

Electrical Conductivity Structures and Anomalies

Extension of the Flinders Ranges anomaly

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The first large scale Geomagnetic Deep Sounding Array study in Australia was conducted by Gough *et al.* (1972, 1974), using a widely spaced array across the Flinders Ranges in South Australia, stretching from the West Australian border and into Victoria. A significant conductor was detected and interpreted to run north-south parallel to the main grain of the Flinders Ranges.

Between 1982 and 1984 three closely spaced arrays (Fig. 1) were deployed by the author to delineate the Flinders Ranges

anomaly in detail. The first array covered the central Flinders Ranges and showed (Chamalaun 1985) that the anomaly followed the Houghton anticline to the east. The second array traced the anomaly southward, to where it enters St Vincents Gulf between Wallaroo and Port Victoria. In both these studies the conductor effect is masked by the coast effect. A third array was deployed near Lake Frome, and this showed the anomaly to change to a northerly trend. The coast effect in the Lake Torrens sector is much less, and the anomaly is observed only at high frequencies.

The evidence favours a narrow and relatively shallow (< 10 km) crustal anomaly. The anomaly however cuts across tectonic terrains suggesting that the current follows different tectonic units. In the north, near Lake Frome, it appears to follow the western edge of the Arrowie basin and associated basement highs. Where these abut the Olary Arc of the Flinders Ranges, the current enters the Calanna beds, which it follows along the Houghton anticline. In the south it seems to follow the NE-SW fault pattern out into the St Vincents Gulf.

It is speculated that the northerly extension is likely to follow the western margin of the Cooper basin and may, via the Birdsville basement high, link up with the south-west Queensland anomaly discovered by Woods and Lilley (1979, 1980).

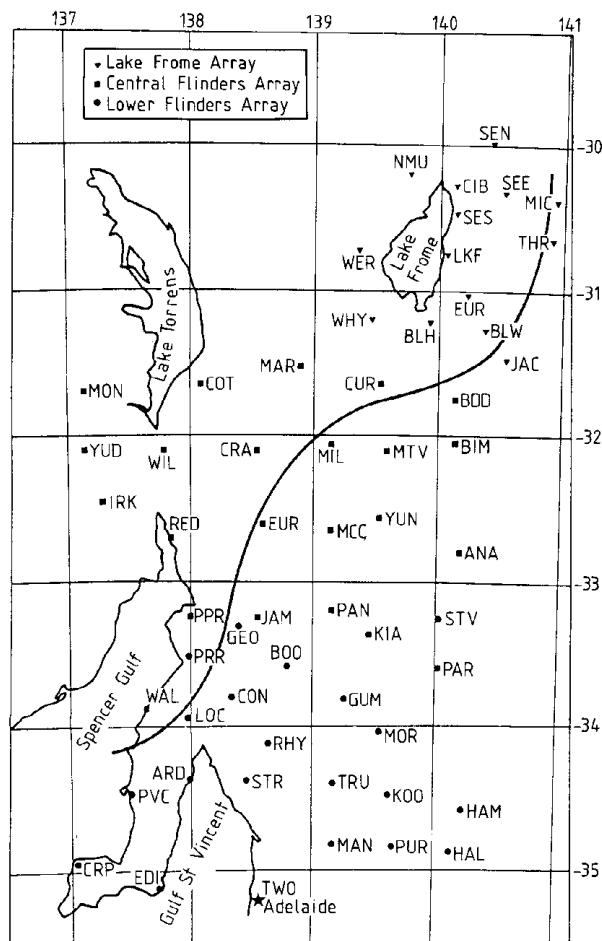


Fig 1 Magnetometer arrays deployed in South Australia.

References

- Chamalaun F. H. (1985), 'Geomagnetic deep sounding experiment in the central Flinders Ranges of South Australia', *Phys. Earth Planet. Int.* **37**, 174-182.
- Gough D. I., Lilley F. E. M. & McElhinny M. W. (1972), 'A polarization-sensitive magnetic variation anomaly in South Australia', *Nature* **239**, 88-91.
- Gough D. I., McElhinny M. W. & Lilley F. E. M. (1974), 'A magnetometer array study in Southern Australia', *Geophys. J. Roy. Astr. Soc.* **36**, 345-362.
- Woods D. V. & Lilley F. E. M. (1979), 'Geomagnetic induction in central Australia', *J. Geomag. Geoelectr.* **31**, 449-458.
- Woods D. V. & Lilley F. E. M. (1980), 'Anomalous geomagnetic variations and the concentration of telluric currents in southwest Queensland, Australia', *Geophys. J. Roy. Astr. Soc.* **62**, 675-689.