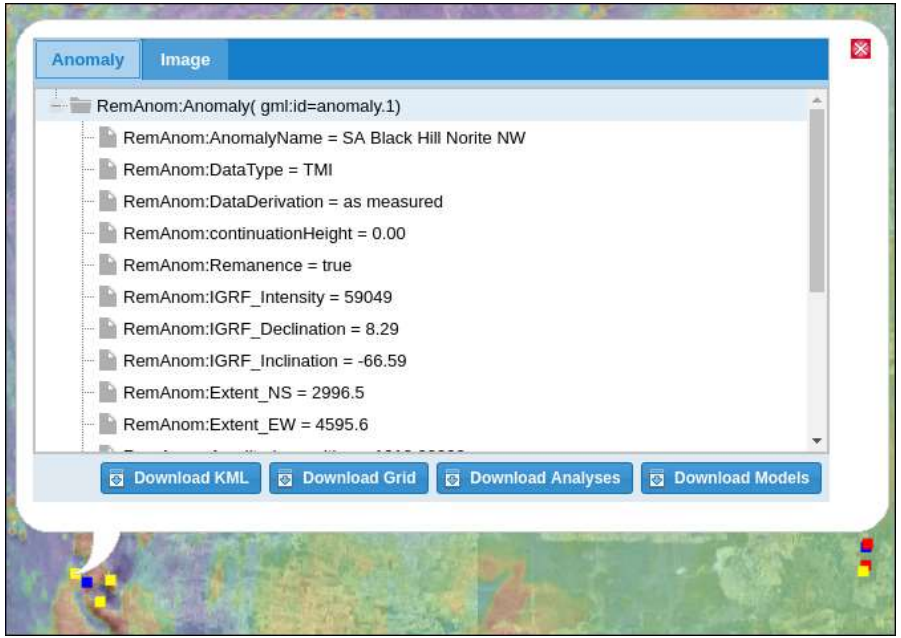


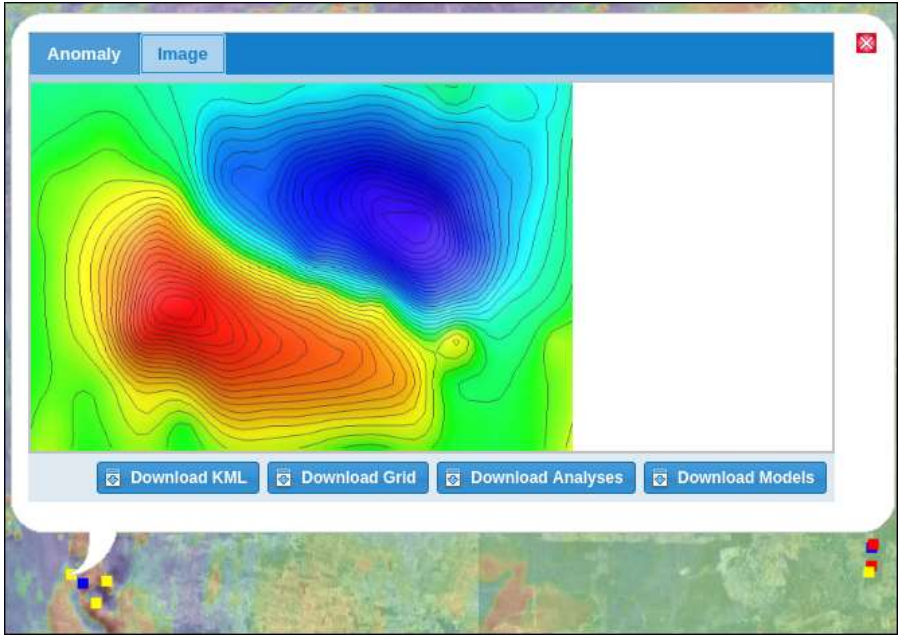
Australian Remanent Anomalies Database



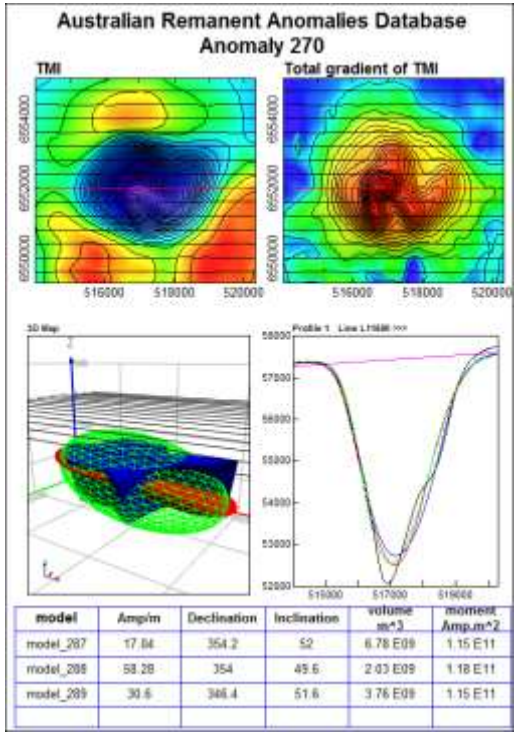
https://confluence.csiro.au/display/cmfr/Home

Database Interrogation





Anomaly Database Download

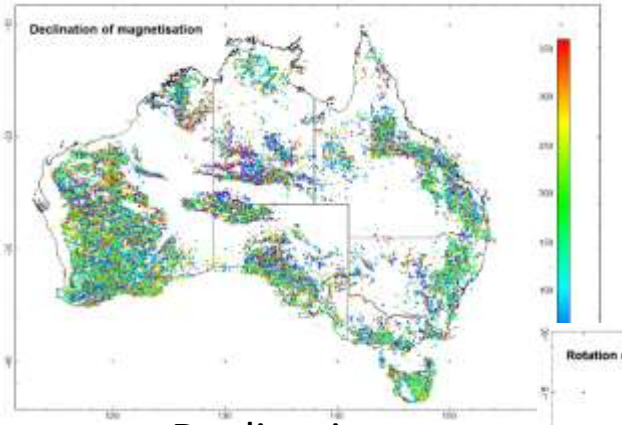


Database entries require only that an anomaly is located and attributed to a survey

Anomalies can be attributed with magnetization direction by analytic methods or inversion

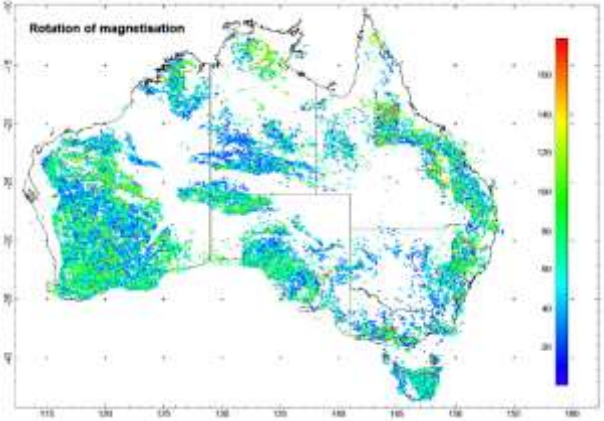
Inversion models can be made available for download (in zip files – allowing versatile formats)

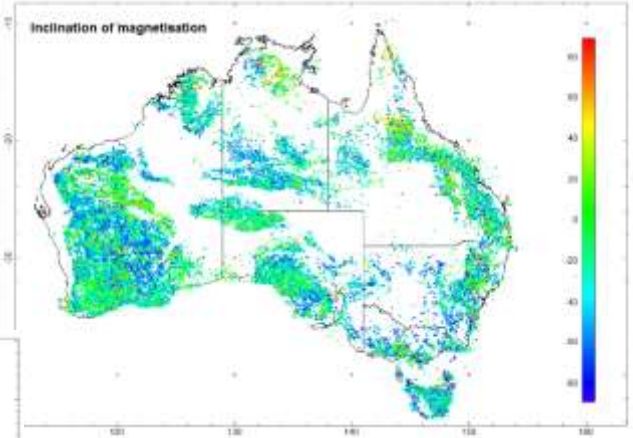
Automated Regional Source Mapping



Declination

ARRA





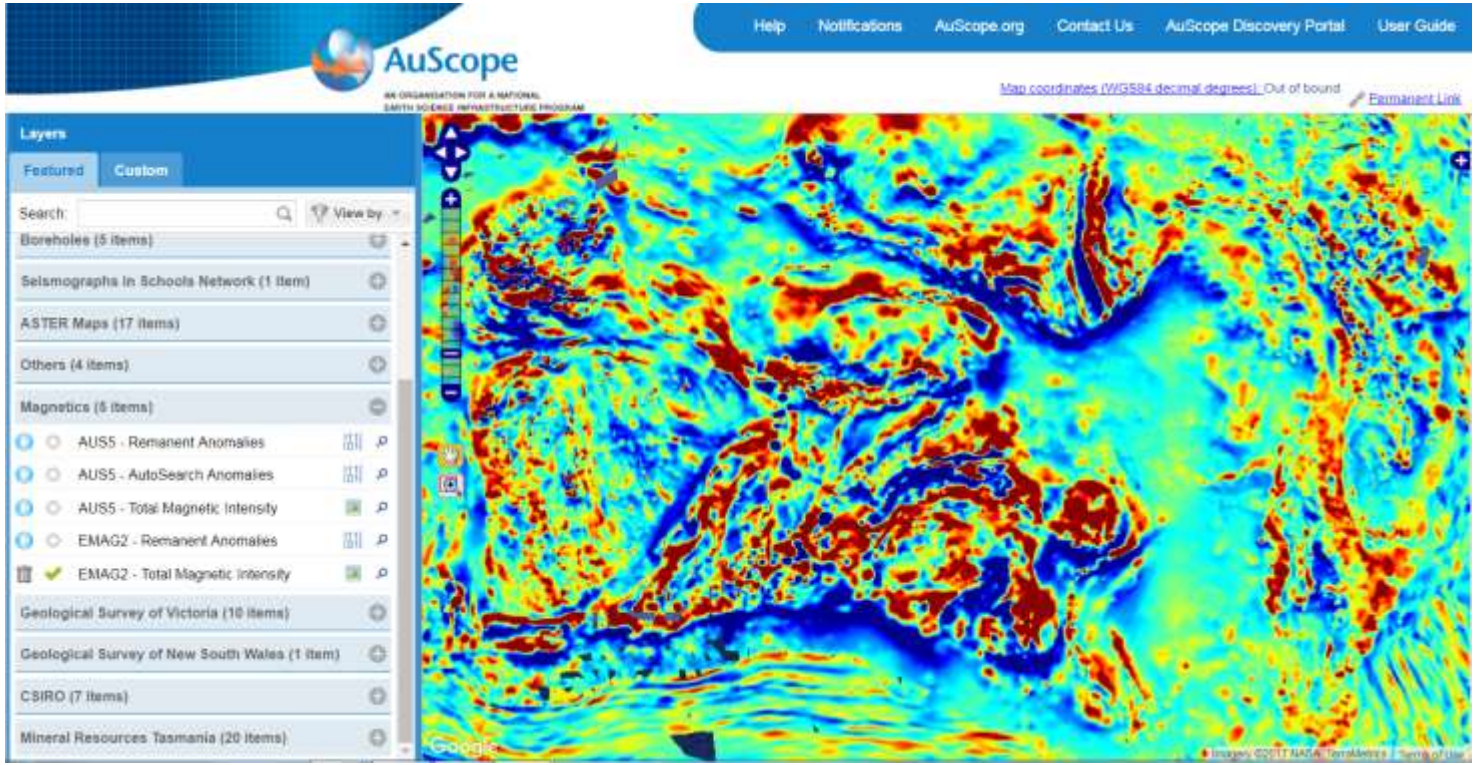
Inclination

Mapping by Dean Hillan

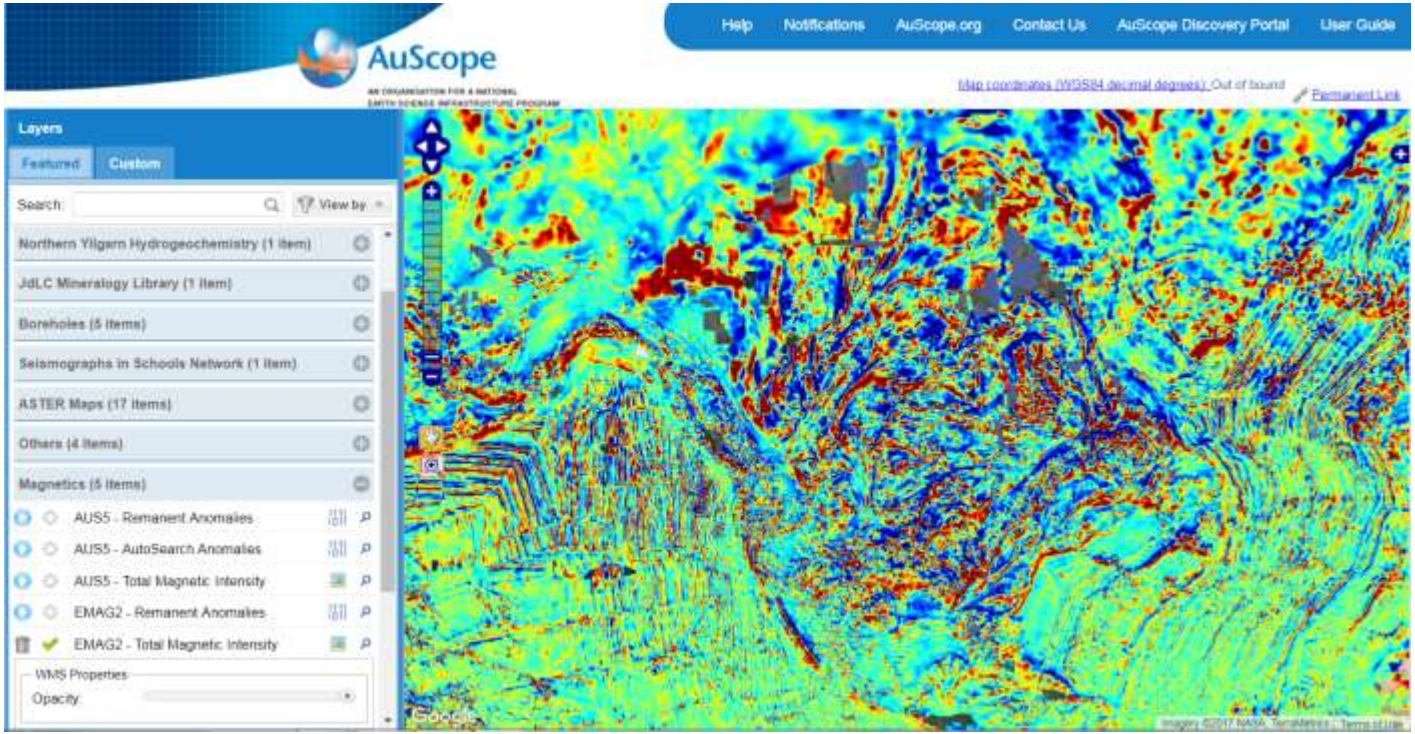
Conclusions

- Mapping distribution of magnetizations can assist geological mapping and mineral exploration
- Magnetization mapping can be conducted at continental (and global) scales

EMAG2 Australia



EMAG2 North America



Thank you

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