

New petroleum frontiers revealed

The release of new pre-competitive seismic data and seafloor mapping acquired in surveys off Australia's western coast will 'create opportunities for Australia's petroleum exploration and the possibility of new oil and gas discoveries to supply Australia's and Western Australia's energy needs in the future' according to the Minister for Resources and Energy, The Hon. Martin Ferguson AM MP.

The Minister released the Southwest Margin Data Package in Perth on 14 April 2010 (figure 1). The release highlights findings from the Southwest Margin Marine Reconnaissance Survey and the Seismic Survey which were completed in February 2009. The surveys collected about 7300 kilometres of seismic reflection data from offshore frontier basins along Western Australia's coast including the Mentelle Basin, the Zeewyk and Houtman sub-basins within the Perth Basin, the Carnarvon Basin and the Wallaby Plateau. They were also the first marine surveys undertaken since the extension of Australia's maritime boundaries and included the Extended Continental Shelf on the Wallaby Plateau.

The data release included seismic, gravity and magnetic data as well as 11 700 kilometres of reprocessed seismic data collected and processed under Geoscience Australia's Offshore Energy Security Program. The release highlighted the role of the surveys in supporting pre-competitive data to underpin offshore acreage releases, and the Australian Government's Energy Security Initiative which supports industry through the provision of pre-competitive data at cost of transfer.



Figure 1. The Minister for Resources and Energy, The Hon. Martin Ferguson AM MP (centre) with (from left) Dr Peter Moore, Executive Vice President, Exploration, New Ventures, Mergers and Acquisitions, Woodside Energy Ltd, Dr Clinton Foster, Chief of Geoscience Australia's Petroleum and Marine Division, Dr Chris Pigram, Acting CEO of Geoscience Australia and Dr Bruce Goleby, Chief Geophysicist and Group Leader, Geoscience Australia, following the release of the Southwest Margin Data Package on 14 April.

The Southwest Margin Data Package provided a lead-in to the APPEA 2010 Conference in Brisbane from 16 to 19 May 2010. The new knowledge has already been used to provide information on the geology of areas scheduled for acreage release in 2010 in the Mentelle Basin (southwest of Perth). This issue of *AusGeo News* includes two articles on the 2010 Acreage Release Areas.

For more information

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Related articles/websites

Southwest Margins Survey details
www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70291

Southwest Margins Data Package
www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70292

AusGeo News 98: New opportunities for offshore petroleum exploration
www.ga.gov.au/ausgeonews/ausgeonews201006/offshore.jsp

AusGeo News 98: First acreage release in frontier Mentelle Basin
www.ga.gov.au/ausgeonews/ausgeonews201006/mentelle.jsp

AusGeo News 94: Southwest Margin surveys completed
www.ga.gov.au/ausgeonews/ausgeonews200906/surveys.jsp

AusGeo News 94: The geology and deep marine terrains of Australia's western margin
www.ga.gov.au/ausgeonews/ausgeonews200906/marine.jsp

Assessing Australian energy resources

Australia's abundance of energy is a key contributor to Australia's economic prosperity. The Australian energy sector directly accounts for five per cent of gross-industry value-added; 20 percent of total export value; supports a large range of manufacturing industries and provides significant employment and infrastructure. The demand for energy is increasing as Australia's economy and population grows.

A major report on Australia's energy resources was released by the Minister for Resources and Energy, The Hon. Martin Ferguson AM MP, on 1 March 2010. The *Australian Energy Resource Assessment* examines the nation's identified and potential energy resources ranging from fossil fuels and uranium to renewables. The assessment reviews the factors likely to influence the use of Australia's energy resources to 2030, including the technologies being developed to extract energy more efficiently and cleanly from existing and new energy sources. The Minister said that the assessment 'was more than a snap-shot of Australia's energy resources. It is a national prospectus for energy investment and exports. It would provide fundamental information for policy debates over the next couple of years'.

Australia has an abundant and diverse range of energy resources. It has very large coal resources that underpin exports and low-cost domestic electricity production, more than one third of the world's known uranium resources, and substantial conventional gas and coal seam gas resources. These can support Australia's domestic needs and exports for many years to come. Identified resources of crude oil, condensate and liquefied petroleum gas are more limited and Australia is increasingly reliant on imports for transport fuels.

Australia has a rich diversity of renewable energy resources (wind, solar, geothermal, hydro, wave, tidal, bioenergy) with low greenhouse gas emissions. With the exception of hydro and wind energy (which is

growing strongly) many of these resources are largely undeveloped, constrained by the current immaturity of technologies. The expected advances in technology by 2030 will allow them to make a growing contribution to Australia's future energy supply. By this time Australia's energy consumption pattern is expected to change significantly. While fossil fuels (coal, oil and increasingly gas) will continue to dominate the energy mix, renewable energy sources, notably wind, are expected to become increasingly more significant.

The Australian Energy Resource Assessment was undertaken jointly by Geoscience Australia and the Australian Bureau of Agricultural and Resource Economics (ABARE) at the request of the Department of Resources, Energy and Tourism as a contribution to future energy policy. The publication is available for download through the Geoscience Australia website and is also available in printed and CD-ROM formats from the Geoscience Australia Sales Centre.



For more information or to download a copy visit

www.ga.gov.au/products

www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70142

Australian Energy Resource Assessment

www.ga.gov.au/image_cache/GA16983.pdf

Chile earthquake triggers tsunami warning for Australia

Australia's Tsunami Warning System issued a tsunami warning for sections of Australia's east coast following the fifth largest earthquake ever recorded which occurred off the coast of Chile on 27 February 2010 at 5.34 pm Australian Eastern Daylight Time (6.34 am UTC). The magnitude 8.8 earthquake struck close to the coastal city of Concepción, approximately 300 kilometres south of Santiago. Though significant shaking was felt in Santiago, the capital, damage to infrastructure was limited mainly to towns near the epicentre.

During the week following the main shock, 14 aftershocks that exceeded magnitude six were recorded as well as 169 aftershocks exceeding magnitude five. The aftershocks extend for 700 kilometres along the subduction zone, centred on the location of the main shock, giving an indication of the rupture zone. The earthquake generated a tsunami which had more wide-reaching effects. This was a similar scenario to an event that occurred in 1960 when a magnitude 9.5 earthquake, the largest ever recorded, struck Chile approximately 400 kilometres to the south of the recent event. The 1960 earthquake generated a Pacific-wide tsunami which reached the coasts of Hawaii, Japan and Australia.

The initial assessment of the earthquake gave a magnitude of 8.5 after it was recorded by seismic stations across the Australian National Seismograph Network operated by Geoscience Australia (figure 1). The Joint Australian Tsunami Warning Centre, which is jointly

operated by Geoscience Australia and the Bureau of Meteorology (see *AusGeo News* 96), then issued the warning. Australian emergency managers were then able to prepare for the potential impact that a tsunami could have on the Australian coast.

Consequently, a marine and immediate foreshore threat was put into effect for the east coast between southern Tasmania and central Queensland as well as Norfolk Island and Lord Howe Island. This level of threat warns of potentially dangerous waves, strong ocean currents and the possibility of some localised overflow onto the immediate foreshore. Observations from the tide gauges in the warning zone ranged from 0.5 metres at Norfolk Island to 0.16 metres at Southport, Tasmania. The effects of the tsunami were observed on the tide gauges for several hours after the first arrival. The resulting unusual currents and foreshore conditions validated the marine warning issued by the JATWC.

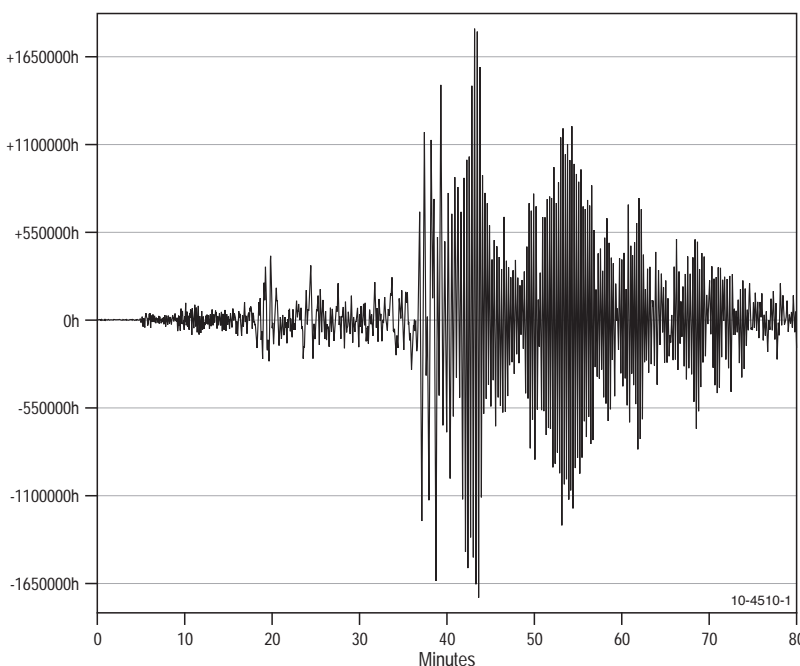


Figure 1. A seismogram of the Chile earthquake as recorded by a seismometer in Canberra operated by Geoscience Australia.

For more information

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Related articles/websites

AusGeo News 96: Tsunami warning system fully operational
www.ga.gov.au/ausgeonews/ausgeonews200912/tws.jsp

New beach information from OzCoasts

Australia has a long and diverse coastline of almost 60 000 kilometres. The Australian coast contains 10 685 beach systems, which occupy half the open coast or about 15 000 kilometres. A new beach database search capability and beach conceptual models are recent additions to Geoscience Australia's OzCoasts website. The website, which was launched in August 2008, contributes to improving natural resource management and the conservation of Australia's coastal zone, estuaries and near-shore environments.

OzCoasts users can search Australian beaches based on name, geomorphic state, and area at a range of scales from local government areas, through Natural Resource Management regions, states or territories, to national coverage. The search produces a report with the location of each selected beach, as well as links to images and descriptions of features and physical characteristics (length, orientation, embaymentisation, number of bars, wave height and period, spring and neap tides and nearest tide station). The beach reports can also be accessed through the Smartline maps in the landform and stability module, by clicking on a line segment (see *AusGeo News* 97).

The beach content was developed by Professor Andrew Short from the University of Sydney who classified the variety of beach systems into three major types. He also contributed to the development of an extensive database on beach hazards and physical characteristics. The conceptual models (figure 1) depict and explain each of the three major beach types found in Australia. These include six wave-dominated, three tide-modified, and four tide-dominated beach states which are a product of wave-tide and sediment conditions, and two states which are fronted by intertidal rocks and fringing reefs (making a total of 15 beach state models). As with estuaries, wave-dominated beaches predominate along the higher energy,

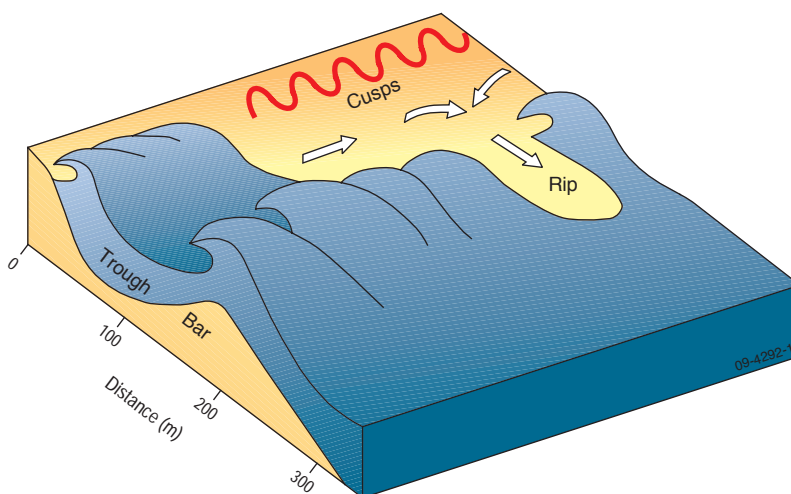


Figure 1. Conceptual model of longshore bar and trough wave-dominated beach showing the offshore bar and trough, with rip feeder currents converging to flow seaward as a rip current (arrows).

microtidal southern coast, while tide-modified and tide-dominated beaches occur most frequently around the tropical northern coast, as well as some sheltered and mesotidal southern locations. The beach models are found in the Conceptual Models module, alongside similar pictorial illustrations of estuarine function and coastal stressors.

Professor Short's research investigated all Australian mainland beach systems as part of a long-term collaborative project with Surf Life Saving Australia between 1990 and 2004. The database was developed during this time as part of the Australian Beach Safety and Management Program. The new beach search capability complements the estuary search which was developed during the initial phase of the National Land and Water Resources Audit (NLWRA), and provides access to data on approximately 1000 Australian estuaries.

Safety-related aspects of the Australian Beach Safety and Management Program dataset are available through the new Surf Life Saving Australia Beachsafe website.

Related articles/websites

Australian Beach Safety and Management Program, Surf Life Saving Australia Beachsafe website
www.beachsafe.org.au

Relevant publications by Dr Andrew Short, University of Sydney website
www.sup.usyd.edu.au/marine/

Short AD. 2006. Australian beach systems – Nature and distribution. *Journal of Coastal Research* 22(1): 11–27.

First absolute gravity measurements in the Australian Antarctic Territory

Geoscience Australia has recently conducted absolute gravity observations at Davis and Mawson stations in the Australian Antarctic Territory. These observations are the first such measurements undertaken at any of the Australian Antarctic stations to establish accurate gravity reference points for future gravity surveys. They will also enable gravity surveys that have already been conducted in the Australian Antarctic Territory to be tied to the same datum, thus allowing previous and future gravity surveys to be accurately merged and combined.

Gravity reference points (or gravity base stations) have been established at the Australian Antarctic stations in the past but these were done with relative gravity meters. These instruments measure the difference in gravity from one point to another and were used

to measure the difference between a reference point in Australia and the reference points that had been established in Antarctica. Unfortunately the length of time involved in travelling to Antarctica combined with 'instrumental drift' was not conducive to accurate readings so the accuracy of these older reference points was compromised.

The absolute gravity meter determines the actual acceleration of gravity by measuring the trajectory of a free-falling object in a vacuum. The surviving gravity base stations at Davis and Mawson were tied to the new absolute base stations using a relative gravity meter (figure 1). Gravity surveys that used these old reference points can now be adjusted to the new absolute datum.

Transport to and from the Antarctic stations was onboard the Australian Antarctic Division's re-supply vessel RSV *Aurora Australis*, which departed Hobart on 25 January 2010 and returned on 28 February 2010. The ship's track for this voyage and the location of Davis and Mawson can be seen in figure 2.



Figure 1. Ties between existing gravity base stations and the new absolute gravity base stations were conducted using a relative gravity meter.



Figure 2. Map showing the location of Davis and Mawson in relation to Australia and the track of the RSV *Aurora Australis* during Voyage 3, 2009–10.

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