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Geoscience Australia

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Onshore Energy Security Program update

Delivering data and improved scientific understanding

Frome airborne electromagnetic data release

Geoscience Australia has recently released the Phase 1 (contractor-delivered) data from the Frome airborne electromagnetic (AEM) survey. The Frome AEM survey was flown between May and November 2010 and was the most extensive survey of its kind in Australia. The survey was a collaborative project involving Geoscience Australia, the Department of Primary Industries and Resources South Australia (PIRSA) and a consortium of exploration industry representatives. The data will assist in highlighting potential areas for mineral exploration as well as improving the understanding of groundwater resources in the area.

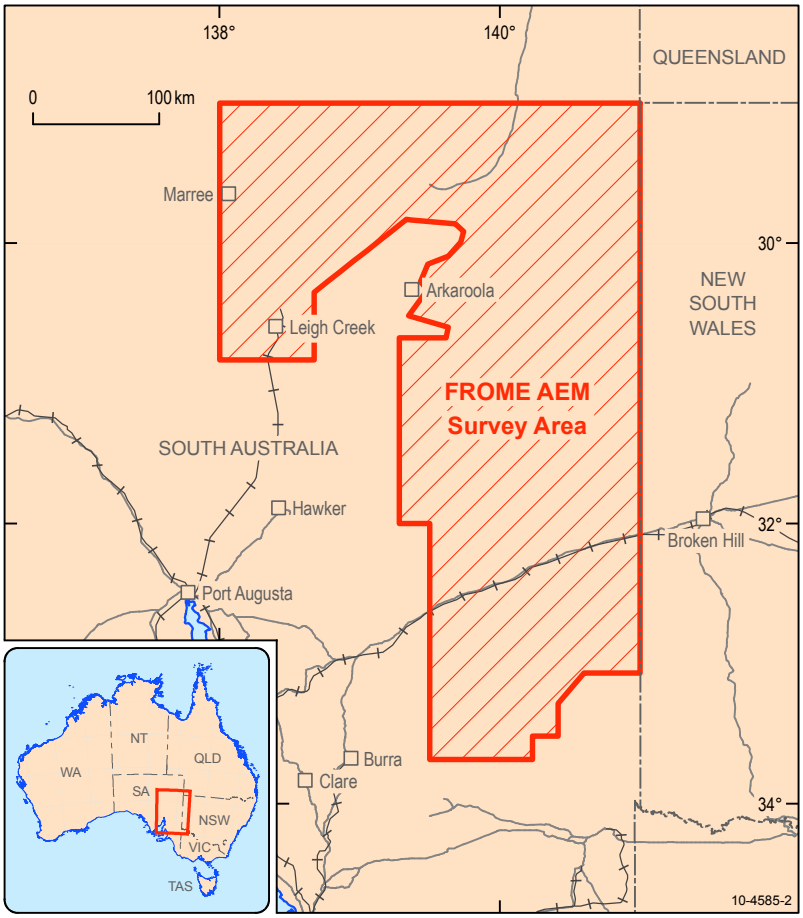

Figure 1. The survey area over the Frome Embayment and northern Murray Basin in South Australia.

The survey was the last of three regional AEM surveys conducted as part of Geoscience Australia's Onshore Energy Security Program (OESP). The program was designed to reduce risk in exploration and support the development of Australia's onshore energy resources. Data from the first two surveys, Paterson in Western Australia and Pine Creek in the Northern Territory, have already been released and are available through Geoscience Australia's website together with supporting information.

The Frome AEM survey covers 95 450 square kilometres in South Australia's outback (figure 1). The survey aircraft acquired 32 317 line kilometres of data using Fugro Airborne Surveys' TEMPEST™ system. The aircraft flew along east-west lines spaced 2.5 kilometres and 5 kilometres apart at a nominal height of 100 metres above ground level, resulting in data with an enhanced signal-to-noise ratio compared to previous surveys. The survey also included a global positioning system (GPS) unit fitted to the aircraft's receiver bird to enhance the accuracy of the received data for the first time.

The survey primarily targeted potential uranium-bearing mineral systems in the Callabonna Sub-basin of the Frome Embayment and the Lake Eyre Basin on the flanks of the northern Flinders Ranges as well as the area around Marree and Camerons Corner. It also included:

- The northwest Murray Basin including the South Australian Delamerian Orogen which is prospective for uranium, heavy mineral sands, gold and base metal deposits.

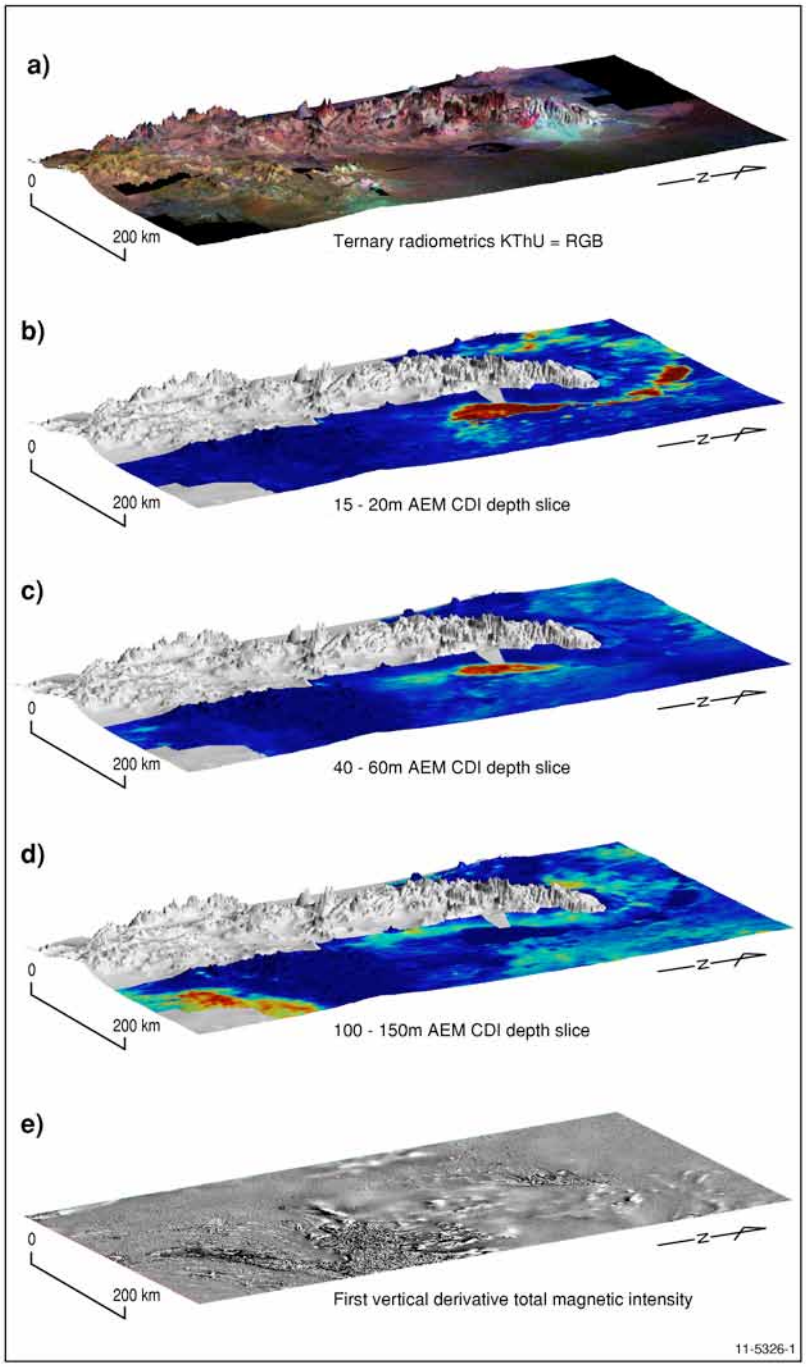

Figure 2. Radiometric data, AEM depth slices, and first vertical derivative total magnetic intensity for the Frome survey area superimposed on digital elevation data.

- The Benagerie Ridge which is prospective for uranium, gold, copper and Broken Hill-style lead-zinc-silver deposits.
- The Olary Range (Nackara Arc) which is prospective for uranium, gold, copper, Broken Hill-style lead-zinc-silver deposits and sedimentary iron ore deposits.
- The Leigh Creek–Beltana area which is prospective for coal, copper, zinc and magnesite.

Overall the survey will provide new geological insights into the distribution of prospective rocks within the Benagerie Ridge, the depth to highly-prospective rocks of the Delamerian Orogen under the Murray Basin, and the three-dimensional structure of Neoproterozoic rocks within the Nackara Arc. It will also map Cenozoic paleovalleys or paleochannels, neotectonic activity surrounding the Flinders Ranges and the depth of cover within the survey area (figure 2).

The Phase 1 release data include point-located ASCII data, EM Flow™ conductivity-depth interval (CDI) grids and EM Flow™ CDI multiplots. It is available for free download through the Geoscience Australia website or on DVD ROM for $99.00 from the Geoscience Australia Sales Centre.

The data will be further enhanced at Geoscience Australia using the agency's layered earth inversion (GA-LEI) algorithm (Brodie and Sambridge 2006) to produce point-located ASCII

data and geolocated grids and sections. These enhanced data will be released as Phase 2 of the Frome AEM data release in mid-2011.

References

Brodie R & Sambridge M. 2006. A holistic approach to inversion of frequency domain airborne EM data. Geophysics 71: G301–313.

Related websites/articles

Airborne Electromagnetics Project downloadable data
www.ga.gov.au/energy/projects/airborne-electromagnetics.html

Phase 1 data on DVD-ROM from Geoscience Australia Sales Centre
https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=71624

New structures revealed in Northern Territory seismic survey

A deep seismic survey undertaken as part of Geoscience Australia's Onshore Energy Security Program has revealed major new geological structures in the Northern Territory which will assist energy and mineral resource exploration in the region.

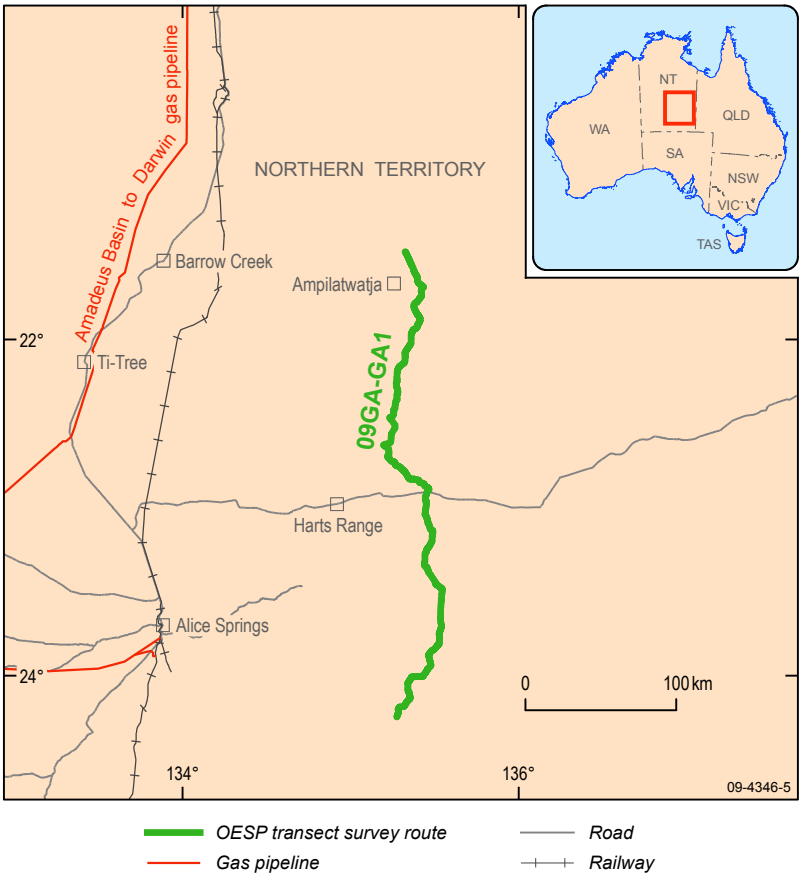

Figure 3. Location map for the Georgina–Arunta Seismic Line in central Australia which extends for 373 kilometres.

The Georgina–Arunta Seismic Line extended over 373 kilometres from near the Todd River 150 kilometres east of Alice Springs to just north of Amaroo. The survey was a cooperative program carried out by Geoscience Australia in collaboration with the Northern Territory Geological Survey (figure 3).

Analysis of the survey data has identified a series of previously unknown fault systems, and provided 3D constraints on the geometry and origin of the Irindina Province, an enigmatic late Neoproterozoic to early Paleozoic basin that has recently yielded significant copper-cobalt, nickel-copper and gold discoveries. These results will help to develop a better understanding of the geological architecture of the Northern Territory and improve the appreciation of how the Australian continent was formed.

> "These results will help to develop a better understanding of the geological architecture …"

The datasets will also help in developing a greater knowledge of the potential for future mineral and energy discoveries, particularly through the relationship between the newly-discovered features and other geological features supporting

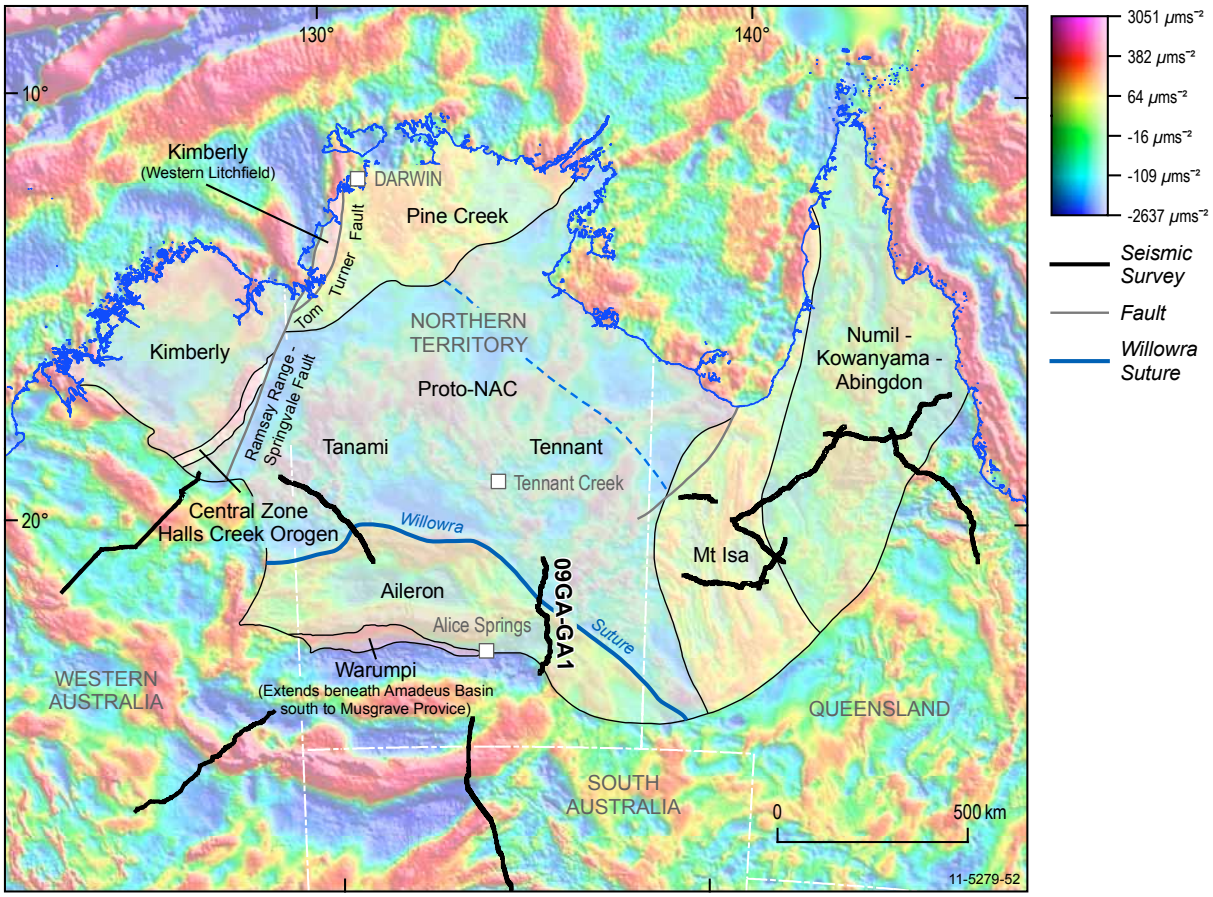

Figure 4. Gravity image showing the location of the Georgina-Arunta survey (09GA-GA1) and Tanami survey (05GA-T1) and the interpreted location of the Willowra Suture.

known mineral occurrences in the Northern Territory and elsewhere in Australia. The data from this survey and a survey carried out in the Tanami region in 2005 (*AusGeo News* 85), along with magnetic and gravity data, create a strong possibility that the feature known as the Willowra suture extends over a much more significant distance than previously inferred (figure 4). The suture has similar features to those associated with the Olympic Dam mineral system in South Australia and at Cloncurry in Queensland and may be related to the Tennant Creek gold–copper district and/or possible iron-oxide copper-gold discoveries in the southern Aileron Province.

For more information

email ausgeomail@ga.gov.au

Related websites/articles

Northern Territory Geological Survey Annual Geoscience Exploration Seminar 2011

www.minerals.nt.gov.au/d/Minerals_Energy/Geoscience/Content/File/Pubs/Record/NTGSRec2011-003.pdf

Geoscience Australia's Onshore Energy Security Program

www.ga.gov.au/energy/energy-security-program/onshore-energy-security.html

Geoscience Australia's Seismic Acquisition and Processing Project

www.ga.gov.au/energy/projects/seismic-acquisition-processing.html

Northern Territory Geological Survey

www.nt.gov.au/d/Minerals_Energy/Geoscience/