

## New geochronology results from South Australia

New geochronology results from the southern Gawler Craton and Curnamona Province in South Australia are included in a recently released report from Geoscience Australia (Geoscience Australia Record 2010/16). The 68 samples were acquired between 2008 and 2010 as part of Geoscience Australia's Onshore Energy Security Program (OESP). This program of geochronology was specifically targeted to provide time controls relevant to the interpretation of several deep seismic reflection profiles and consequently the geographic coverage of the samples is heavily biased towards these areas. The seismic data were also acquired by Geoscience Australia, in collaboration with Primary Industry and Resources South Australia (PIRSA), as part of the OESP. Information on the seismic transects is included in the *In brief* item on the Gawler Craton and Curnamona Province seismic lines in this issue of *AusGeo News*.

The geochronology results were obtained from Geoscience Australia's Sensitive High Resolution Ion Microprobe (SHRIMP). The SHRIMP measures uranium and lead isotopes from tiny portions of zircon crystals and the results are then used to calculate the age of the crystal based on the natural decay rate of uranium to lead (U-Pb). The samples are listed according to geological domains or regions, and the report includes a location map showing the location of samples for each domain. The results for each sample are presented in a standard format that includes a summary table, sample and zircon descriptions, U-Pb isotopic results, a geochronological interpretation and a data table.

The geochronological samples from the southern Gawler Craton come from a transect across the northern Eyre Peninsula in the vicinity of the seismic line 08GA-G1. Results from this region are presented in approximate geographic order, from east to west, and are subdivided according to regional tectonic domains. Samples from the Curnamona Province were concentrated in the outcropping Mount Painter and Mount Babbage Inliers and from selected drillholes along the seismic line 08GA-C1. The results are also presented in approximate geographical order, from north to south, and are subdivided according to regional domains.

The new results presented in this report inform the interpretation of the recently-acquired seismic lines, as well as providing much-improved age controls on surface rocks from regions for which relatively little age control has been available. The geographic coverage of the samples includes the Middleback Ranges, the site of Australia's oldest and longest operating iron-ore mines and recently discovered Mesoarchean rocks (see *AusGeo News* 92), lead-zinc and gold prospects on Eyre Peninsula, and the Mount Painter Inlier, regarded by many as the source of uranium for the nearby Beverley and Four Mile deposits.



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### Related websites/articles

New SHRIMP U-Pb zircon ages from the Gawler Craton and Curnamona Province, South Australia, 2008-10 (Geoscience Australia Record 2010/16)

[www.ga.gov.au/image\\_cache/GA17485.pdf](http://www.ga.gov.au/image_cache/GA17485.pdf)

*AusGeo News* 99: Gawler Craton and Curnamona Province seismic lines show potential

[www.ga.gov.au/ausgeonews/ausgeonews201009/capel.jsp](http://www.ga.gov.au/ausgeonews/ausgeonews201009/capel.jsp)

*AusGeo News* 92: Foundations of South Australia discovered

[www.ga.gov.au/ausgeonews/ausgeonews200812/gawler.jsp](http://www.ga.gov.au/ausgeonews/ausgeonews200812/gawler.jsp)

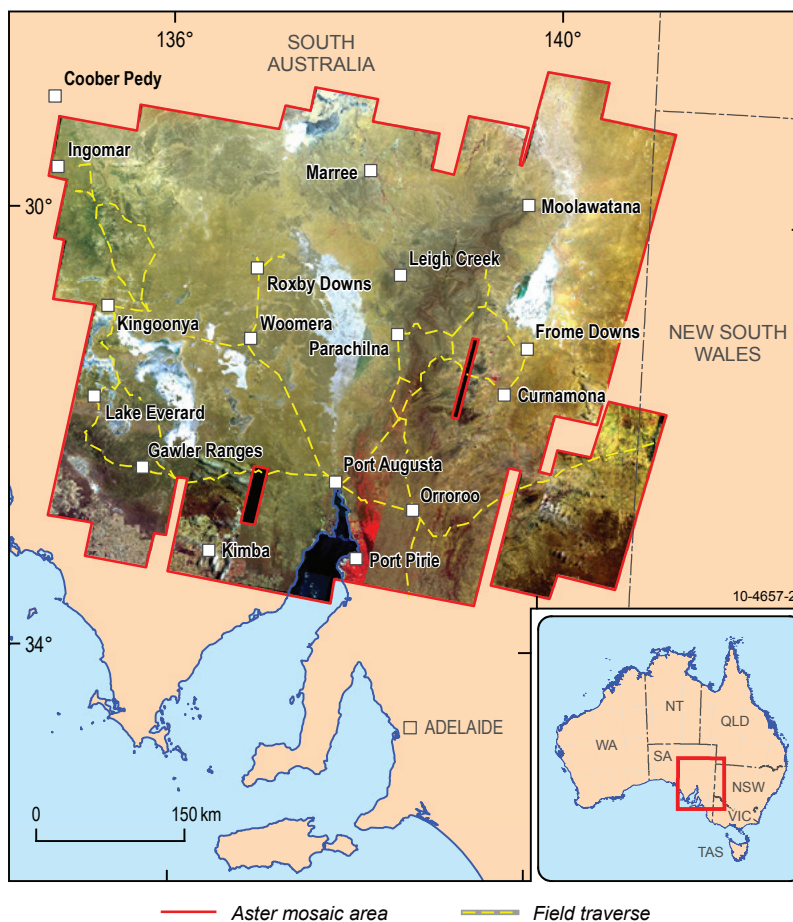
## Gawler-Curnamona region mineral exploration maps now available

Geoscience Australia and CSIRO, in collaboration with Primary Industries and Resources SA, are releasing a suite of 14 new ASTER mosaiced mineral maps covering a significant part of the Gawler-Curnamona region in South Australia. These new products have numerous applications for mapping surface materials, understanding hydrothermal footprints and targeting surface sampling for mineral exploration. They can also be used to understand mineral dispersion pathways in the regolith. The maps were produced as part of Geoscience Australia's Onshore Energy Security Program which is designed to reduce risk in exploration and develop Australia's onshore energy resources.

Alteration chemistry associated with footprints of mineral systems, as well as surface and near-surface bedrock locations, and regolith characterisation and distribution can be determined by analysing spectral ground response, particularly in short-wave infra-red.

About 110 ASTER satellite scenes have been mosaiced and processed into georeferenced products that can be quickly and easily

integrated with other datasets, such as geology and regolith maps, or other geophysical datasets in a GIS. The products have been pre-processed and calibrated with available airborne HyMap (or hyperspectral mapping) data and provide basic mineral group information. This includes ferric oxide abundance and aluminium hydroxyl (AIOH) group distribution as well as mosaiced and levelled false colour and regolith ratio images. Key materials that can be identified include clays and magnesium/iron/aluminium oxyhydroxides, as well as information on mineral composition, abundance and physicochemistry. Multispectral ASTER data has much lower spatial and spectral resolution than HyMap, but the calibration and validation of the ASTER data using the higher resolution HyMap aims to greatly improve ASTER product accuracy.



**Figure 1.** Levelled and calibrated VNR ASTER mosaic. Processing provides a significantly improved image of the study region (field traverse shown in yellow dashed lines).

### The ASTER georeferenced products include:

- False colour
- Opaque group
- Ferric oxide content
- Iron hydroxyl group (Fe-OH)
- Green vegetation
- Aluminium hydroxyl group (AIOH)
- CSIRO regolith ratios
- Ferrous iron group

### **For further information**

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### **Related articles/websites**

Gawler-Curnamona region images with accompanying notes (free ftp download)

<ftp://ftp.arcc.csiro.au/NGMM/Gawler-Curnamona ASTER Project/>

- Magnesium hydroxyl group (MgOH)
- Ferrous iron abundance
- Advanced argillic group.

## **New geophysical datasets released**

### **Gravity surveys**

Datasets from two new gravity surveys covering the Southern Cross and Gascoyne North areas in Western Australia were released in May 2010. Each dataset provides basic geophysical data which can be interpreted to reveal the sub-surface geology of the survey area and will be a valuable tool in assessing their mineral potential.

Both gravity surveys were managed by Geoscience Australia on behalf of the Geological Survey of Western Australia. The point-located and gridded data for these surveys have been incorporated into the national geophysical databases and can be obtained free online using the GADDS download facility.

### **Radiometric Anomaly Grids of Australia updated**

Updated digital gridded radiometric datasets that comprise the Radiometric Map of Australia were released on 1 July 2010. The new levelled composite K (potassium), U (uranium) and Th (thorium) grids cover Australia at 100 metres resolution and include data from geophysical surveys flown over Western Australia and Queensland in the last 12 months.

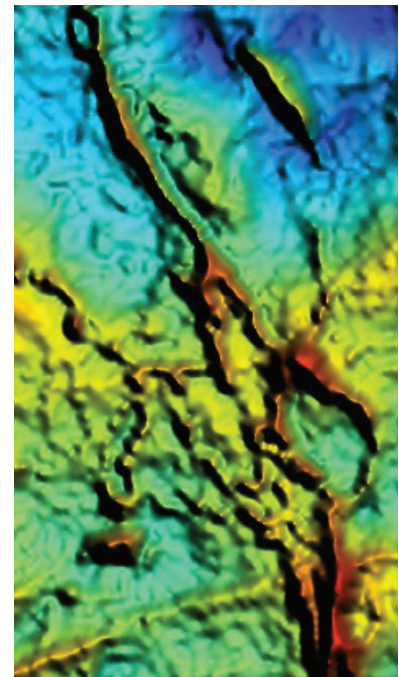
### **New Magnetic Anomaly Grid of Australia (5th Edition)**

The gridded digital data that comprise the fifth edition Magnetic Anomaly Map of Australia were released by Geoscience Australia on 1 July 2010. The new magnetic anomaly grid includes an additional 115 survey grids acquired since the fourth edition was released in 2004.

The extracts from the gridded datasets can be downloaded free-of-charge in ERMMapper format from the Australian governments' Geophysical Archive Data Delivery System (GADDS).

### **Requests for data**

The complete digital data for the Magnetic Anomaly and Radiometric Maps of Australia datasets cannot be requested through GADDS as the system has a download limit of one gigabyte for each download.



Clients requiring the complete Radiometric Map of Australia dataset (13 grids totalling 72Gb), or complete Magnetic Map of Australia (one grid approximately 8.5Gb in size) should supply digital media such as a portable external hard disk drive in NTFS format with at least 100Gb of free space. The Geoscience Australia contact is Murray Richardson (contact details below) who will arrange to load the data and for its immediate return.

**Table 1.** Details of the gravity surveys.

Survey	Date	1:250 000 map sheets	Station spacing/ orientation	Line km	Contractor
Southern Cross (WA)	January–March 2010	Jackson (part), Southern Cross, Hyden.	2500 m east–west	6343	Atlas Geophysics Pty Ltd
Gascoyne North (WA)	March–May 2010	Edmund, Turee Creek (part), Kennedy Range (part), Mount Phillips (part), Mount Egerton (part).	2500 m east–west	7292	Atlas Geophysics Pty Ltd

**For more information**

**Radiometric Map**

phone Brian Minty on +61 2 6249 9228

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**Magnetic Anomaly Map**

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**Geophysical datasets**

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**Geoscience Australia Sales Centre**

phone +61 2 6249 9966 or Freecall 1800 800 173

e-mail [sales@ga.gov.au](mailto:sales@ga.gov.au)

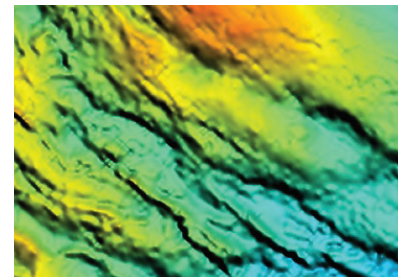
**Related websites**

Geophysical Archive Data Delivery System (GADDS)

[www.geoscience.gov.au/gadds](http://www.geoscience.gov.au/gadds)

Geological Survey of Western Australia

[www.dmp.wa.gov.au](http://www.dmp.wa.gov.au)



**New maps cover the Red Centre**

Uluru-Kata Tjuta National Park and the Watarrka National Park are the subject of two new 1:100 000 scale topographic maps recently released by Geoscience Australia. These maps will provide an important reference for visitors seeking to explore and appreciate the scenic beauty and history of Australia's vast and spectacular Red Centre, in the Northern Territory, which is an outstanding example of an ancient landscape sculptured by nature.

The Uluru-Kata Tjuta National Park map features the awe-inspiring rock formations of Uluru and Kata Tjuta. This World Heritage-listed landscape is approximately 440 kilometres southwest of Alice Springs.

The Watarrka National Park, located 330 kilometres southwest of Alice Springs, is where the vast red sandhill country of the western desert abruptly meets the ancient ranges of central Australia. It is an internationally significant conservation area and provides refuge



for more than 600 species of native plants and animals. The Park's attractions include Kings Canyon, Kathleen Springs and the Giles Track.

Each of the maps feature a topographic map useful for tourists, bushwalkers, four wheel driving and sight seeing. The reverse side of each map depicts the same area using a satellite image overlaid with major roads, camping areas, fuel services, water supplies, telephone access and medical facilities. The Uluru Kata Tjuta map includes insets featuring aerial photographs of Yulara, Uluru and Kata Tjuta at 1: 30 000 scale. The maps are valuable for emergency managers involved in search and rescue operations or dealing with bushfires and other natural disasters in these remote regions.

The maps are part of a pilot project made possible by increased Australian Government investment in the tourism industry through the National Landscapes initiative. The program identifies and promotes distinctive and inspirational destinations to domestic and international visitors.

The maps are the result of collaboration between Geoscience Australia, the Australian Government Department of Resources, Energy and Tourism, the Department of the Environment, Water, Heritage and the Arts and Northern Territory Government agencies

including the Departments of Planning and Infrastructure and Natural Resources, Environment, The Arts and Sport. The maps are available from the Geoscience Australia Sales Centre and map retailers.

**For more information or to order a copy visit**

[www.ga.gov.au/products](http://www.ga.gov.au/products)

Uluru Kata Tjuta National Park  
1:100 000 scale topographic map

[https://www.ga.gov.au/products/servlet/controller?event=GEOCAT\\_DETAILS&catno=69344](https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=69344)

Watarrka National Park 1:100 000  
scale topographic map

[https://www.ga.gov.au/products/servlet/controller?event=GEOCAT\\_DETAILS&catno=70462](https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70462)

## New maps of Australian territories

Geoscience Australia has recently released new topographic maps of three of Australia's offshore territories: Norfolk Island, the Cocos (Keeling) Islands and Christmas Island. Each territory includes a National Park which highlights their unique geography and many natural wonders.

The maps, which are at 1:25 000 scale (Norfolk Island and Cocos (Keeling) Islands and 1:30 000 scale (Christmas Island), feature detailed contour or height information, infrastructure, vegetation and reserves, and rivers and streams. Each map also includes a location map relative to the continent of Australia as well as a climate graph showing temperature and rainfall.

**Norfolk Island** is located off Australia's east coast in the South Pacific Ocean, approximately 1700 kilometres northeast of Sydney. The island is approximately eight kilometres long and five kilometres wide and has an area of 3455 hectares. Its unique geography includes 32 kilometres of mostly inaccessible cliffs which slope down to the sea only at Sydney and Emily bays. The Norfolk Island National Park, which covers about 10 per cent of the land area, contains remnants of the forests which originally covered the island including stands of subtropical rainforest.



The **Cocos (Keeling) Islands** are located in the Indian Ocean approximately 2950 kilometres northwest of Perth and 3700 kilometres west of Darwin. There are 27 coral islands in the group with a total land



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area of approximately 14 square kilometres. The northern atoll of North Keeling Island and the marine area extending one and a half kilometres around the island form the Pulu Keeling National Park. The Park features an intact coral atoll, supports an internationally significant seabird rookery, and is home to land crabs and turtles as well as a range of flora.

**Christmas Island** is located in the Indian Ocean approximately 2650 kilometres northwest of Perth and 900 kilometres northeast of the Cocos (Keeling) Islands. The island covers an area of 135 square kilometres of which 63 per cent is Christmas Island National Park. The Park also includes a marine area extending 50 metres seaward from the low water mark. The island's coastline is an almost continuous sea cliff up to 20 metres high. In a few places the cliff gives way to shallow bays with small sand and coral shingle beaches with the largest bay being Flying Fish Cove, the island's only port.

During the compilation information was contributed by the Australian Government Attorney-General's Department and Parks Australia within the Department of the Environment, Water, Heritage and the Arts.

**For more information or to order a copy visit**

Norfolk Island 1:25 000 scale topographic map

[https://www.ga.gov.au/products/servlet/controller?event=GEOCAT\\_DETAILS&catno=70147](https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70147)

Cocos (Keeling) Islands 1:25 000 scale topographic map

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Christmas Island 1:30 000 scale map

[https://www.ga.gov.au/products/servlet/controller?event=GEOCAT\\_DETAILS&catno=70145](https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70145)

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