

## *Enhanced* GEOSPATIAL AND EARTH MONITORING *capabilities*

Geoscience Australia's new Geospatial and Earth Monitoring Division (GEMD) is working to improve the safety of communities and the protection of Australia's critical infrastructure, through its comprehensive monitoring, research and mapping programs.

The merger of Geoscience Australia's Geohazards and National Mapping Divisions enhances the agency's geospatial information and knowledge management, and earth observations capabilities. Combining the strengths of the two former divisions will improve the agency's capacity to respond flexibly to current and emerging government priorities.

In developing its risk assessment, mitigation and Earth monitoring capacity, GEMD will provide a single point of focus for negotiating with jurisdictions and industry on technical and implementation aspects of spatial sciences in government. It will also facilitate the use of geodesy, satellite remote sensing and other earth observation and monitoring tools in new areas of rapid and slow-onset hazards, and climate change impact.

The new division supports five key agency functions under the leadership of Dr Chris Pigram, former Chief of Geoscience Australia's Minerals Division.

### Earth Monitoring Group

The Earth Monitoring Group is tasked with developing and implementing the Australian Government's 24/7 Tsunami Warning System. It will also continue to deliver earthquake, nuclear event, geomagnetic event and geodesy monitoring and advice services.

**Group Leader: Dr Barry Drummond (email: [barry.drummond@ga.gov.au](mailto:barry.drummond@ga.gov.au))**

### Risk Research Group

The Risk Research Group is continuing its natural and human-caused hazard research to enhance Australia's risk mitigation capabilities through policy and decision-maker support. The group is working with other agencies to develop and collect information on natural disasters, and develop risk models for forecasting the impact of future hazard events.

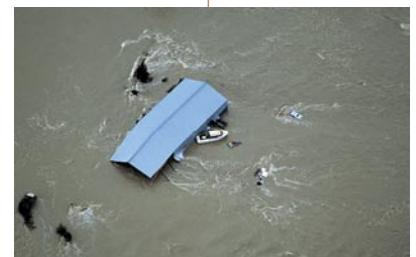
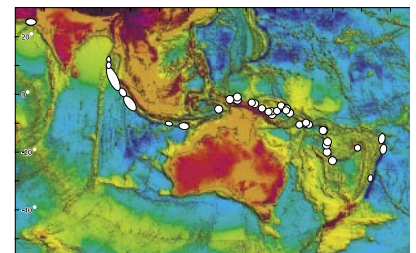
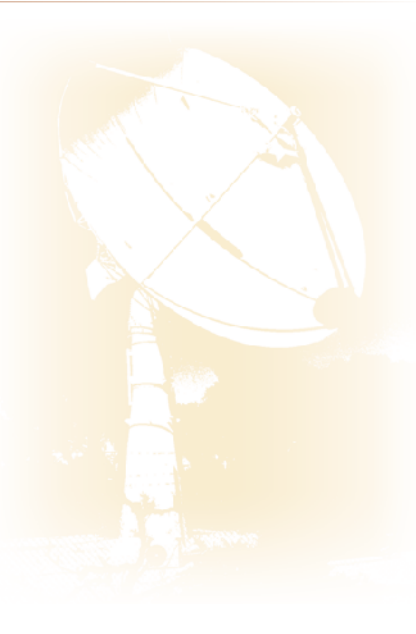
**Group Leader: Dr John Schneider (email: [john.schneider@ga.gov.au](mailto:john.schneider@ga.gov.au))**

### National Mapping and Information Group

The National Mapping and Information Group provides maps and fundamental spatial data sets to emergency managers, defence, other government departments and the public. It also coordinates the agency's national mapping activities and standards, through the Intergovernmental Committee for Surveying and Mapping (ICSM).

**Group Leader: Mr Ian O'Donnell (email: [ian.odonnell@ga.gov.au](mailto:ian.odonnell@ga.gov.au))**

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# GEMD

## Enhanced GEOSPATIAL AND

## EARTH MONITORING *capabilities* (continued)

### Spatial Information Access and Remote Sensing Group

The multifunctional Spatial Information Access and Remote Sensing Group supports both internal and external clients by providing spatial data, remote sensing, GIS, and visualisation services, and facilitating data integration and interoperability. The group also operates Australia's public good remote sensing satellite data reception facilities, and provides access to and delivery of geographic, spatial and remote sensing data.

**Group Leader: Dr Adam Lewis (email: [adam.lewis@ga.gov.au](mailto:adam.lewis@ga.gov.au))**

### Spatial Information Industry Advice and Facilitation Branch

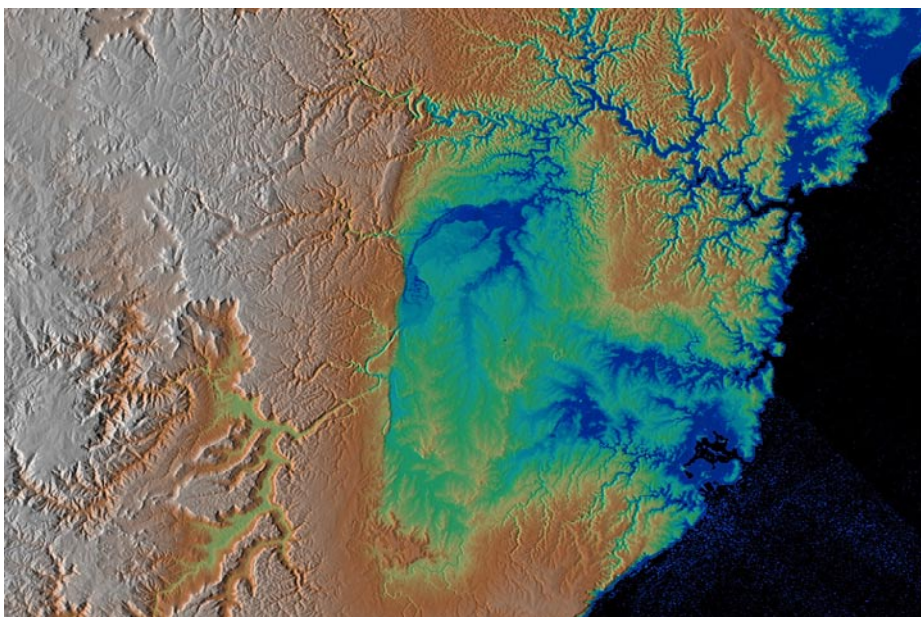
The newly formed Spatial Information Industry Advice and Facilitation Branch will provide advice and information to government. The branch aims to facilitate

improved decision-making through better use of spatial information industry capability. It will focus on providing the government with advice on the form and capacity of the spatial information industry and its strategic issues. It will also work to improve access to industry capabilities and Australian Government support programs.

**General Manager: Mr Peter Holland (email: [peter.holland@ga.gov.au](mailto:peter.holland@ga.gov.au))** ☐

## Geologic sources of seismic hazard *in Sydney Basin*

The Sydney Basin is home to a significant proportion of the Australian population, and the 1989 M5.6 Newcastle earthquake demonstrated that the basin is vulnerable to impact from a relatively modest earthquake. In spite of this, few investigations have been conducted to identify and characterise potential sources of seismic hazard. A recent major study on the southern part of the basin found that "The available data are less complete than ideal for the purposes of probabilistic seismic hazard analysis". Essentially, the extreme infrequency of large earthquake events in intraplate regions, such as Australia, means that the short historic record of seismicity forms a poor basis on which to make informed hazard assessments. Consequently, large earthquakes might be expected to occur in unanticipated places. In these circumstances, the record of pre-historic seismicity captured in the landscape provides an important tool to capture the recurrence intervals of large and damaging earthquakes.



▲ **Figure 1.** SRTM 3-second Digital Elevation Model over the Sydney Basin. The Lapstone Structural Complex is the northerly trending linear feature in the middle of the image. Sydney CBD is in the centre-right.

To address this issue, Geoscience Australia held a workshop entitled "Geologic sources of seismic hazard in the Sydney Basin" in April. The workshop was attended by 30 expert representatives from government, academia and industry. They heard a number of talks covering aspects of geology, geomorphology, seismicity and hazard. It was found that in the recent geologic past there is robust geomorphic evidence in stream profiles, ponded drainage and along several faults scarps, that large earthquakes have occurred on faults comprising the Lapstone Structural Complex (LSC). A clustering of epicentres recorded in the last several decades beneath and to the west of the LSC show that these structures may still be active and pose an unquantified hazard to greater Sydney. The possibility of future neotectonics research was examined in order to support future seismic hazard studies in the Sydney area.

A proceedings and discussion volume will be published as a Geoscience Australia Record in November 2005.

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## Major coral reef discovery

### IN GULF OF CARPENTARIA

Scientists from Geoscience Australia recently announced the discovery of a previously unidentified major coral reef province in the southern part of the Gulf of Carpentaria.

This discovery makes the Gulf of Carpentaria an important coral reef region of Australia encompassing as many as 50 small coral patch reefs, one to ten kilometres in diameter, plus an elongate platform coral reef that is around 100 kilometres in length extending westwards from Mornington Island. The thickness and wide distribution of the reefs point to a long history of reef growth extending possibly over the past 100 000 years or more.

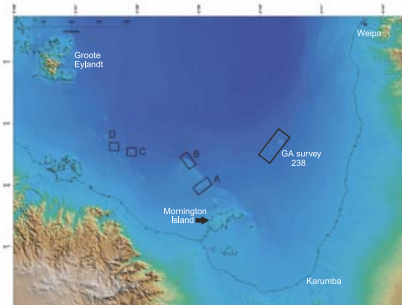
The first hint of the reefs' existence came two years ago during a survey in the Gulf conducted by Geoscience Australia (see *AusGeo News 72*). Three patch reefs which varied from one to ten kilometres across were discovered northeast of Mornington Island.

Information on the distribution of coral reefs in the Gulf will assist the Department of Environment and Heritage in developing the Northern Regional Marine Plan as well as establishing a series of marine protected areas in northern Australia to represent the diverse range of habitats in that region.

Geoscience Australia led the survey which was run in conjunction with the Department of Environment and Heritage and CSIRO Marine and Atmospheric Research. It was the second leg of an 80 day marine science voyage conducted in northern Australian marine waters on board the Australian Government's National Facility ocean research vessel, the *Southern Surveyor*.

The survey used a sophisticated sonar seabed mapping system and an underwater corer to investigate the reefs (see *AusGeo News 72*). This research forms a critical part of Geoscience Australia's Seabed Mapping and Characterisation Project.

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▲ **Figure 1.** The newly-discovered coral reefs, extending westwards from Mornington Island, are shown as areas A, B, C and D. The patch reefs discovered two years earlier on GA survey 238 are about 100 kilometres north-east of Mornington Island.

## New agreement furthers Antarctic research

French-Australian cooperation in marine and Antarctic geoscience is being further strengthened by the signing of a new MOU between Geoscience Australia and the Institut Polaire Français Paul-Emile Victor (IPEV) during a visit by the Institute's Director Dr Gérard Jugie. Cooperation between IPEV and Geoscience Australia goes back many years through joint surveys on the IPEV research vessel *Marion Dufresne II*. The *Marion Dufresne II* is used for resupply of French sub-Antarctic islands but is also equipped with full ocean-depth multibeam sonar and a unique "jumbo" piston corer capable of recovering sea floor sediment cores up to 60 metres long. The multibeam sonar provides detailed maps of the sea floor in water depths beyond the reach of similar systems on Australian survey vessels and the cores provide extended records of environmental change.

The *Marion Dufresne II* has conducted surveys with Australian participation in the Murray Canyons area in the Great Australian Bight, the Diamantina Fracture Zone off Western Australia and the Wilkes Land-Terra Adélie area of Antarctica.

The Antarctic survey used seismic data collected by Geoscience Australia in 2001 and 2002 to select suitable coring sites.

During his visit, Dr Jugie met with staff in Geoscience Australia's Petroleum and Marine Division to discuss possible projects using the *Marion Dufresne II* in the south-west Pacific region and the continental slope off New South Wales. Discussions also covered French and Australian geoscience projects in the Antarctic and how collaborative projects could be based around Geoscience Australia's extensive Antarctic seismic data sets. Possible projects to mark the next International Polar Year in 2007-08 is another area of joint interest.

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# Remote Sensing *update*

## National Remote Sensing Technical Reference Group

The National Remote Sensing Technical Reference Group (NRSTRG) provides advice to Geoscience Australia on strategic positioning and technical decisions relating to the provision of 'public good' satellite imagery.

The Group, which was established by Geoscience Australia's remote sensing unit, ACRES, held its second meeting in April 2005. Two items of particular interest that were discussed during this meeting included an update on ACRES activities in relation to the Advanced Land Observing Satellite (ALOS) mission and the draft LANDSAT Contingency Plan.

## ALOS Data Node

ACRES has been appointed as the Oceania Data Node for acquisition and distribution of ALOS data.

ACRES has been preparing for ALOS for two years, and is on schedule to complete all the mission tests required of Data Nodes prior to the launch. In total there are five Data Nodes covering the globe: Japan, Thailand (sub node), Europe, Oceania, and North America.

As the Oceania Node, ACRES's responsibilities will include data acquisition, archiving, cataloguing, and distribution, as well as coordinating acquisition requests for the region and managing the 'announcement of opportunities'.

The ALOS satellite will have three sensors onboard. The Panchromatic Remote-sensing Instrument for Stereo Mapping (PRISM), which comprises three sets of optical systems to measure precise land elevation, the Advanced Visible and Near Infrared Radiometer type 2 (AVNIR-2) and the Phased Array type L-band Synthetic Aperture Radar (PALSAR).

## LANDSAT Contingency Plan

The draft LANDSAT Contingency Plan identified the China Brazil Earth Resources Satellite 2 (CBERS-2), the Indian Remote Sensing Satellite (IRS-P6), SPOT and ASTER as suitable alternative data sources for LANDSAT data. The plan recognises that there is no one-to-one match or single replacement for LANDSAT data to cover all application needs in Australia. A combination of data sources would therefore be needed to satisfy all user needs.



▲ Figure 1: LANDSAT 5 image of The Granites area, Northern Territory.



ACRES is currently gathering further information about the CBERS-2 mission and data access. CBERS-2 is a joint venture mission, between the Chinese and Brazilian governments and was launched in October 2003. There are three sensors onboard CBERS-2: a High Resolution CCD Camera (HRCC), an Infrared Multi-spectral Scanner (IRMSS), and a Wide-Field Imager (WFI). Spatial resolution ranges from 20 to 260 metres with spectral range similar to that of LANDSAT. Access to IRS-P6 imagery will also be explored as part of the LANDSAT Contingency Plan. ASTER and SPOT data are already available via ACRES and Raytheon respectively.

## Other remote sensing news

Following the signing of a data distribution agreement with the Japanese Earth Remote Sensing Data Analysis Centre (ERSDAC), ACRES is distributing ASTER products and placing future data acquisition requests through ERSDAC's General Programming Request (GPR) program. For more information about ACRES ASTER products and services see: [www.ga.gov.au/acres/prod\\_ser/aster.jsp](http://www.ga.gov.au/acres/prod_ser/aster.jsp)

According to user feedback composite LANDSAT 7 Scan Line Corrector (SLC)-off products, released by ACRES in April 2005 ([www.ga.gov.au/acres/referenc/sloff\\_composite.jsp](http://www.ga.gov.au/acres/referenc/sloff_composite.jsp)), have been considered suitable for map revision and production. However, suitability for other applications still needs further investigation. Therefore individuals or organisations using these products for other applications (and finding them useful) are requested to contact ACRES ([acres@ga.gov.au](mailto:acres@ga.gov.au)).

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