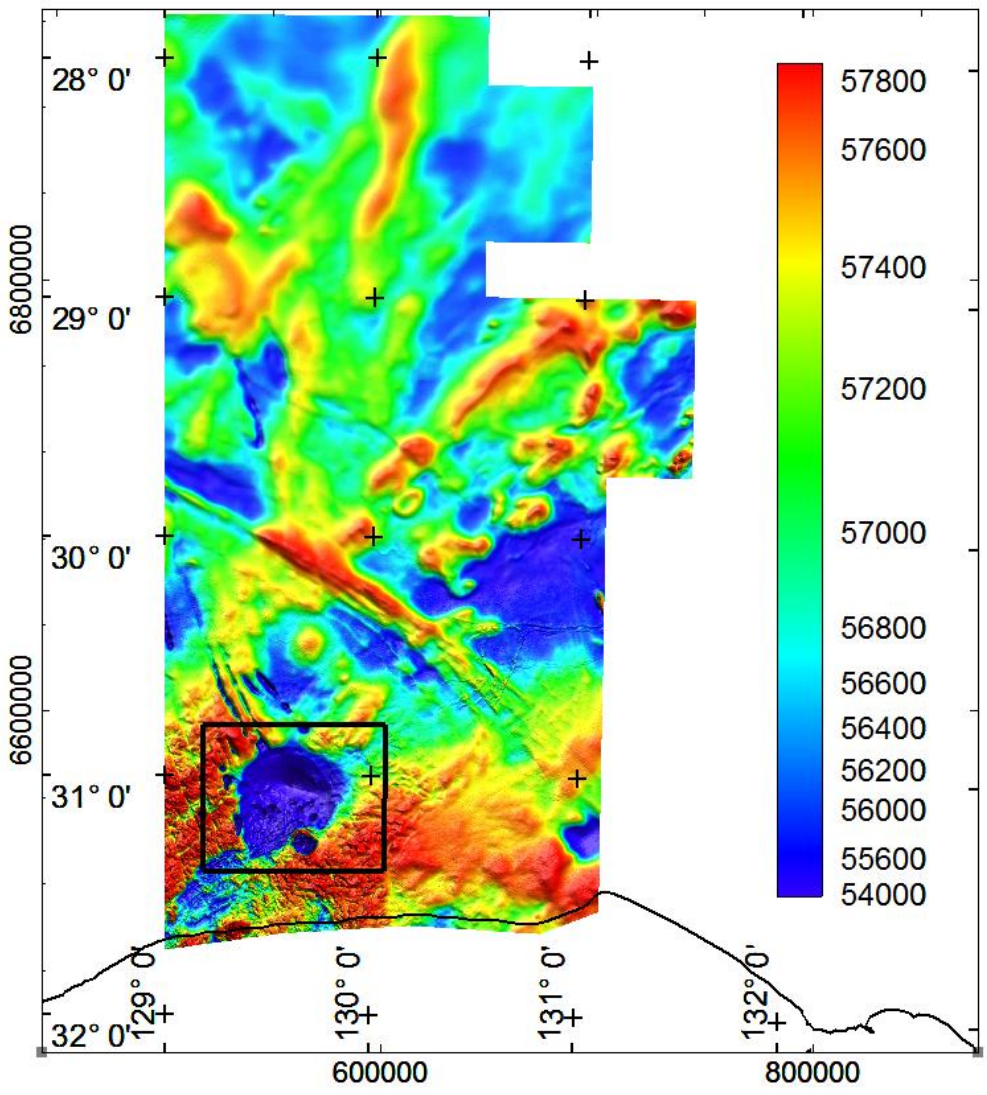
Investigation of the Coompana negative magnetic anomaly in southwestern South Australia

Clive Foss[1], Gary Reed[2], Philip Heath[2], Rian Dutch[2] and Tom Wise[2]

1) *CSIRO Mineral Resources*
2) *Geological Survey of South Australia*

2015 Coompana Airborne Magnetic and Radiometric Survey



Terrain clearance 80m

Lines east-west

Spacing 400m (infill 200m)

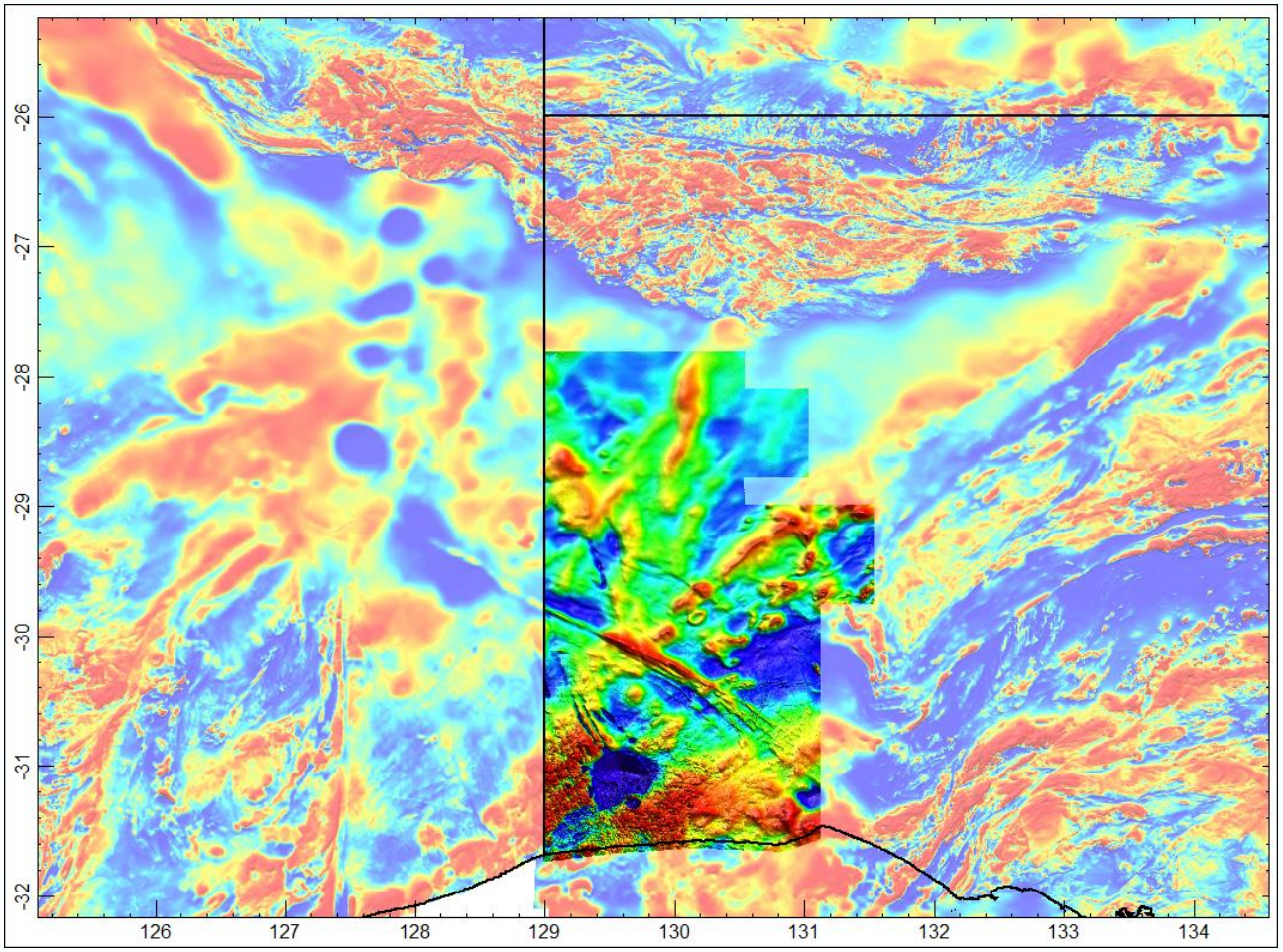
Government of South Australia
Department of State Development

CSIRO

Remanent magnetization

- Ferromagnetic rocks carry induced magnetization due to their magnetic susceptibility plus a remanent magnetization
- The relative strength of remanent to induced magnetization (Q factor or Koenigsberger ratio) is poorly predictable, but is generally close to one
- An anomaly due to a reverse remanent magnetization must be due to remanence with a Q factor greater than one
- The direction of remanent magnetization carries information about the age of that magnetization

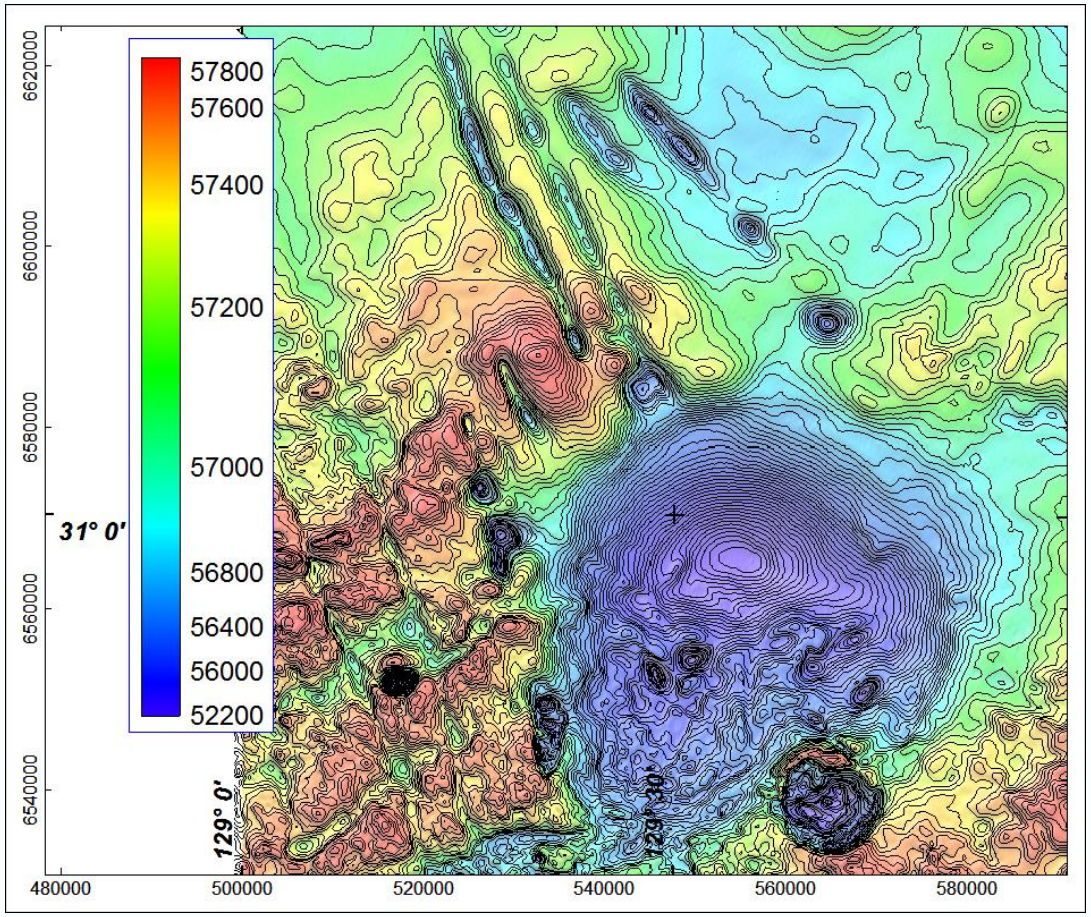
Regional setting



Government of South Australia
Department of State Development

CSIRO

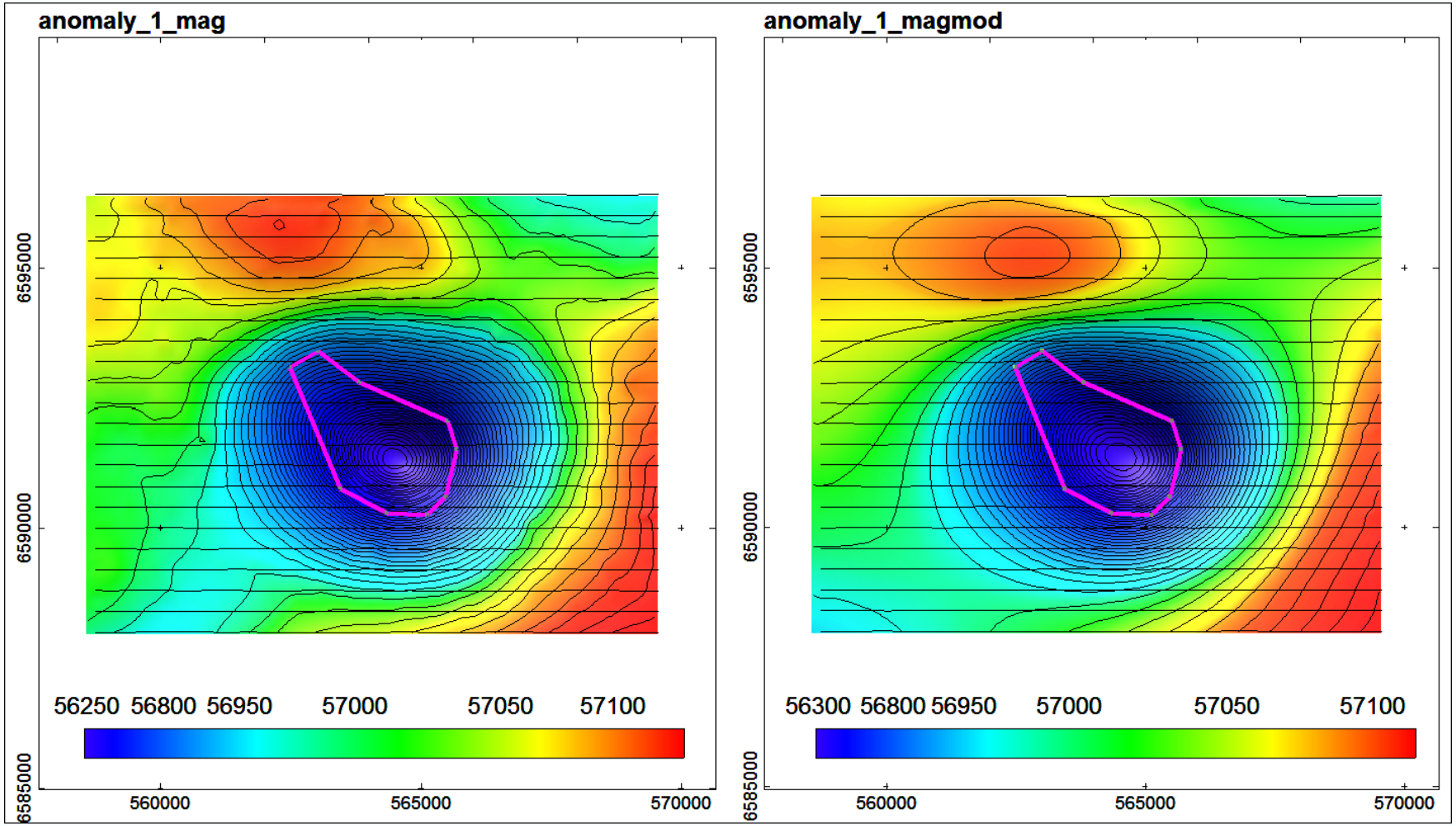
Coompana main reverse magnetization anomalies



Government of South Australia
Department of State Development

CSIRO

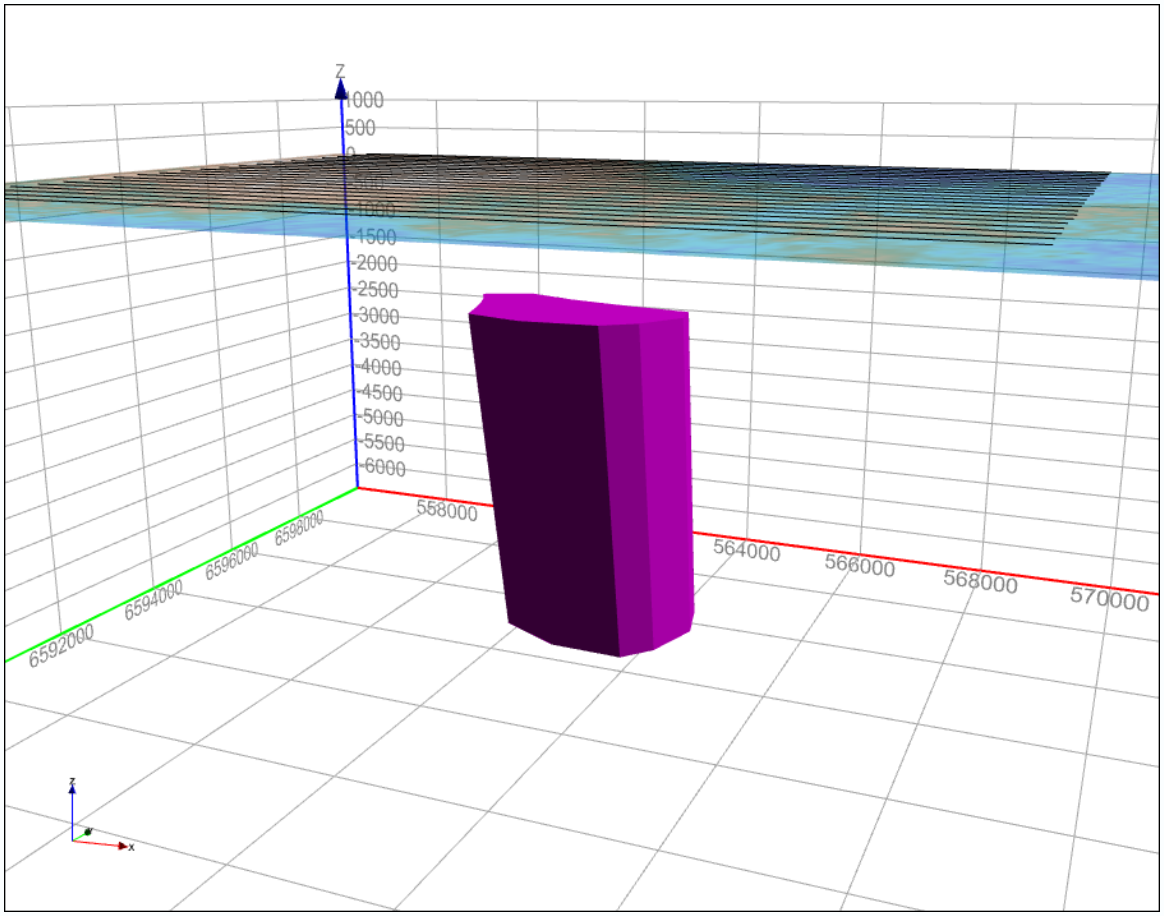
Anomaly 1



Government of South Australia
Department of State Development

CSIRO

Anomaly 1



Intensity of magnetization:

7.2 A/m

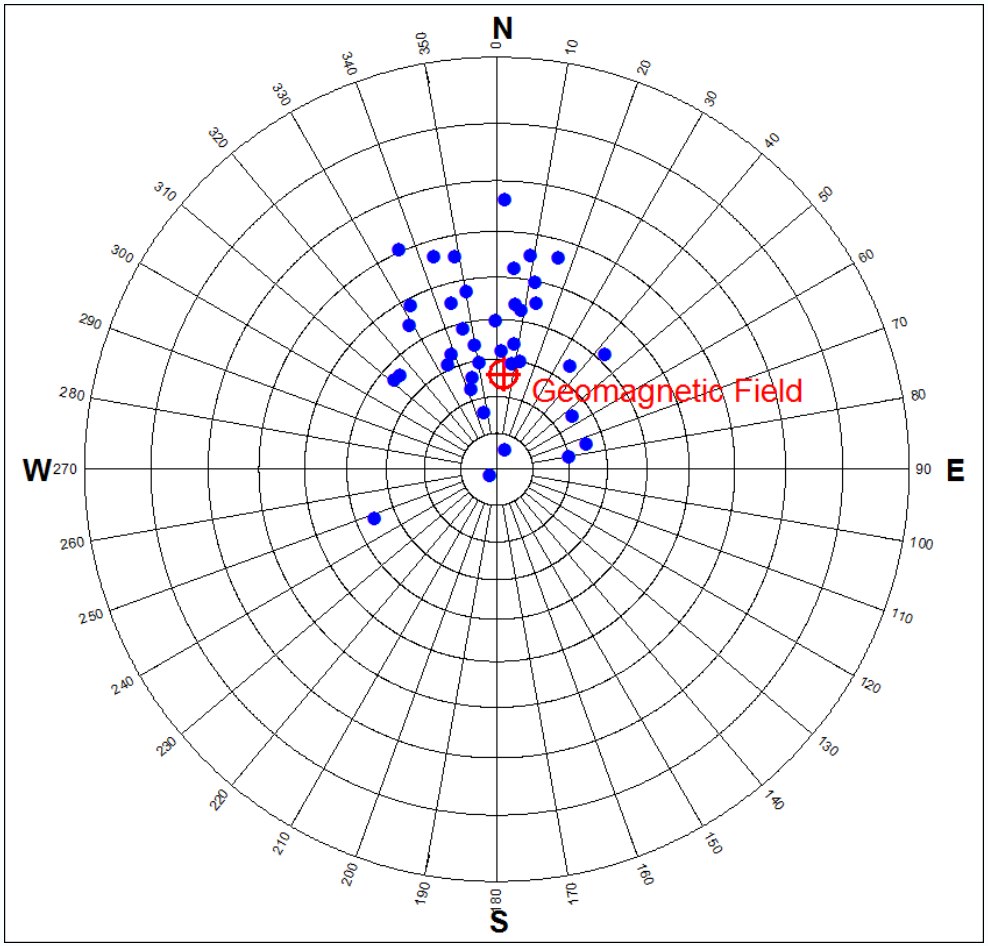
Declination 344°

Inclination +36°

Depth below surface:

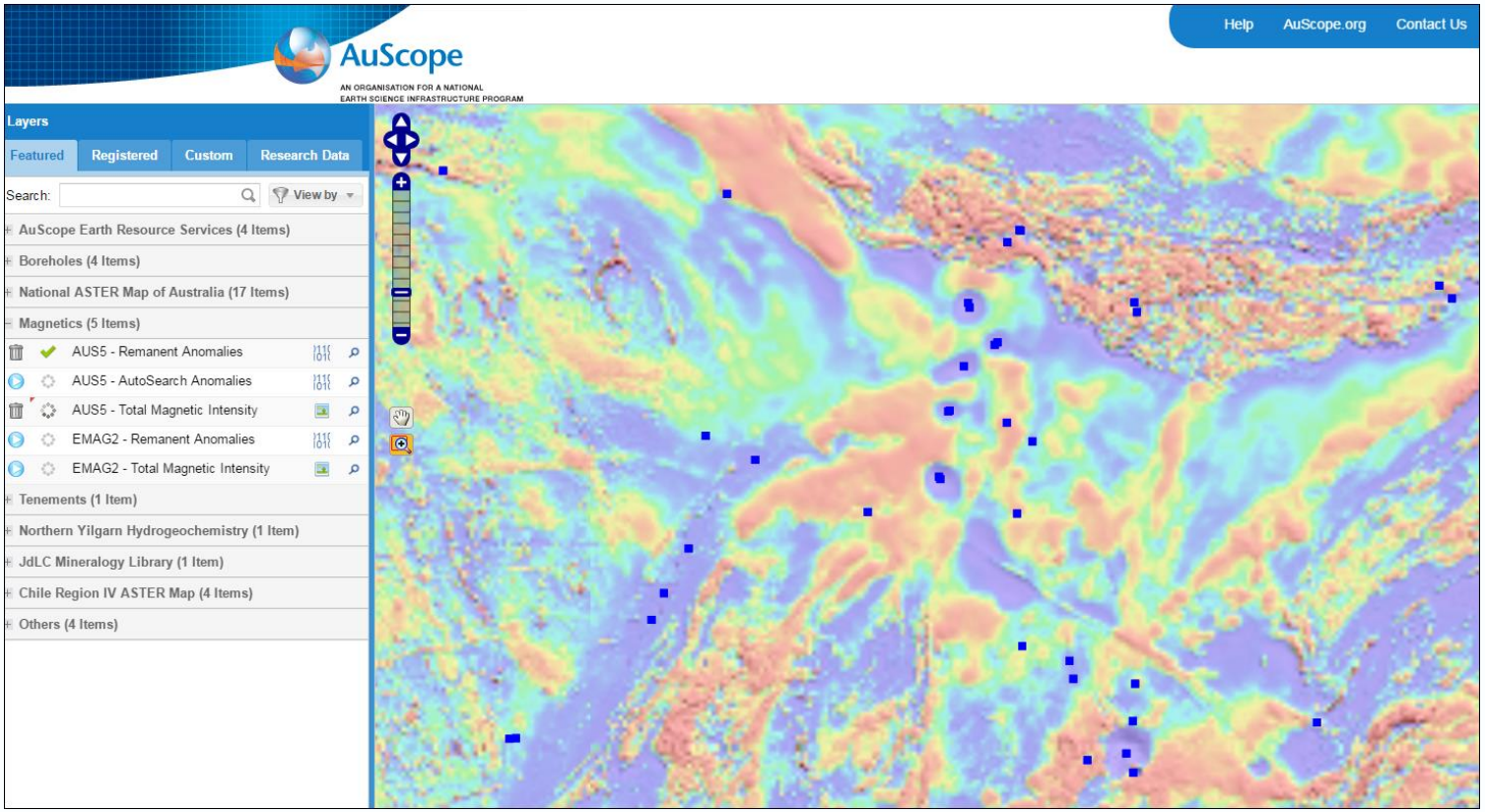
1170 metres

Magnetization directions estimated from reverse anomalies



Government of South Australia
Department of State Development

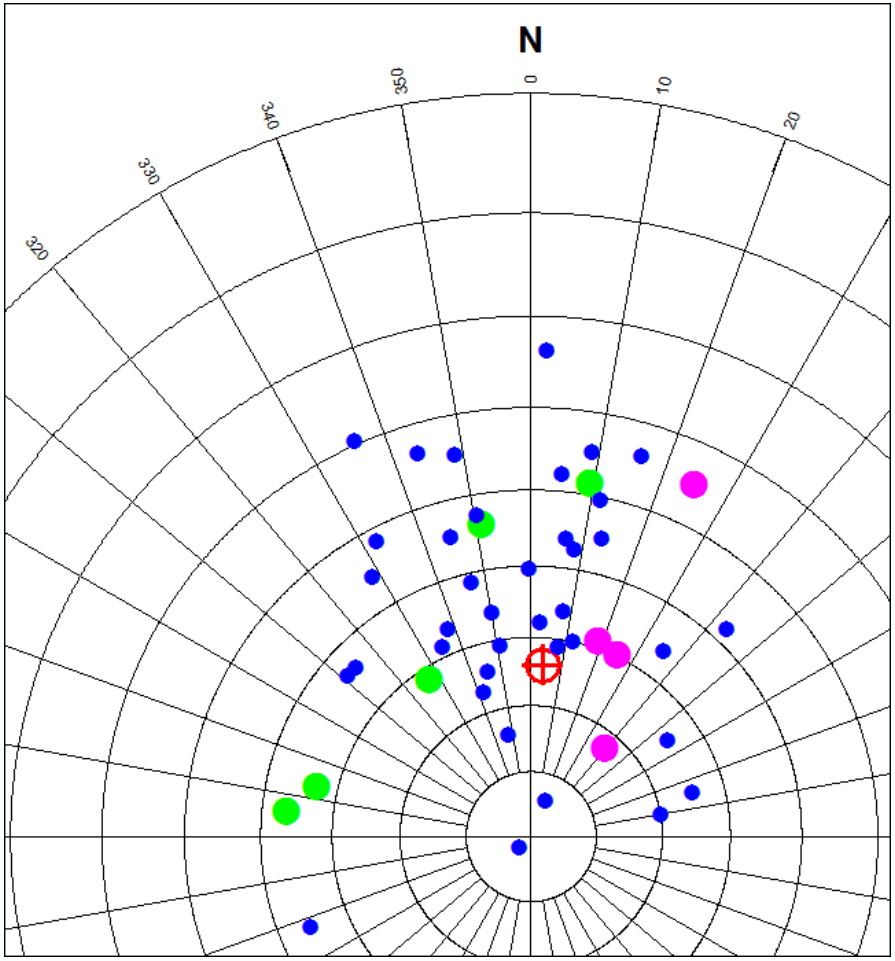
Australian Remanent Anomalies Database



Government of South Australia
Department of State Development

CSIRO

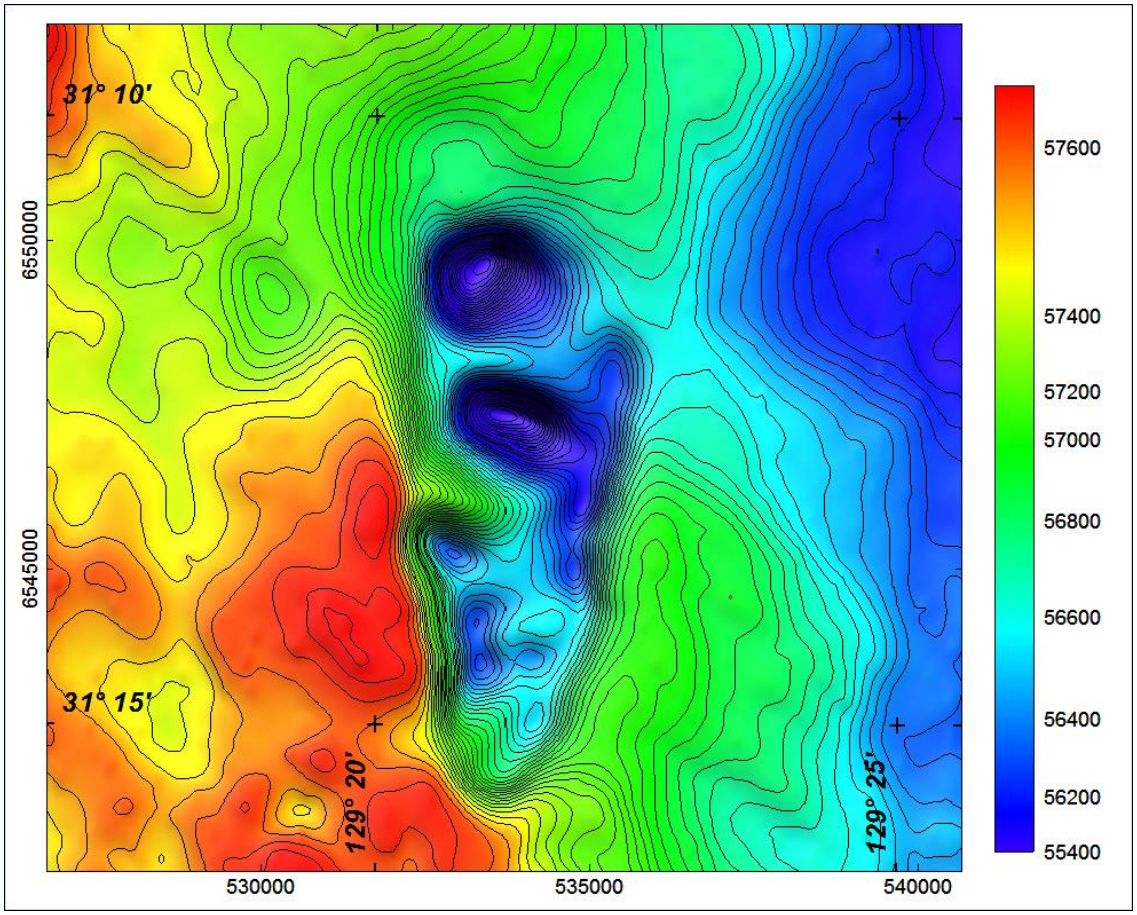
Comparison with magnetizations from the Musgraves and beneath the western Officer



Musgrave magnetizations

Western Officer magnetizations

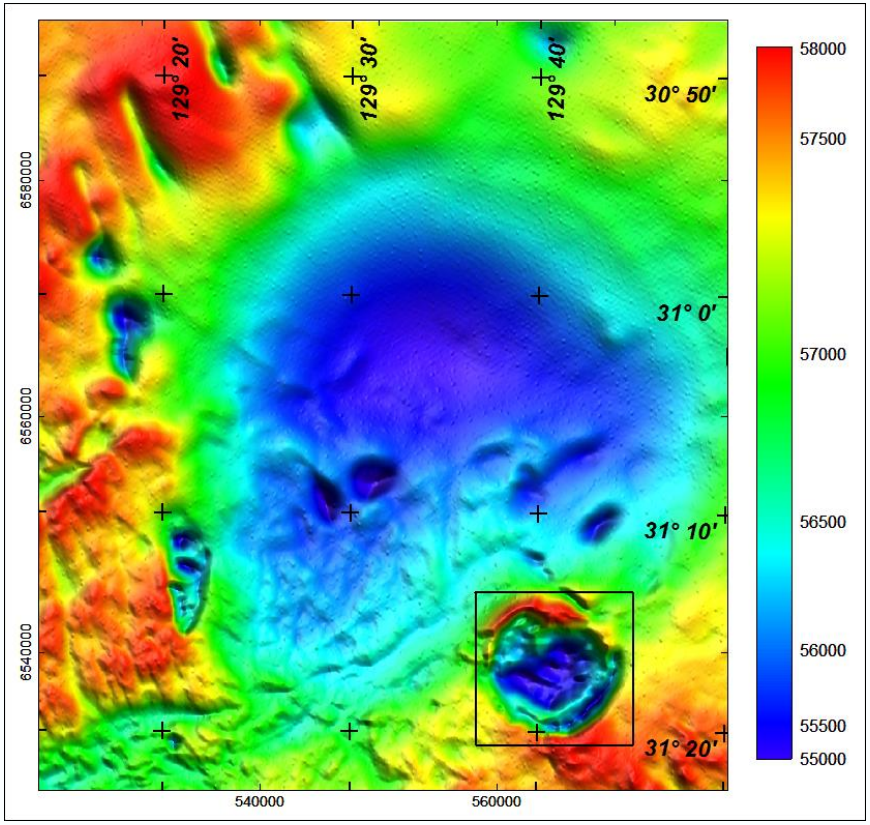
Anomalies 29,30
possible sheet and feeder pipes

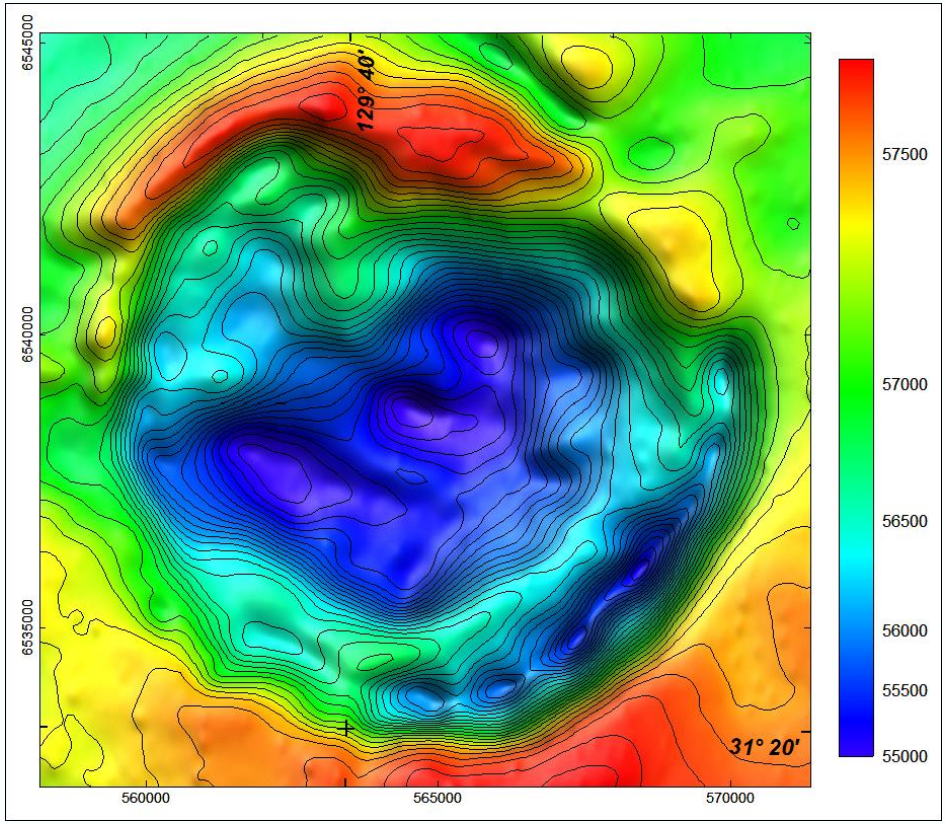


Government of South Australia
Department of State Development

CSIRO

Anomaly 5

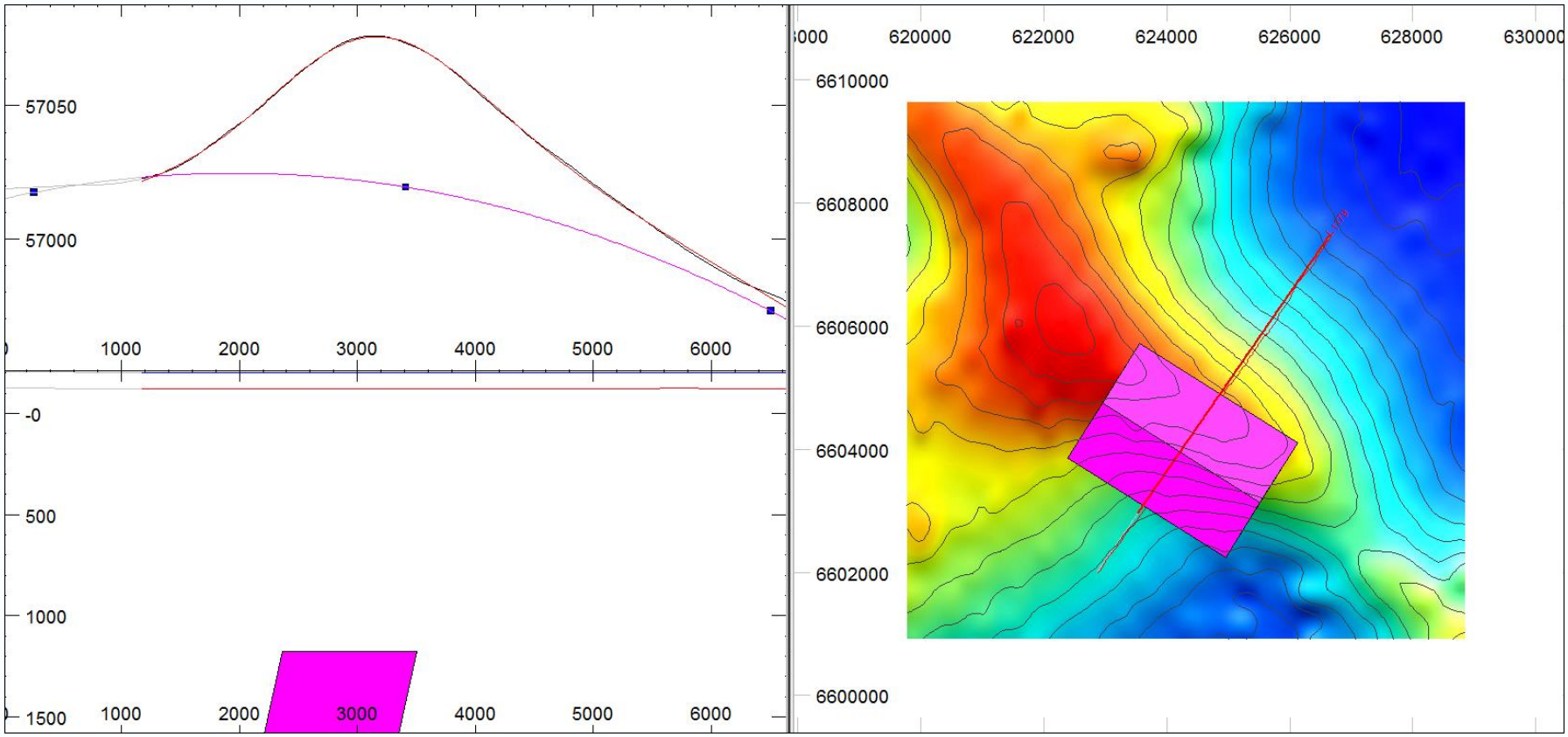




Government of South Australia
Department of State Development
CSIRO

Magnetic source depth study

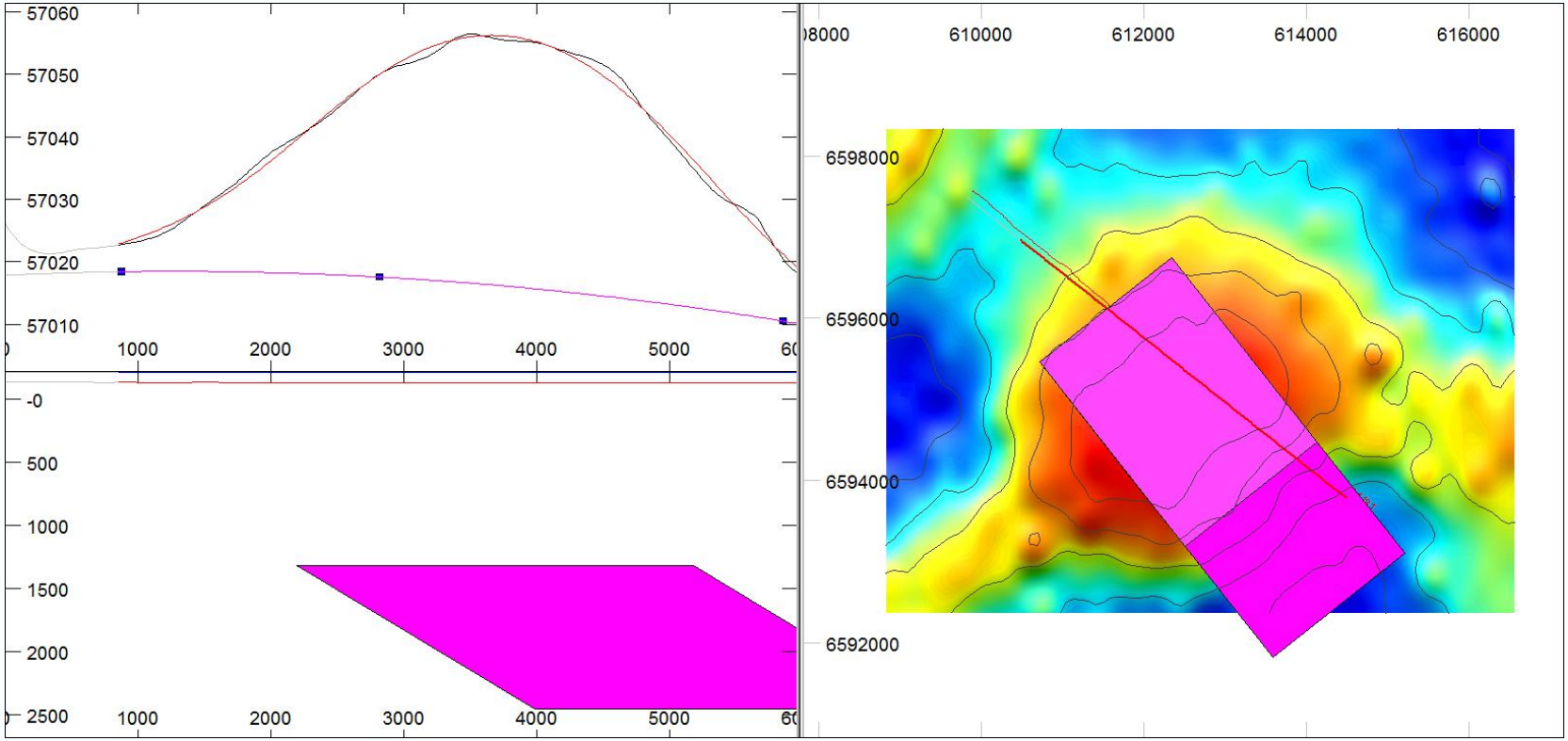
Coompana source depth study



Government of South Australia
Department of State Development

CSIRO

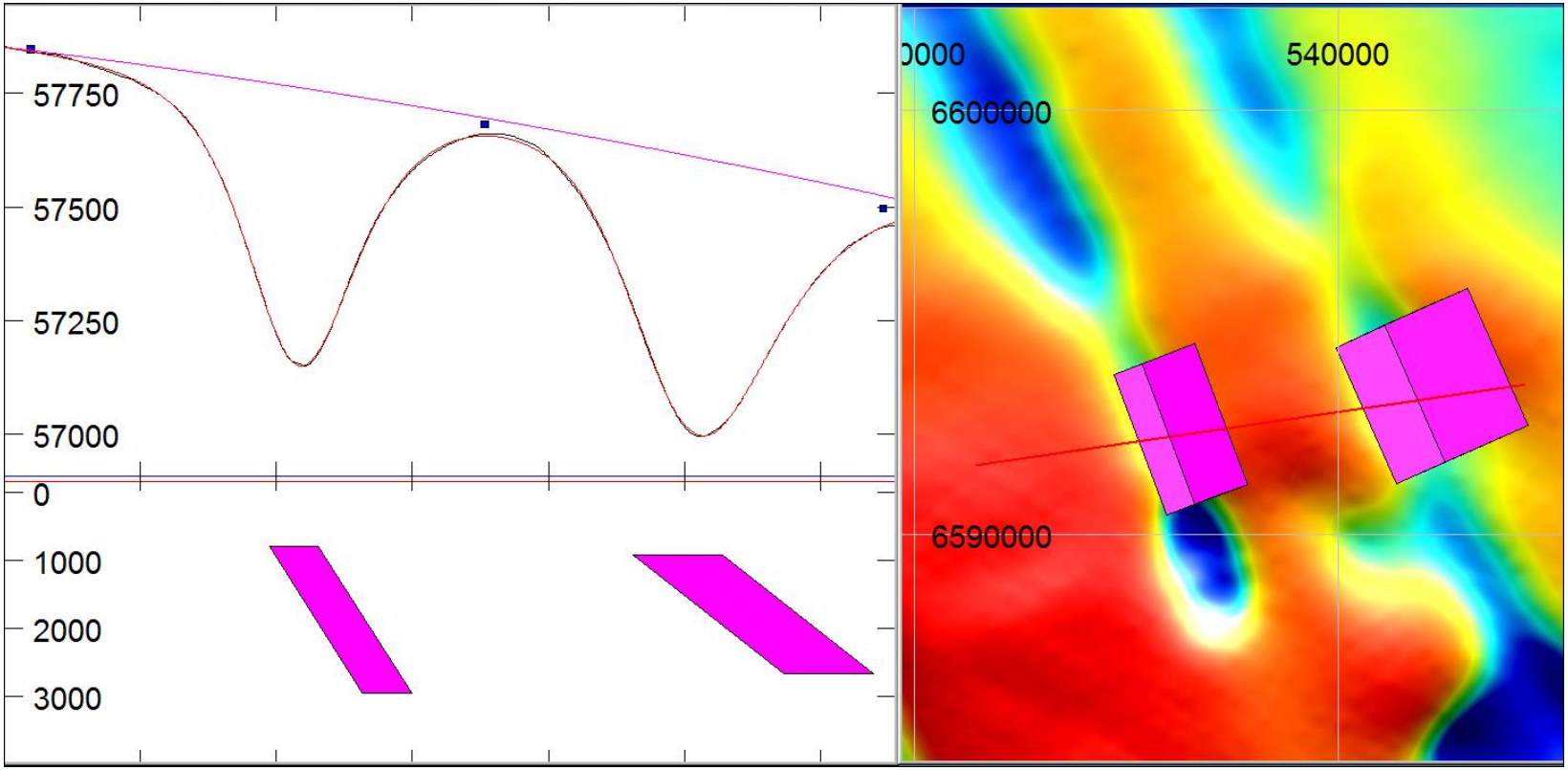
Coompana source depth study



Government of South Australia
Department of State Development

CSIRO

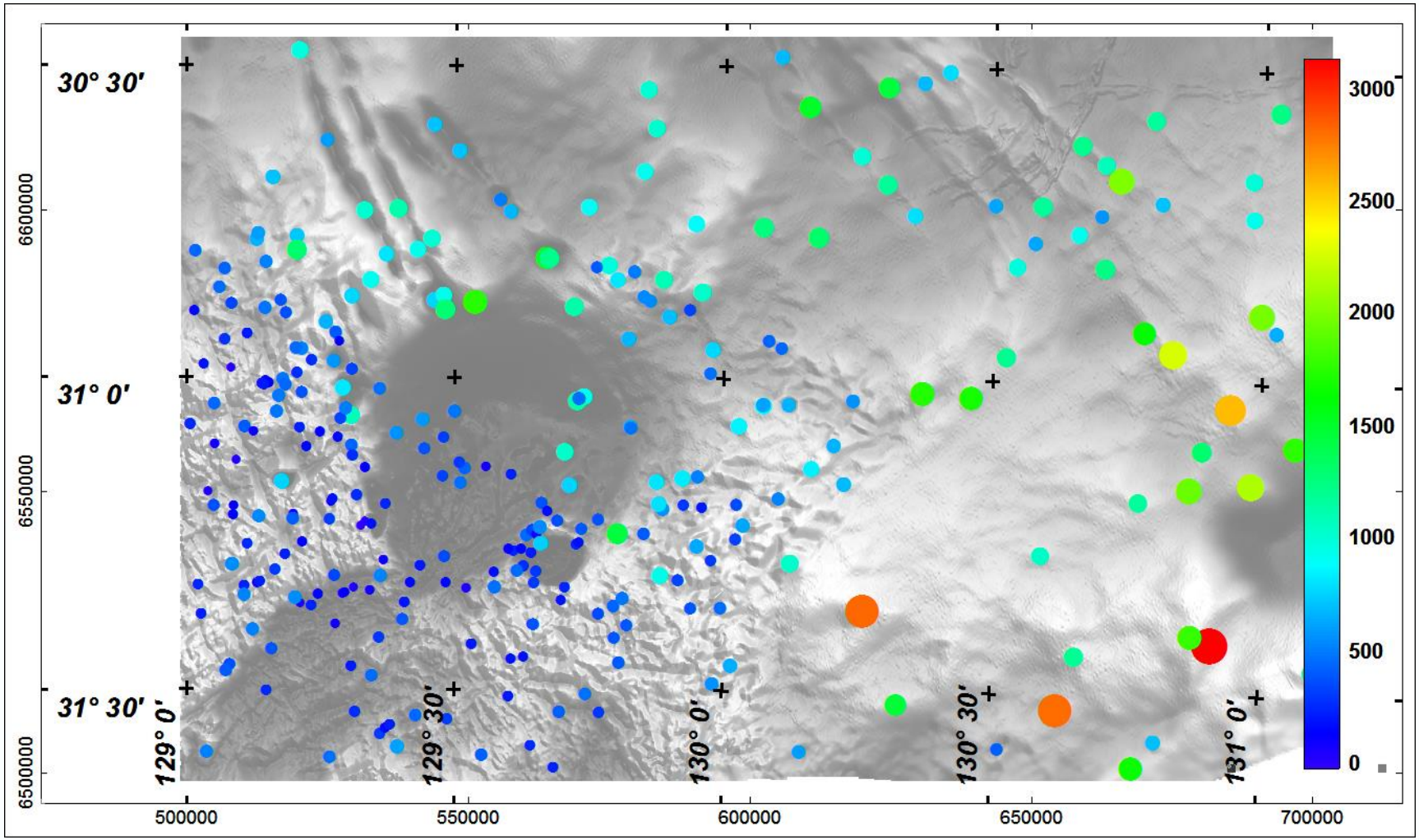
Coompana source depth study – remanent sources



Government of South Australia
Department of State Development

CSIRO

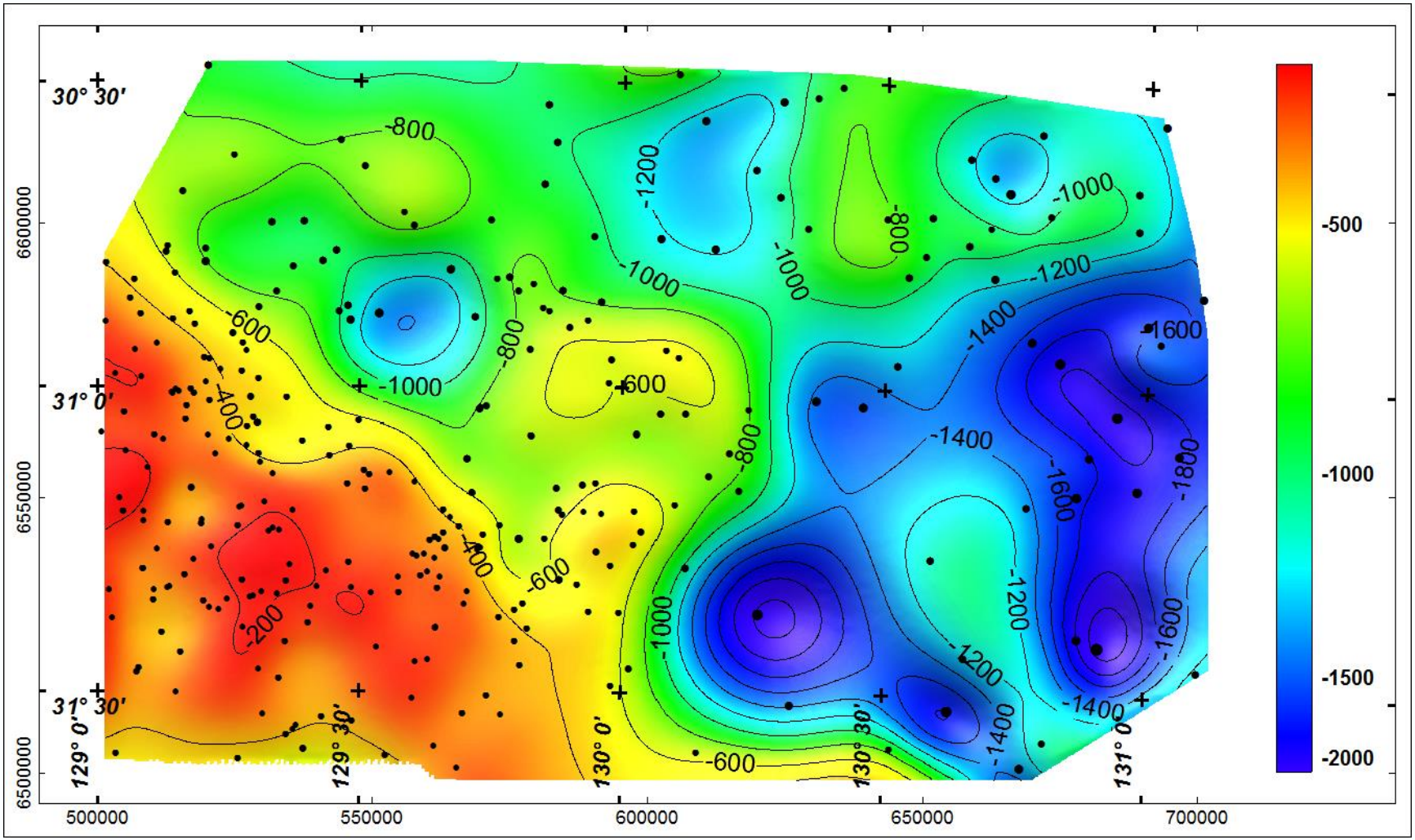
Coompana magnetic depths (metres BSL)



Government of South Australia
Department of State Development

CSIRO

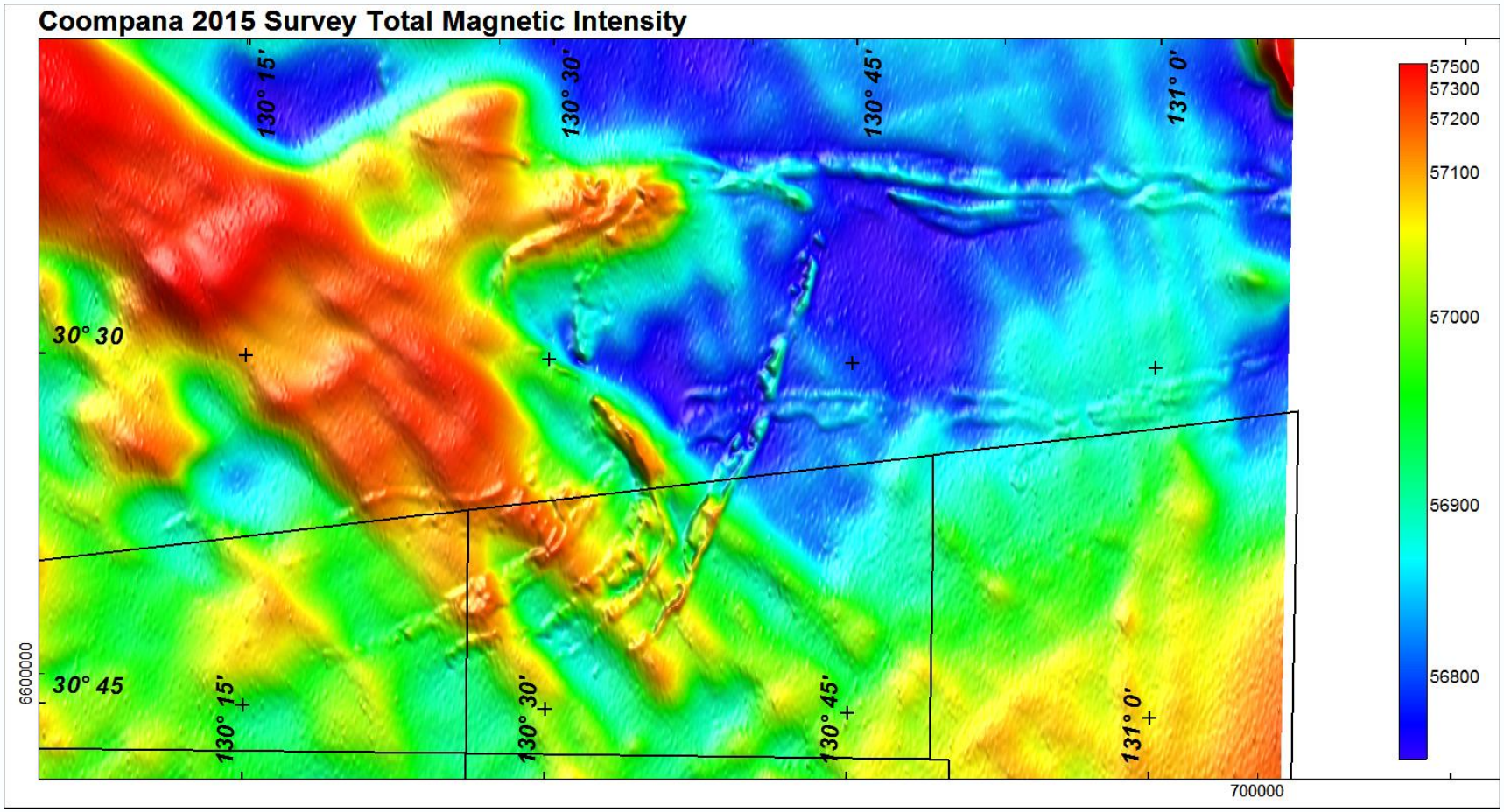
Coompana magnetic depths (metres ASL)



Government of South Australia
Department of State Development

CSIRO

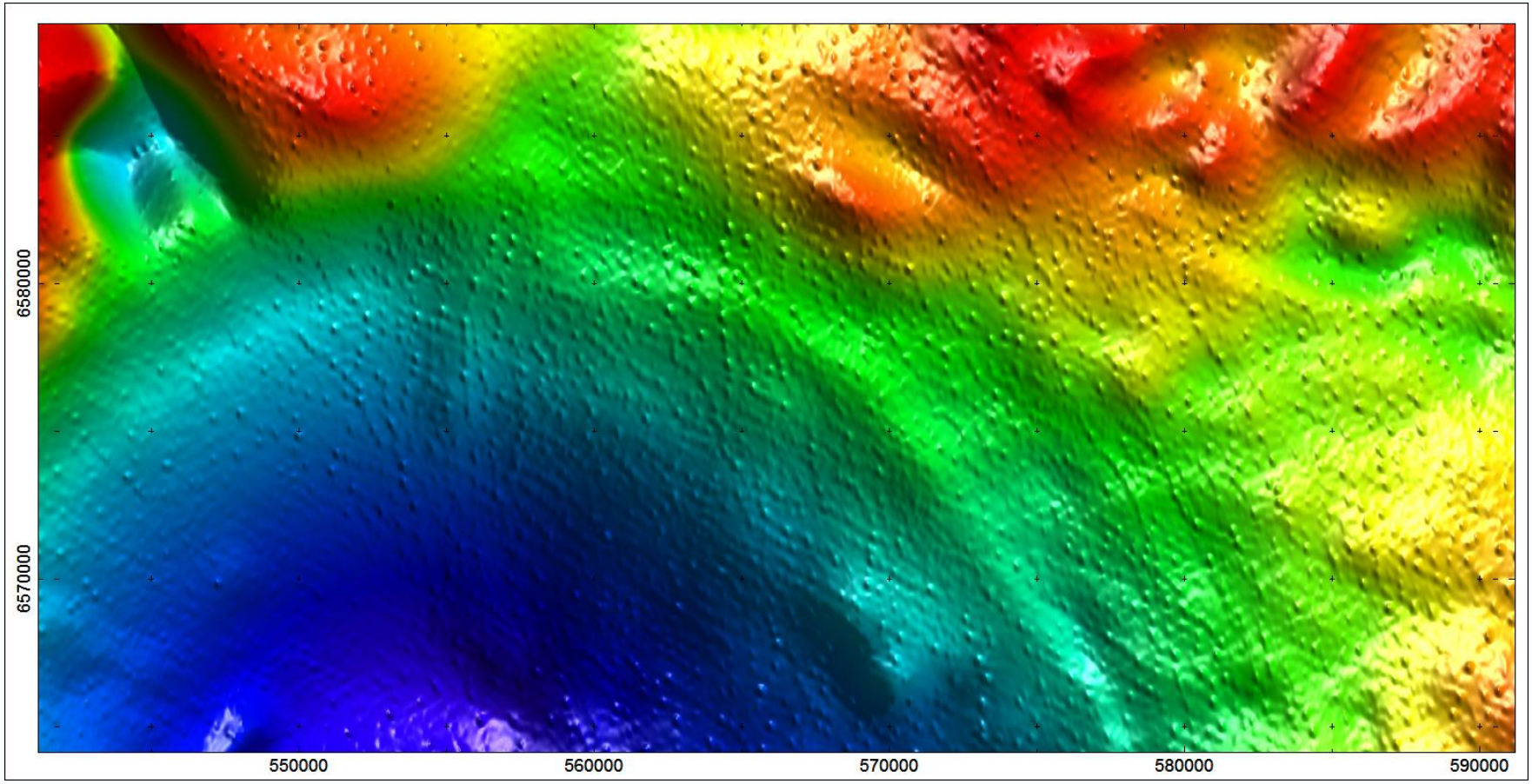
Anomalies from detrital magnetite in the cover



Government of South Australia
Department of State Development

CSIRO

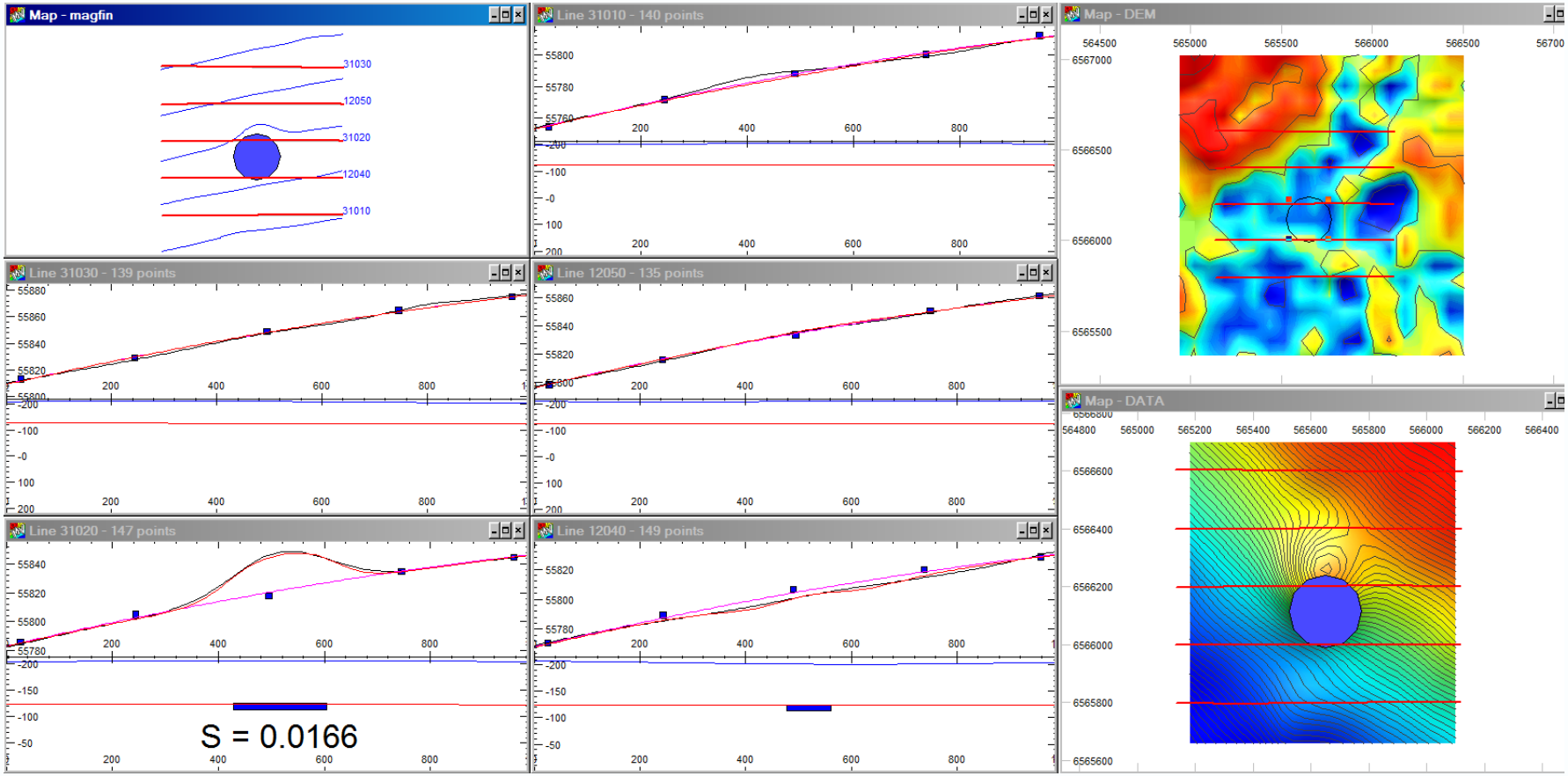
Northern anomaly rim and “Pimples”



Government of South Australia
Department of State Development

CSIRO

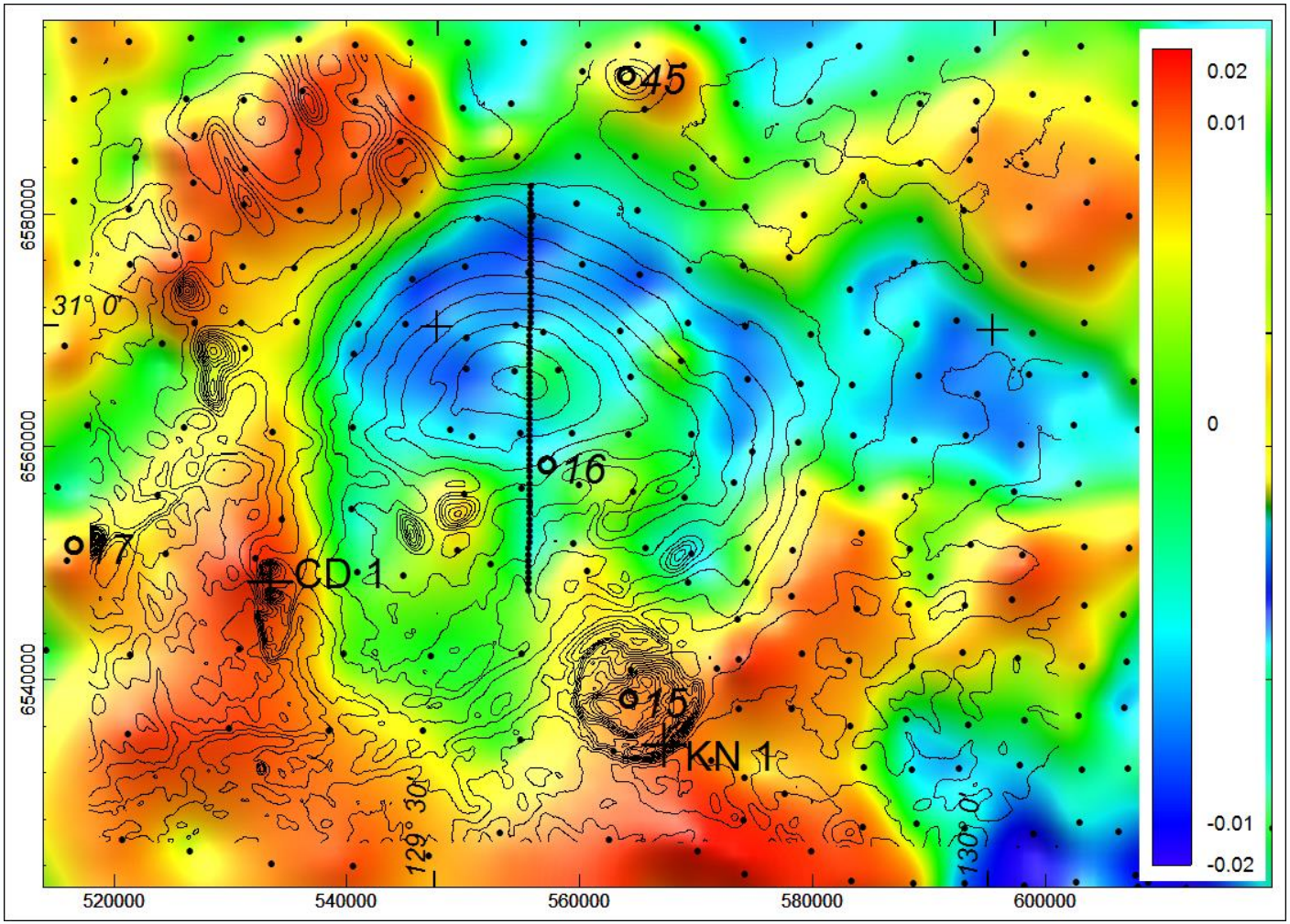
“Pimple” model



Government of South Australia
Department of State Development

CSIRO

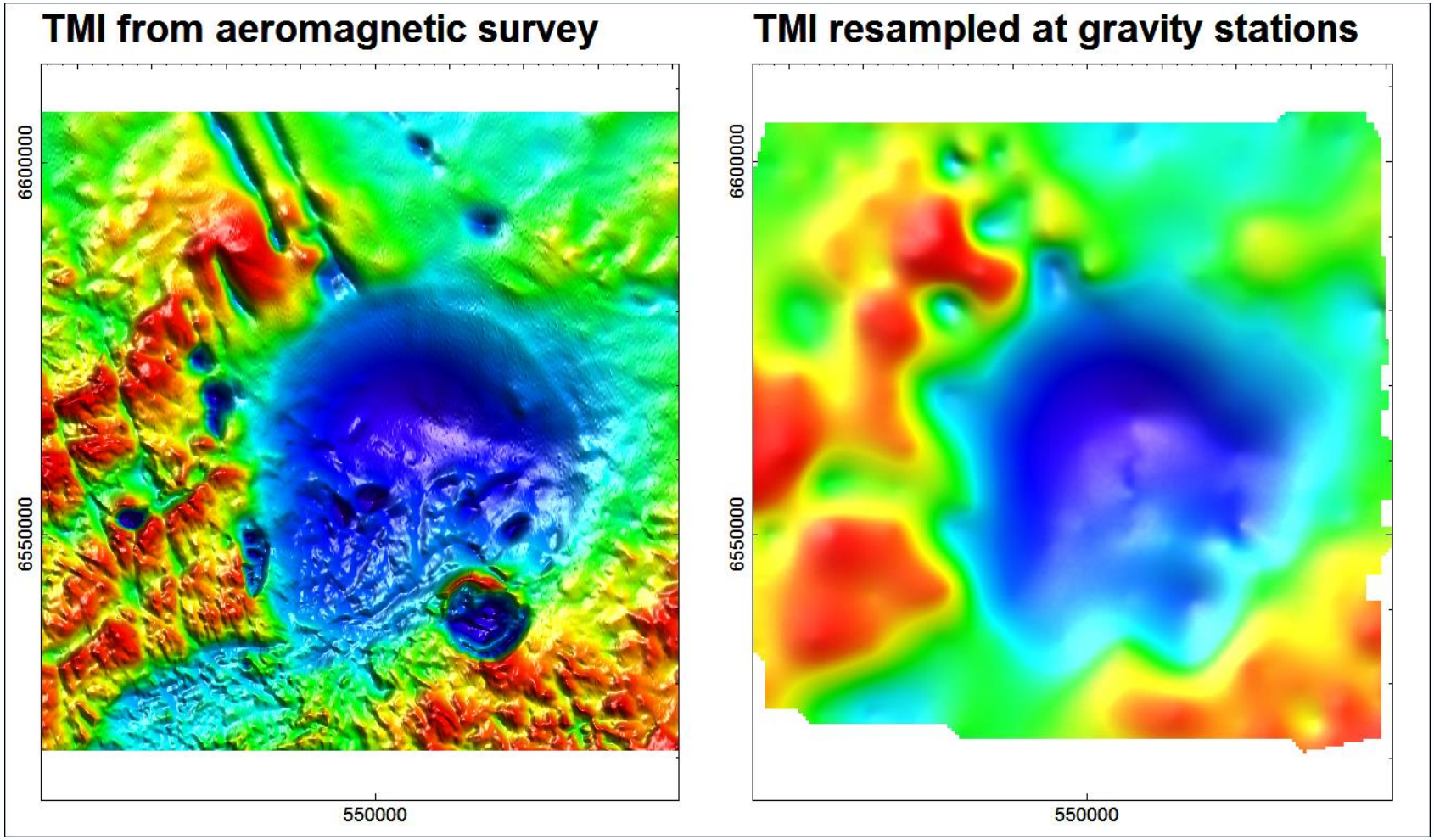
Gravity stations and vertical derivative image with magnetic contours



Government of South Australia
Department of State Development

CSIRO

TMI sampled at gravity stations



Government of South Australia
Department of State Development

CSIRO

Conclusions

- The new aeromagnetic survey has provided important new capability to map basement structure and a complex distribution of magnetization
- A distinctive high-inclination reverse remanent magnetization appears to belong to an extensive regional igneous event extending to the Musgraves and beneath the western Officer Basin
- The main Coompana magnetic anomaly has a negative gravity expression. There are indications that the smaller satellite bodies may have positive gravity expressions
- A planned gravity survey and drilling program will further advance understanding of the presently poorly known basement geology
- Results of this study will be available as reports and a digital data package from the GSSA web site

Thank you

CSIRO Mineral Resources

Clive Foss

t +61 2 9490 8713
e clive.foss@csiro.au

Government of South Australia
Department of State Development