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Contents

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CEO comment

Since the last issue of AusGeo News, Geoscience Australia has become part of the new Department of Industry. The Minister for Industry is the Hon Ian Macfarlane MP, a role he previously held during 2001–07. The Department also has a new Secretary, Glenys Beauchamp PSM. Prior to her new appointment, she served as Secretary of the former Department of Regional Australia, Regional Development and Local Government, Arts and Sport. Glenys has also served as Deputy Secretary, Department of the Prime Minister and Cabinet, and Deputy Secretary, former Department of Families, Housing, Community Services and Indigenous Affairs.

Included in this December issue is an article on Geoscience Australia's contribution to the Bushfire and Natural Hazards CRC. Every year Australian's go through fires across every state and territory. Geoscience Australia has been involved in the BNHCRC from the initial concept. Geoscience Australia is continuing its involvement in the lead up to the scheduled start of the research program around January 2014 through projects on exposure, building vulnerability and coastal hazards.

There is a report on an exciting new project to image the deep-crustal electrical conductivity of the Australian Continent commenced in Victoria this month. The Australian Lithospheric Architecture Magnetotelluric Project (AusLAMP) is a national survey being undertaken by Geoscience Australia in conjunction with AuScope, the Australian National Seismic Imaging Resource (ANSIR) , the State and Northern Territory geological surveys, the University of Adelaide and other partners.

Also included in this issue is a report on the prototype Corner Reflectors deployed outside Canberra. The Corner Reflects are part of the geospatial component of the Australian Geophysical Observing System (AGOS) enabling precise measurement of ground deformation which is a reliable means to perform ongoing radiometric and geometric measurements for calibration of SAR instruments on satellites.

Product news features the release of the 2013 preliminary edition of its Australian Geological Provinces dataset. The dataset contains descriptions and spatial extents of the fundamental geological elements of the Australian continent and its offshore surrounds. Province types include sedimentary basins, tectonic provinces such as cratons and orogens, igneous provinces and metallogenic provinces.

Geoscience Australia is committed to continuously assessing and improving our level and quality of services. As always we welcome your feedback and encourage you to use the email address at the end of each article.

Finally, I wish to thank all our readers for your continuing support and extend best wishes for the festive season and the New Year.

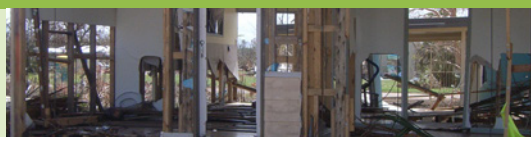
Dr Chris Pigram
CEO Geoscience Australia

Australian Government
Geoscience Australia

AUSGEO news
ISSUE 112 Dec 2013

The Bushfire and Natural Hazards CRC

Building a disaster-resilient Australia



Martine Woolf

The impacts of natural disasters are increasing in Australia, as they are throughout the world. In Australia, the summed costs of natural disasters incurred since 2011 are predicted to exceed $11 billion in insured damages alone—a figure that is likely to be two to five times higher when accounting for total damages and indirect costs (Deloitte Access Economics, 2013). Such dollar figures don't begin to quantify the intangible value of lost lives and health and community disruption. Recovery can take many years where consequences continue to be felt by those affected by the disaster.

Australia's rising disaster costs are closely linked to an expanding, ageing population that continues to build and live in exposed areas such as the coasts, floodplains and fire sensitive urban and rural areas. Indeed, the growth in the loss figures doesn't include any impact of climate change on the frequency of disasters. This places significant pressure on government policy, particularly around risk communication, infrastructure development and land use planning. In a recent workshop, emergency management organisations indicated they were progressively struggling under the need to respond to increasing numbers of people affected by disasters. The emergency management sector also mentioned additional pressure from expanding public expectations, as well as the challenge to deal with rapid advances in information technology. The question was raised as to whether current policy and service delivery models may be becoming unsustainable into the future.

Figure 1. Storm surge damage due to cyclone Yasi, 2011.

Tackling a complex issue

The mounting pressure from the effects of disasters has prompted a world-wide recognition of the need to promote resilience, rather than focusing on disaster response alone. The issues surrounding the impacts of natural disasters are complex, and promoting resilience remains easier said than done. Strategies and policies need to include a better understanding of issues such as:

- The physics and mechanics of natural hazards
- the vulnerability of the built environment and economy
- the behaviour of people under extraordinary circumstances
- the ability of organisations, institutions and policy to cope with unforeseen events and emerging technologies, as well as an interplay of all of the above.

It is likely that resilience will come only through improving our capability in all stages of the emergency management cycle; from prevention, preparation, response and recovery to natural disasters. All these complexities require a multi-disciplinary suite of evidence and solutions.

The CRC solution

The Bushfire and Natural Hazards Cooperative Research Centre (BNHCRC) was established in July 2013 to undertake vital research to support the development of cohesive, evidence-based policies, strategies and tools to build a disaster-resilient Australia. The $130 million eight years funding for the BNHCRC in cash and in-kind, which has been contributed by the Australian Government and the CRC's more than 45 partners, will improve approaches to mitigation, operational responses and community resilience to natural hazards.

The CRC is building on the work of the Bushfire CRC, which was set up in 2003 and will cease operations in 2014. In contrast to the single hazard focus of the Bushfire CRC, the BNHCRC will expand its predecessor's research work into other natural hazards, including floods, earthquakes, cyclones and storm surge, as well as bushfires. The expanded focus of the new BNHCRC appropriately reflects the impact of broader natural hazards on the Australian community.

What is a CRC?

Cooperative Research Centres are an Australian initiative, funded through the Australian Department of Industry. Within this concept, the Australian Government provides funding to establish a collaborative partnership between scientists and end users, which includes industry, government, the private sector and communities. These groups and research institutions also provide funding to the CRC as they enter into a partnership agreement. This partnering of science and end users ensures that research is solution oriented, and increases the opportunity for adoption and implementation of research outcomes. Currently, there are more than 40 CRCs working on topics ranging from health to mining, manufacturing and livestock.

bushfire&natural HAZARDSCRC

The end user partners in the BNHCRC include organisations from across the emergency management sector along with all Australian States and Territories and New Zealand. This means that the CRC includes Australian Government and State and Territory operational and policy agencies, as well as non-government organisations. A few examples from across this spectrum are the Australian Government Attorney General's Department, the Bureau of Meteorology, the Western Australian Department of Fire and Emergency Services, the New South Wales Office of Environment and Heritage, The Australian Capital Territory Parks and Conservation Service, the Victorian Country Fire Authority, the State of Queensland, the Red Cross, the RSPCA Queensland and Geoscience Australia. These organisations and others will be instrumental in driving the BNHCRC's focus on delivering innovative solutions to high priority problems.

The BNHCRC research program

To establish a diverse, high quality CRC research program, scientists and program partners work to tight timelines with the focus for the research program being developed through a workshop with end users. In its initial phase, the BNHCRC received almost 200 proposals from research institutions in response to a call for potential projects. The proposals were assessed by a committee of end users based on a range of criteria which included scientific excellence and alignment to end user needs. This assessment resulted in 35 proposals being short-listed for scientists and end users to further develop the selected projects. This process is currently underway and is expected to result in a varied research program which is scheduled to start around January 2014. In addition, the BNHCRC will run an active PhD program of up to 50 students at any time.

The research program of the BNHCRC is structured around three overarching themes, composed of clusters of inter-related projects. They are:

- Economics, Policy and Decision Making, which addresses the need for an evidence-base for decision making and prioritising resource allocation across the emergency management sector.
- Resilient People, Infrastructure and Institutions which is aimed at improving the qualification and quantification of resilience, and the factors that promote or inhibit its development. Improved understanding of these factors should help optimise the ability to identify vulnerability, manage the risk and enable resilience
- Bushfire and Natural Hazards Risks which aims to achieve improved modelling of likely events and precursor conditions, greater accuracy of forecast tools and more timely forecasts. This is expected to result in increased preparedness for the impacts of natural hazards, improved communications and warnings, and an enhanced ability to predict and mitigate the risk

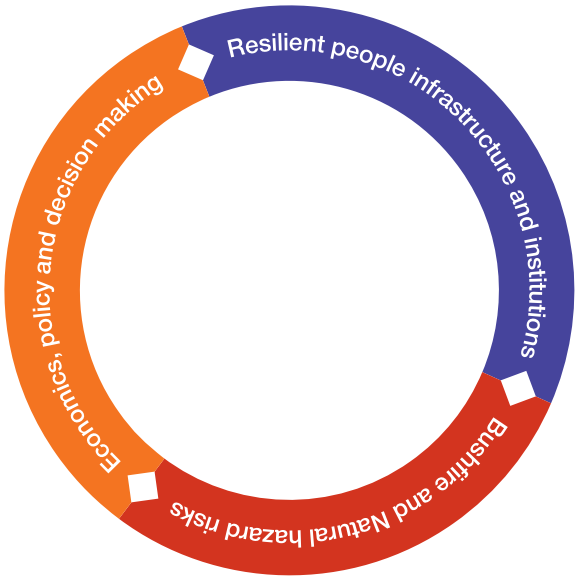


Figure 2. BNHCRC research program structure. The circle is formed by the three main research themes, with the project clusters under each theme in the corresponding colour shown below.

Towards a more resilient Australia

The BNHCRC is set to provide a range of world-class research outcomes that will impact across the entire emergency management sector. The multi-disciplinary nature of the research program aims to develop a next generation of experts, solutions and techniques. Ultimately, the BNHCRC aims to produce outcomes which improve the capability of the emergency management sector to plan for, prepare for, respond to and recover from the disasters that continue to have an impact on Australia. The ability of the BNHCRC to meet this ambitious objective depends on active and on-going collaboration between the researchers and the end users. The variety of end users involved in the BNHCRC will ensure the research reflects the complex issues driving Australia's disaster resilience.

Geoscience Australia's involvement in the BNHCRC

Geoscience Australia has been involved in the BNHCRC from the initial concept and provided a senior hazards scientist to support the implementation committee. Geoscience Australia is continuing its involvement in the lead up to the scheduled to start of the research program around January 2014 through projects on exposure, building vulnerability and coastal hazards.

These projects involve close collaboration with academic partners, as well as end users from, among others, the Office of Environment and Heritage and State Emergency Services in New South Wales, the Victorian Department of Planning, Transport and Infrastructure, the South Australian Department of Environment, Water and Natural Resources, and the Tasmanian Department of Premier and Cabinet. In its role as the Australian Government's geoscience agency, Geoscience Australia also is involved as an end user on several projects, such as projects on hardening buildings and infrastructure to a range of hazards, as well as several Earth-observation related projects.

Related articles and websites

BNHCRC and its research program
www.bnhcrc.com.au

For more information

email ausgeomail@ga.gov.au

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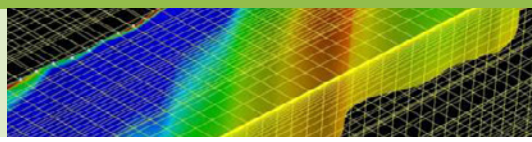
AUSGEO news
ISSUE 112 Dec 2013

New National Magnetotelluric (MT) survey gets underway

Comprehensive national survey



Ned Stolz

An exciting new project to image the deep-crustal electrical conductivity of the Australian continent commenced in Victoria in November. The Australian Lithospheric Architecture Magnetotelluric Project (AusLAMP) is aimed at acquiring MT soundings across Australia on a grid of approximately 50 km (1/2 degree geodetic). This visionary, big-picture program has been made possible by the new funding Geoscience Australia received in November 2012 for the acquisition of pre-competitive data.

Electrical conductivity imaging allows characterisation of the deep-crust and upper mantle, and can define fundamental blocks of crust, as well as delineate major sutures and boundaries. This information is of significant importance to researchers

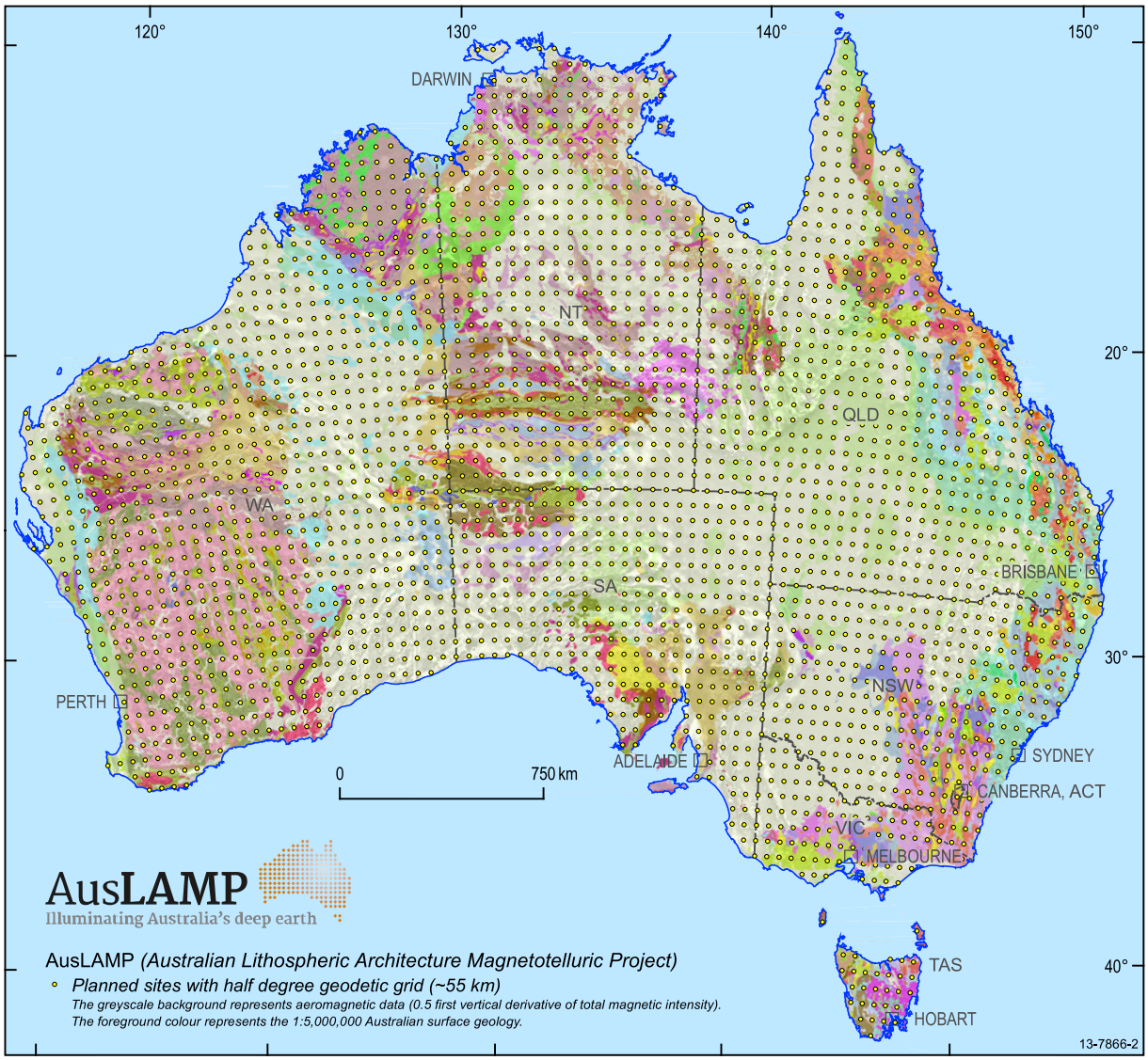


Figure 1. Map of Australia showing the distribution of 50 km by 50 km AusLAMP stations. The background shows the surface geology with Precambrian rocks in darker colours.

attempting to reconstruct the tectonic evolution of the Australian continent. The information also provides fundamental clues to resource explorers about large-scale structures which control mineral deposition and hydrocarbon basin formation. Conductivity images will complement information from national gravity and tele-seismic surveys which map the density and seismic-velocity of the crust and upper mantle.

Investigating Australia's lithospheric architecture is one of the key research themes of the Uncover initiative, launched by the Australian Academy of Science in 2012 to address Australia's declining resource discovery rate. AusLAMP is a national collaboration led by Geoscience Australia with contributions from AuScope (a component of the National Collaborative Research Infrastructure Strategy), universities, research organisations and the State and Northern Territory geological surveys. The acquisition phase of AusLAMP will collect over 2800 MT soundings across Australia over several years. A map showing the proposed approximate location of the AusLAMP stations is presented in Figure 1.

The MT Method

Magnetotelluric imaging measures the Earth's response to naturally occurring magnetic and electrical signals generated by solar activity and lightning strikes. An MT station uses dipoles with electrodes and a magnetometer to continuously record two components of the electric-field and three components of the magnetic field as a time-series. A typical field set-up for MT is shown in Figure 2.

Figure 2. An AusLAMP MT station set-up for continuous recording of electric and magnetic signals in the field.

The time-series measurements are converted to a set of frequency-amplitude/ phase responses—the lower the frequency, the deeper the source of the Earth response. In order to image the deep crust and upper mantle it is necessary to measure very low frequencies, which correspond to long periodicities of up to six hours. To ensure the MT measurement captures strong natural signals at such long periods involves recording continuously for about four weeks.

Converting the magnetic and electric field response from hundreds of MT stations into a coherent image of the deep Earth electrical conductivity structure requires a sophisticated mathematical inversion algorithm. Geoscience Australia has established a powerful MT inversion capability by installing newly developed programs on high performance computers at the National Computational Infrastructure facility at the Australian National University. This software inverts MT measurements to a 3-D Earth conductivity model (Figure 3) and can split large computational problems into smaller components that are then solved in parallel. This will enable the AusLAMP data to be inverted to a very large model thousands of kilometres in the east and west dimensions and hundreds of kilometres in the depth dimension.

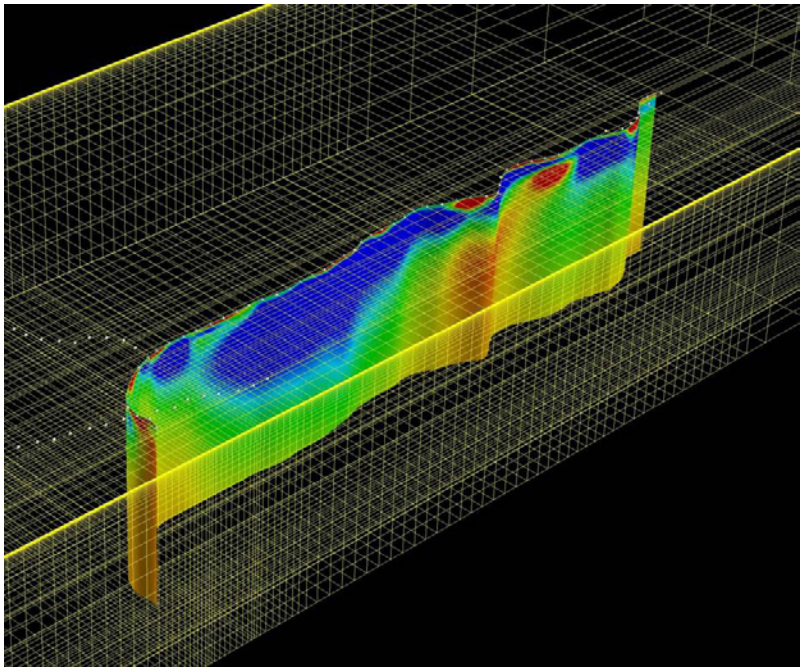


Figure 3. A deep-crustal resistivity image produced by 3D inversion of a transect of long-period MT stations. The profile is approximately 300 km long and the depth extent is about 100 km.

AusLAMP

Establishing MT stations which are robust and secure enough to record continuously for four weeks is a major logistical exercise requiring state of the art equipment, batteries, solar panels, data loggers and communication devices. Initially, AusLAMP will use long period MT equipment purchased through AuScope, maintained by the University of Adelaide and accessed through the ANSIR facility for deep Earth imaging. Approximately 25 sets of AuScope equipment are available at the current time but these must be shared between all the MT researchers in Australia, and cannot be used for AusLAMP exclusively.

The Geological Survey of Victoria provided funding for Geoscience Australia field technicians to begin deploying 10 sets of long period MT equipment in Victoria during November 2013. A series of field visits will recover and re-deploy equipment throughout 2014 so that the entire State is covered by about 95 stations. Deployment will then move on to another State, depending on funding and equipment availability. Geoscience Australia is enthusiastic about collaborating and cooperating with as many organisations as possible to ensure that adequate resources can be made available to complete this visionary, nation-building survey. All data and results will be posted on a dedicated AusLAMP website as soon as they are deemed fit-for-purpose. Australian and international researchers and explorers will be encouraged to access the data and incorporate results into their individual modelling and research programs.

Related articles and websites

AuScope Earth Imaging
http://auscope.org.au/site/imaging.php

ANSIR
http://ansir.org.au/index.php

Geoscience Australia MT
www.ga.gov.au/minerals/disciplines/geophysics/magnetotellurics.html

Uncover
www.science.org.au/policy/uncover.html

For more information

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email graham.heinson@adelaide.edu.au

in brief

Major program of deep-crustal seismic reflection transects

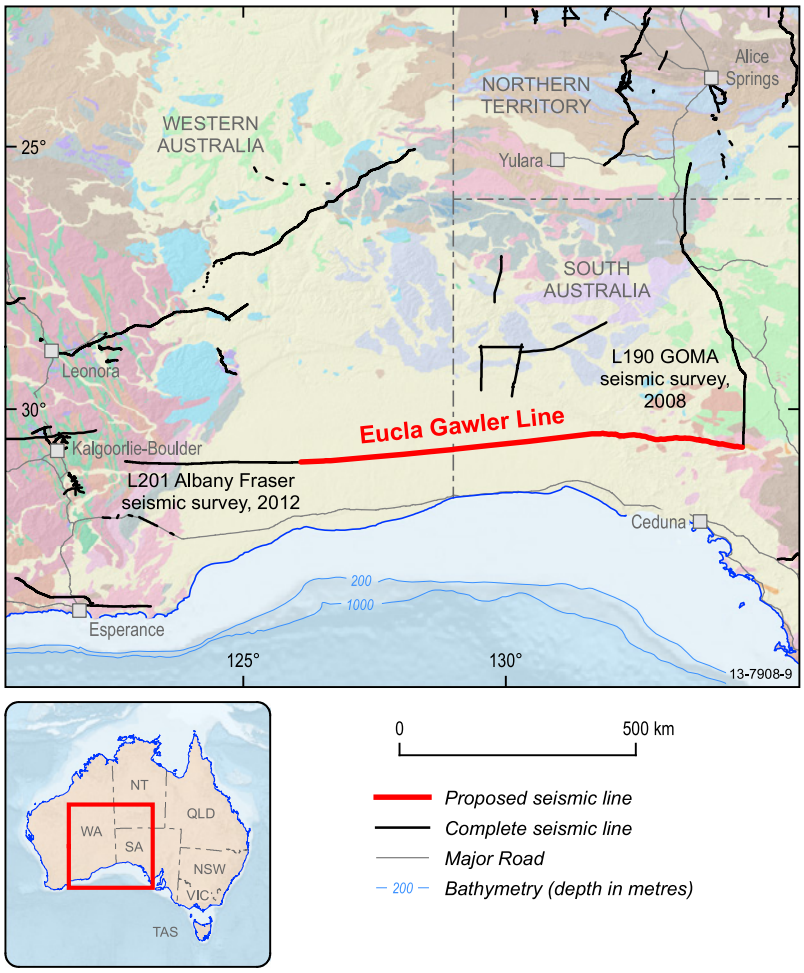

Figure 1. Location of the Eucla-Gawler seismic transect (red) overlain on the geology map of Australia and with existing deep crustal seismic transects (black).

Figure 2. Vibroseis trucks working on a GA deep crustal reflection seismic transect

A major new tranche of regional-scale seismic reflection surveys commences this month with a field crew mobilising to the Nullarbor region of Western Australia. In an exciting national collaboration, Geoscience Australia will be working with the Geological Survey of Western Australia, the Geological Survey of South Australia and AuScope Earth Imaging (part of the National Collaborative Research Infrastructure Strategy) to acquire data along the trans-Australian railway-line between Haig (WA) and Tarcoola (SA). Geoscience Australia will be contributing financially to the project through the new minerals pre-competitive data funding that it received in November 2012, with funding in South Australia through the PACE initiative and in Western Australia through the Exploration Incentive Scheme (EIS). Geologically, the 870 km transect (Figure 1) will cross the greenfields Eucla Basin, image continental-scale basement magnetic and gravity features such as the Mundrabilla Lineament and the Coompana magnetic anomaly, and also extend into the highly prospective Gawler Craton. The line will fill a 'gap' in seismic coverage to complete a string of deep-crustal seismic transects stretching from west to east across the Australian Continent. This big-picture coverage will enable researchers and resource-explorers to assess major crustal

in brief

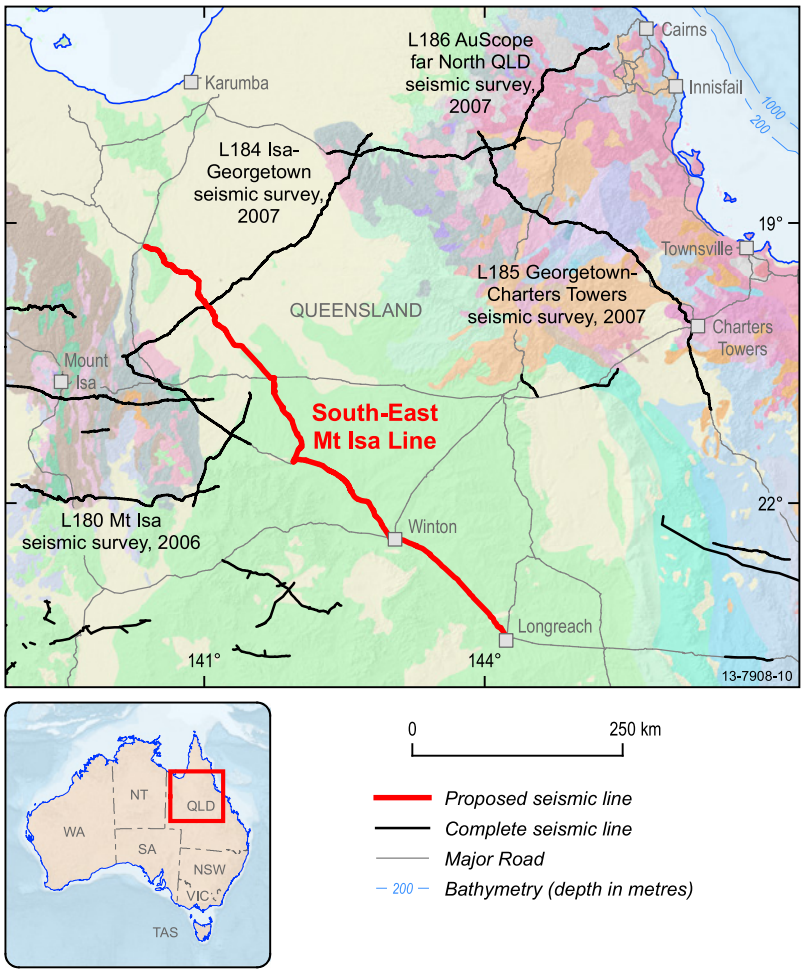

Figure 3. Location of the south-east Mt Isa seismic transect (red) overlain on the geology map of Australia and with existing deep crustal seismic transects (black).

Figure 4. Onshore seismic crew en-route to a GA deep-crustal seismic transect in Western Australia. A typical remote area crew consists of 40 people, over 20 4WD and other support vehicles, and a mobile camp.

blocks and deep-crustal structures using a nationally consistent dataset, and will be an important asset to geologists trying to reconstruct the tectonic evolution of Australia.

A second major survey is scheduled to commence in Queensland around April 2014, and is a collaboration between Geoscience Australia and the Geological Survey of Queensland, with funding coming from the Queensland Government Greenfields 2020 program. The line will extend 670 km over the south-east Mt Isa Province (Figure 3) and cross the Cork Fault, a continental-scale structure separating the Mt Isa block from the geological terrains underneath the Eromanga Basin to the south. The line will also traverse the Millungera Basin, discovered by a seismic survey acquired during the Onshore Energy Security Program, which has potential for unconventional hydrocarbons, carbon capture and storage, and geothermal energy.

The final survey proposed for the 2013–14 financial year is along the Great Northern Highway in northwest Western Australia (Figure 5). The 660 km line would be funded by the Commonwealth Government's National CO_2 Infrastructure Plan and the Geological Survey of Western Australia and would cover the onshore Canning Basin, extending from just north of Port Headland to the Gibb River Road near Derby. Acquisition is expected to commence in April–May 2014.

in brief

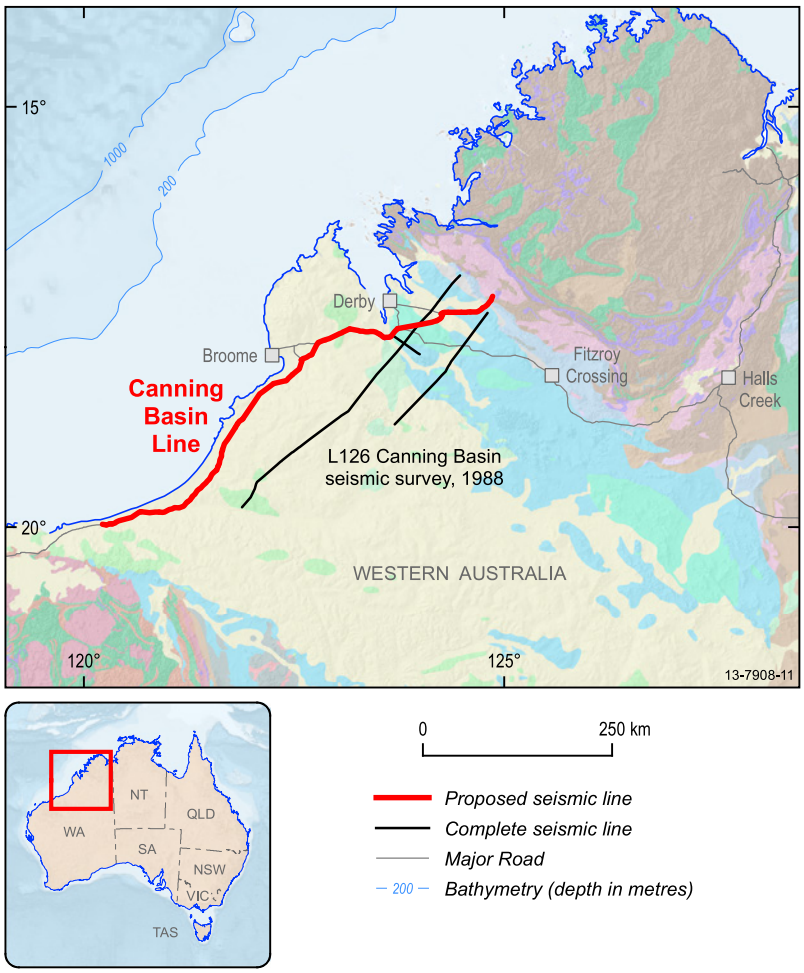

Figure 5. Location of the Canning Basin seismic transect (red) overlain on the geology map of Australia and with existing deep crustal seismic transects (black).

Related articles and websites

Seismic Acquisition and Processing Project
www.ga.gov.au/minerals/projects/current-projects/seismic-acquisition-processing.html

Seismic
www.ga.gov.au/minerals/disciplines/geophysics/seismic.html

Continental Geology Section
www.ga.gov.au/minerals/projects/current-projects/continental-geology.html

For more information

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New seabed discoveries in the Timor Sea

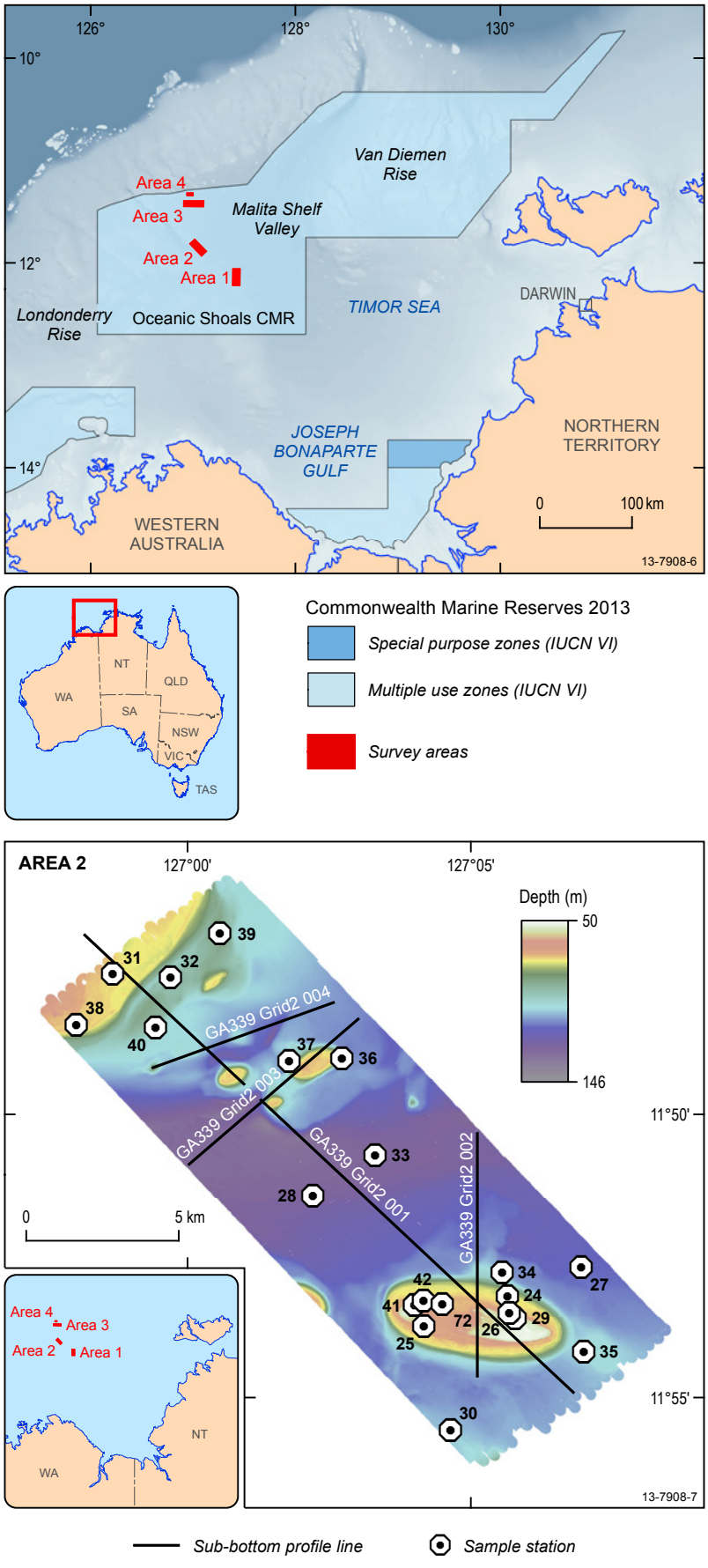
In 2012, Geoscience Australia completed a marine survey of an area in the newly declared Oceanic Shoals Commonwealth Marine Reserve in the Timor Sea. Undertaken as a collaborative survey with the Australian Institute of Marine Science (AIMS), the University of Western Australia and the Museum and Art Gallery of the Northern Territory, the survey was an activity within the Marine Biodiversity Hub funded through the Australian Government's National Environmental Research Program. The Oceanic Shoals area was chosen through discussion with Department of the Environment for whom the area is of particular interest and is highlighted in marine bioregional plans for the North and Northwest Marine Regions.

The 25 day survey was undertaken during September and October 2012 on the AIMS Research Vessel, RV Solander, and acquired data from four areas in the western sector of the Oceanic Shoals Commonwealth Marine Reserve. Covering 507 square kilometres, these areas incorporate a variety of seabed geomorphic features across water depths ranging from 30 to 180 metres, including carbonate banks, terraces and pinnacles, as well as soft sediment plains and valleys.

Data acquired from each survey area included:

- high-resolution multibeam sonar bathymetry and acoustic backscatter
- sub-bottom acoustic profiles

in brief



- physical samples of seabed sediments and infauna (hard- and soft-bodied organisms)
- physical samples of epibenthic biota (sponges and corals)
- video and still camera observations of seabed habitats and associated biological communities, including fish
- observations of pelagic predators (whales, dolphins)
- oceanographic measurements.

In total, samples and/or video observations were collected at 70 stations.

Significant findings included:

- The geomorphic diversity of the seabed within the Oceanic Shoals Commonwealth Marine Reserve is well represented in the western part of the reserve, with numerous banks and terraces providing hard substrate for benthic communities.
- The biodiversity on banks appears to vary as a function of water depth and associated light and turbidity conditions, with shallower banks (less than 45 metres) supporting more biodiversity than deeper banks, including hard corals.

Figure 1. Location map of areas investigated during the Oceanic Shoals Commonwealth Marine Reserve Biodiversity Survey (**top**).

Figure 2. False colour bathymetry image of Area 2 with sub-bottom profile (sparker) lines and sampling stations indicated **(bottom)**.

in brief

- Sponges are located on all the banks that were surveyed, with 350 species identified in the samples collected. However, species richness and endemism of sponges in the survey area may not be as high as that further to the east. This assumption is based on initial comparison with sponges from previous Geoscience Australia surveys in the Timor Sea.
- Spatial gradients in epibenthic biodiversity exist as a possible function of marked changes in substrate, light and turbidity levels along the depth transition from bank to terrace to plain.
- Tidal currents play an important role in regulating levels of suspended sediment (turbidity) and in the redistribution of sediment across the plains and around banks and terraces, with some smaller banks partly buried by sediment.
- Demersal fish communities respond to spatial patterns in benthic biodiversity, occurring in larger and more diverse populations on the shallower, less turbid banks.
- A wide variety of high-order pelagic fish species occur in these waters.

Data collected during the survey will be used to support research being undertaken in the Marine Biodiversity Hub, including the modelling of ecosystem processes for the northern region, and to support the work programs of the Australian Government Department of the Environment. These data will be made publicly available via the Marine Biodiversity Hub website and the Australian Ocean Data Network Portal, adding to the knowledge base of Australian tropical shelf habitats and contributing to the long term management of these poorly understood areas.

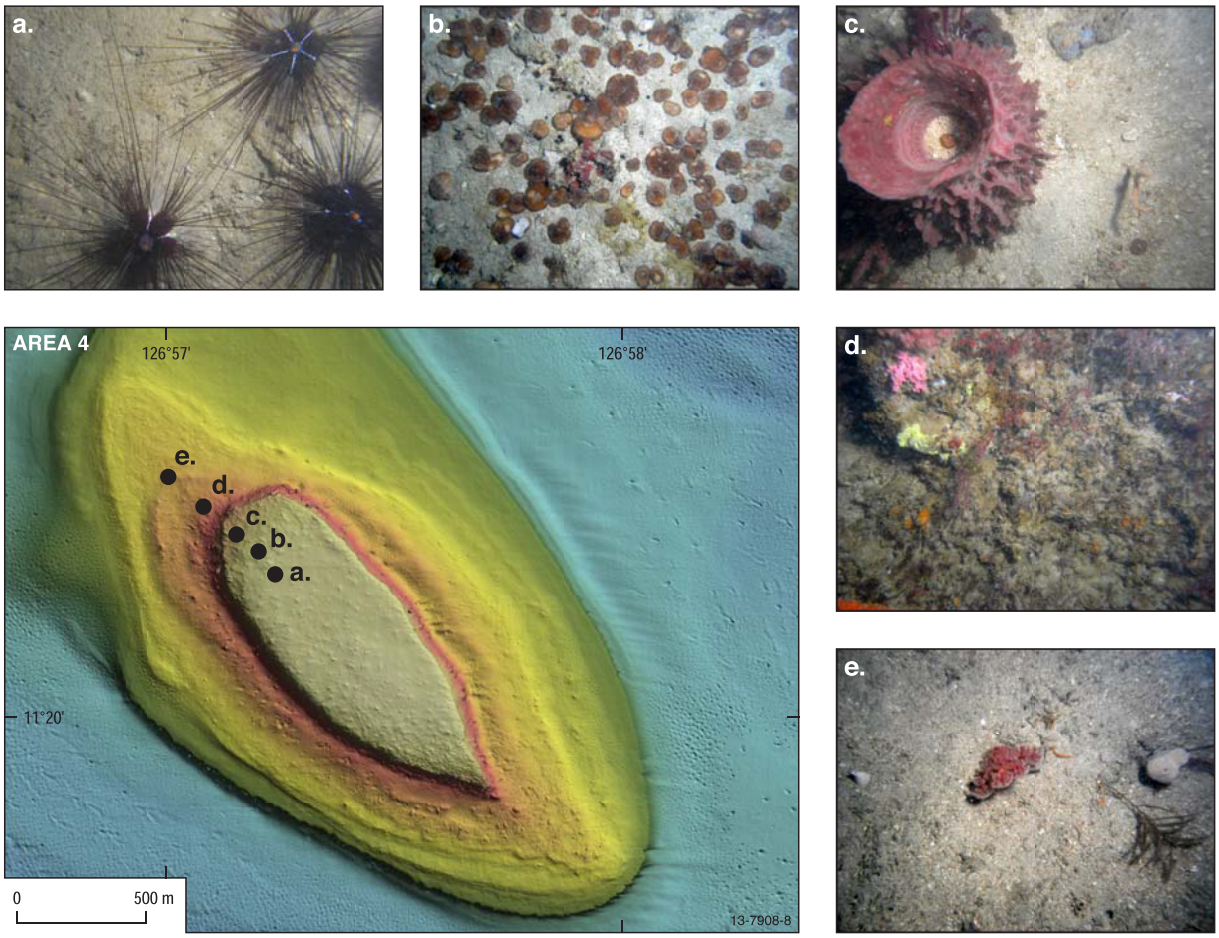


Figure 3. Representative underwater photos from Area 4, showing: **(a)** the top of the bank with conspicuous sea urchins; **(b)** mushroom corals; **(c)** a barrel sponge Xestospongia; **(d)** the flank of the bank supporting encrusting and low-relief epifauna, and; **(e)** the margin of the bank showing scattered epifauna and low levels of bioturbation.

in brief

Related articles and websites

Marine bioregional plans
www.environment.gov.au/topics/marine/marine-bioregional-plans

Oceanic Shoals Commonwealth Marine Reserve (Timor Sea) Biodiversity Survey *(Geoscience Australia Record 2013/38).*
www.ga.gov.au/metadata-gateway/metadata/record/gcat_76658

For more information

email ausgeomail@ga.gov.au

Synthetic Aperture Radar calibration using the Australian Geophysical Observing System corner reflectors

Geoscience Australia will conduct a field performance evaluation during the next 3 to 4 months of 18 corner reflector prototypes which will be used to support the Australian Geophysical Observing System (AGOS). The prototypes (Figure 1) have been deployed over a test site north of Canberra. Synthetic Aperture Radar (SAR) satellites operating at X and C-band will be used to acquire data over the test site for evaluation. Following the evaluation, the corner reflectors will be deployed permanently in areas of research interest for AGOS.

Figure 1. Corner reflector deployed at a test site north of Canberra.

Through its Education Investment Fund (EIF) the Australian Government has invested $23 million in building AGOS, which is a component of the AuScope program. The geospatial component of AGOS will include:

- Global Navigation Satellite System (GNSS) instrumentation
- a network of high precision GNSS monuments
- a robotic GNSS antenna calibration facility
- high precision GPS monuments
- corner reflectors
- a SAR data repository.

These geospatial components will enable the precise measurement of ground deformation with the corner reflectors supporting studies that use Interferometric SAR (InSAR) techniques. As a secondary benefit, the corner reflectors will offer a reliable means to perform ongoing radiometric and geometric calibration of SAR instruments on satellites.

in brief

The performance of SAR instruments needs to be verified by internal and external calibration to achieve high radiometric and geometric accuracies. For radiometric calibration, the performance of the SAR instruments is related to a known measurement standard; point targets such as corner reflectors or active transponders can be used. Geoscience Australia has chosen corner reflectors because they are low maintenance and low cost compared to active devices such as transponders, which also need power for operation. Relative to their small size, corner reflectors exhibit a high radar cross section (RCS) that can be maintained over a wide range of incidence angles, ensuring their identification in the SAR image.

Geoscience Australia designed and manufactured 18 corner reflector prototypes with different sizes and material finishes to test and identify their optimal characteristics for InSAR and calibration applications. A triangular trihedral design was chosen for the reflectors because of the simplicity of manufacture, long-term structural rigidity and relative stability for large radar cross section. The prototypes were characterised at the Defence Science and Technology Organisation ground range radar test facility in Adelaide, by comparing actual RCS measurements with the expected theoretical values and quantifying the change in RCS at different azimuth and elevation angles. Results from the characterisation of the corner reflectors have shown that the RCS performance of the prototypes is comparable to theoretical values.

The corner reflector infrastructure is expected to be exploited by international satellite operators for independent verification of SAR instrument performance, and will count towards Australia's valuable contribution to international efforts on calibration of satellite borne instruments.

For more information

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product news

Australia's geological provinces revealed

Geoscience Australia has released a new, preliminary 2013 edition of its Australian Geological Provinces GIS dataset. The dataset provides a perspective of Australia through geological time which will help researchers, legislators, and resource exploration companies develop a greater understanding of what lies beneath the continent and its offshore jurisdiction.

The Australian Geological Provinces dataset contains descriptions and spatial extents of Australia's fundamental geological elements, such as sedimentary basins and tectonic provinces, including cratons and orogens, as well as igneous and metallogenic provinces from the Archean to the present day.

Information has been captured for each province on their respective age, geological history, contained stratigraphic units, relationships to other provinces and mineral resources, along with material from selected published references. Links in the dataset allow users to navigate to more detailed information about the stratigraphic units in a province via the Australian Stratigraphic Units Database.

The full 2D spatial extent of each province has been captured and includes the extent of a province under any overlying cover material, as well as the extent of outcrop of many provinces. Where possible, the outlines of provinces have been attributed with information about the source, accuracy, and interpretation method of those lines. The spatial data has been captured mainly at 1:1 million scale for intended use at 1:2.5 million scale or less.

Significant collaboration was undertaken with the State and Northern Territory geological

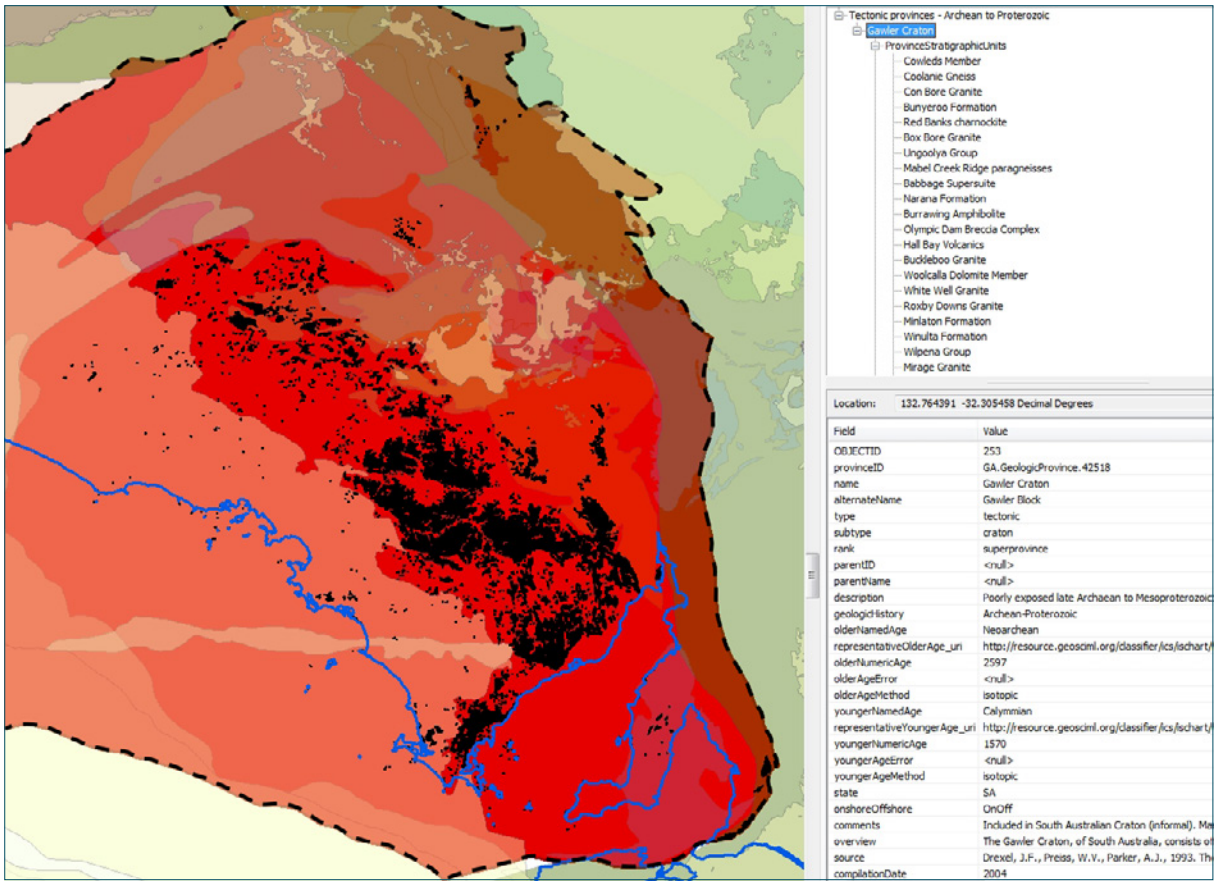

Figure 1. Screen-shot of example data for the Gawler Craton, showing the full extent of the craton (red with dashed outline), overlying sedimentary basins (various yellows and greens), and outcrop (black). The information on the right of the figure shows a summary description of the craton and a list of stratigraphic units with links to detailed unit descriptions.

product news

surveys to achieve a consensus definition and extent of each province. Many provinces extend over large areas of Australia, resulting in some challenging rationalisation of existing mapped boundaries across several State and Territory borders. Every effort has been made to record the most up-to-date and agreed interpretation of all provinces, but the definition of some may still be contentious.

It should be noted that this preliminary edition (version 2013.01) of the dataset is not a complete representation of all of Australia's geological provinces. However, it is the most comprehensive national dataset available. Further work is underway at Geoscience Australia, in cooperation with the State and Territory geological surveys, to complete the national coverage of all of Australia's geological provinces. Additionally, not all the provinces descriptions in this preliminary edition have undergone a rigorous quality assurance check to ensure the accuracy and completeness of their descriptions.

The dataset is available in shapefile and ESRI geodatabase formats as a free download. This new dataset replaces Geoscience Australia's 1998 Australian Sedimentary Basins dataset, and supersedes the previous, and incomplete, 2004 version of the Australian Geological Provinces dataset.

Related articles and websites

Australian Stratigraphic Units Database
www.ga.gov.au/products-services/data-applications/reference-databases/stratigraphic-units.html

Australian Geological Provinces, 2013.01 edition
www.ga.gov.au/metadata-gateway/metadata/record/gcat_74371

For more information

phone Ollie Raymond on +61 2 6249 9575
email oliver.raymond@ga.gov.au

events

Earth Science Week 2013

Geoscience Australia hosted Australia's Earth Science Week celebrations in October with activities supporting the international theme of *Mapping Our World,* promoting awareness of the many uses of maps and mapping technologies.

As part of this year's theme, scientists and cartographers informed the public about how geoscientists, geographers, and other mapping professionals use maps to represent land formations, natural resource deposits, fault lines, geologic heritage, and other geophysical features. A *Geocaching* activity based on freely available smartphone GPS technology provided opportunities for the public to obtain hands-on experience through an outdoor treasure hunt using GPS-enabled devices. Participants were asked to navigate to a specific set of GPS coordinates and then attempt to find a container hidden at the location.

Geoscience Australia also conducted its annual photography competition—*Top GeoShot* as part of Earth Science Week 2013.

More than 350 outstanding entries were received for this year's *Top GeoShot* competition, including 67 entries for the Student category. The winners were announced as part of Earth Science Week celebrations. Congratulations to all the winners.

Related articles and websites

Top GeoShot 2013
www.ga.gov.au/education/public-events/archive/top-geoshot-2013.html

For more information

email ausgeomail@ga.gov.au

Figure 1. Overall Winner, Peter Power, Coogee Cliffs, Coogee, New South Wales **(left)**. People's Choice, Mieke Boynton, Secrets and Whispers, Western Australia **(right)**.

events

National Youth Science Forum 2014
6 January–1 February 2014

Physics, Building 38, Science Road
The Australian National University
Canberra ACT 0200

phone: +61 (0)2 6125 2777
fax: +61 (0)2 6125 8015
nysf@nysf.edu.au
www.nysf.edu.au

Mapping our World: Terra Incognita to Australia
7 November 2013–10 March 2014

National Library of Australia
Exhibition Gallery

www.nla.gov.au/exhibitions/mapping-our-world

Specialist Group in Tectonics and Structural Geology (SGTSG)
2–8 February 2014

Biennial meeting of the Special Group in Tectonics and Structural Geology
Thredbo, NSW
Contact: Gordon Lister

gordon.lister@anu.edu.au
www.sgtsg.org.au

Winter NAPE
4–7 February 2014

George R Brown Convention Center
Houston, Texas
NAPE Headquarters
4100 Fossil Creek Blvd.
Fort Worth, Texas 76137

phone: 817 847-7700
info@napeexpo.com
www.napeexpo.com/nape-shows/winter-nape

PDAC 2014
2–5 March 2014

Metro Toronto Convention Centre
222 Bremner Blvd, Toronto, ON, CANADA
135 King Street East
Toronto, Ontario M5C 1G6

phone: 416 362 1969
fax: 416 362 0101
info@pdac.ca
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mlawler@appea.com.au
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