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Major new interpretation report on the Pine Creek airborne electromagnetic survey, Northern Territory

Geoscience Australia has recently released a comprehensive interpretation report on the Pine Creek airborne electromagnetic (AEM) survey which, combined with the survey data, is expected to provide a major boost to the efforts of explorers in this highly prospective mineral province. The survey was part of Geoscience Australia's Onshore Energy Security Program (OESP) and was the agency's second major electromagnetic survey. It was designed to deliver reliable, pre-competitive AEM data to promote exploration for uranium, copper-gold, base metals, tin and nickel in both brownfield and greenfield regions. The area covered hosts several major uranium deposits, including the Ranger Uranium Mine, Rum Jungle and Nabarlek.

The report demonstrates that the Pine Creek Province is prospective for unconformity-related uranium deposits, particularly where the Kombolgie Sandstone (latest Paleoproterozoic) of the McArthur Basin unconformably overlies early Paleoproterozoic metasediments of the Pine Creek Orogen. There is also potential for sandstone-hosted and Westmoreland-type deposits associated with mafic rocks (such as Oenpelli Dolerite) within the sandstone south of Rum Jungle, and further to the southeast lies an area with potential for buried Cenozoic paleochannel-hosted uranium deposits.

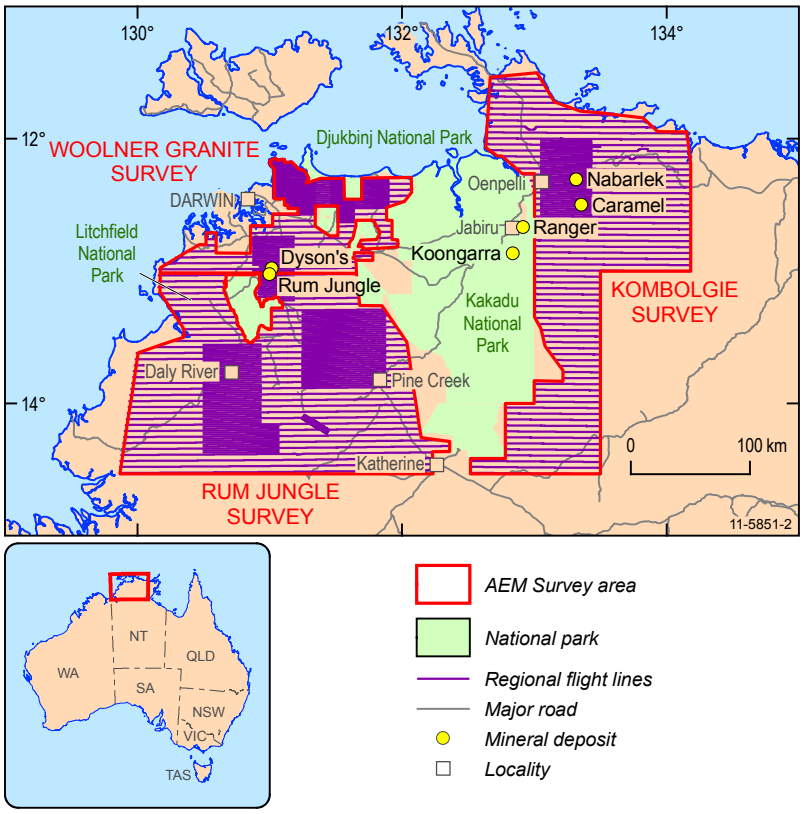

Figure 1. Pine Creek Survey boundary locations.

The survey was flown over the Pine Creek Orogen and parts of the McArthur Basin, Victoria River Basin and Daly Basin in the Northern Territory between August 2008 and May 2009. The survey collected 29 900 line-kilometres of new data at various line spacings (555 m, 1666 m and 5000 m) over an area of approximately 74 000 square kilometres. The survey area, shown in figure 1, covers three main areas: Kombolgie (east of Kakadu National Park), Woolner Granite (near Darwin), and Rum Jungle (west of Kakadu National Park). The Woolner Granite and Rum Jungle survey areas were flown by Fugro Airborne Surveys using the TEMPEST™ AEM system. The Kombolgie survey area was flown by Geotech Airborne using the VTEM™ AEM system.

Interpretation of AEM data for the Pine Creek region demonstrates that AEM data can be used to successfully map critical elements of highly prospective unconformity-related uranium systems. The report includes supporting diagrams and images to illustrate this. The critical elements include the:

- unconformity at the base of the Katherine River and Tolmer groups
- thickness of the Katherine River and Tolmer groups above the unconformity

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- the metasedimentary rocks below the unconformity (especially rocks containing reductants)
- faults in the metasedimentary rocks.

The interpretation of these data has demonstrated that a regional-scale AEM survey in combination with drill-hole data can help to create a 3D model of basin architecture. The report includes examples from the Daly and Birrindudu basins in the Pine Creek area (figure 2). This architecture can provide information on the direction of fluid flow during diagenesis of basin sediments, thereby defining areas prospective for unconformity-related uranium systems.

AEM provides a unique dataset which gives depth information about geological features in the shallow crust at a regional scale. The Pine Creek regional AEM data are very useful in assisting mineral exploration (including uranium) in the top few hundred metres below the surface. The survey also indicates areas where exploration companies would gain maximum benefit from more detailed airborne and ground surveys.

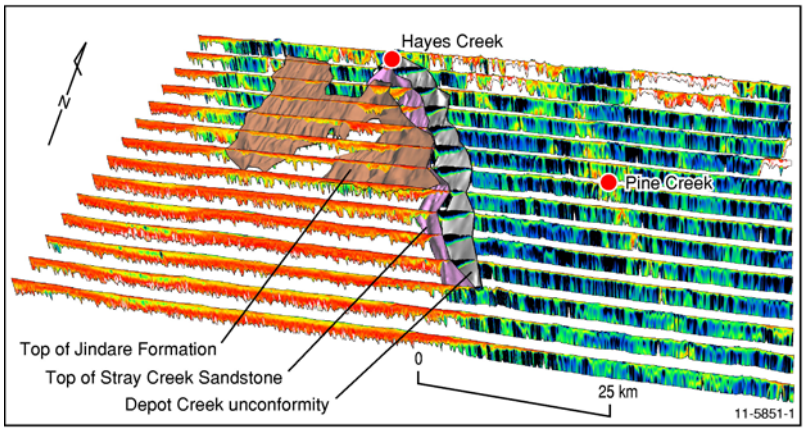

Figure 2. Conductivity-depth sections of the Pine Creek area in 3D plus a 3D model of part of the Daly and Birrindudu basins.

The report includes tables, diagrams and a large number of high-resolution images which highlight methodologies developed to reveal the maximum amount of geological information from the AEM data. The report has been issued as Geoscience Australia Record 2011/18 (GeoCat # 71854). A pdf version is now available for download through the Airborne Electromagnetics Project page on Geoscience Australia's website.

For more information

email ausgeomail@ga.gov.au

Related articles/websites

Geological and energy implications of the Pine Creek region airborne electromagnetic (AEM) survey, Northern Territory, Australia (Geoscience Australia Record 2011/18)

https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=71854

Geoscience Australia's Airborne Electromagnetics Project downloadable data

www.ga.gov.au/energy/projects/airborne-electromagnetics.html

AusGeo News 101: Onshore Energy Security Program update

www.ga.gov.au/ausgeonews/ausgeonews201103/onshore.jsp

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New maps define offshore jurisdiction

Oceanographers, scientific researchers, resource exploration companies, tourism operators and the public will now have a greater understanding of Australia's maritime jurisdiction following the recent release of 28 digital (PDF) maps of Australia's maritime jurisdiction by Geoscience Australia.

The maps detail the jurisdictional zones around the Australian mainland and those of Australia's remote offshore territories, including the Australian Antarctic Territory, Ashmore and Cartier Islands, Christmas Island, Cocos (Keeling) Islands, Coral Sea Islands, Heard and McDonald Islands and Norfolk Island (figure 1).

Figure 1. One of the wall maps showing Australia's maritime jurisdiction.

They also include the internal waters of Australia, the territorial sea, the contiguous zone, the Exclusive Economic Zone and the continental shelf which was confirmed in April 2008 by the United Nations Commission on the Limits of the Continental Shelf.

When launching the maps, the Minister for Resources, Energy and Tourism, the Hon. Martin Ferguson, AM MP, pointed out that in addition to providing details on Australia's maritime jurisdiction the maps show significant features such as bathymetry and reefs. This feature will be particularly beneficial for tourism operators in areas such as Queensland's Great Barrier Reef and Ningaloo Reef off Western Australia.

The series of maps, which was developed in consultation with the Attorney-General's Department and the Department of Foreign Affairs and Trade, can be downloaded from Geoscience Australia's website.

For more information

email ausgeomail@ga.gov.au

Related articles/websites

Australia's marine jurisdiction map series (Geoscience Australia webpage)
www.ga.gov.au/marine/jurisdiction/map-series.html

AusGeo News 93: Setting Australia's limits
www.ga.gov.au/ausgeonews/ausgeonews200903/limits.jsp