NSW DPI

e-news from the GEOLOGICAL SURVEY OF NEW SOUTH WALES

ontheoutcrop

ISSUE 5, DECEMBER 2008

ontheoutcrop is a Geological Survey of New South Wales e-newsletter intended to notify clients of specific events, products and services that may be useful to them in their work.

More information about newsletter items is available through the Geological Survey of New South Wales (GSNSW) web page: http://www.dpi.nsw.gov.au/minerals/geological

COLLABORATIVE PROJECTS is the theme for this issue.

CONTENTS

UPCOMING EVENTS

Macquarie Arc Conference 2009 13–21st April, Orange, NSW

The Macquarie Arc 2009 Conference is an international conference on island arc–continent collisions and mineral deposits in accreted arcs. It comprises four days of talks in a vineyard setting, bracketed by four days of field trips examining key outcrops that demonstrate the evolution of the accreted Macquarie Arc and some of the major gold–copper mines developed in it.

The conference is part of IGCP project 524, a project aimed at understanding arc-continent collisions. The IGCP is a cooperative enterprise of UNESCO and the International Union of Geological Sciences (IUGS).

Contact: Dick Glen, conference convenor for scientific matters: dick.glen@dpi.nsw.gov.au

Program and registration is available at: http://www.hotelnetwork.com.au/macquariearcconference

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TAKE NOTE!

Support service interruption for online minerals applications

Support services for the GSNSW online mineral applications MinView and DIGS will be unavailable from 24th December to 2nd January 2009 inclusive. This service interruption applies to email and phone enquiries only. Full support service will resume on the 5th January 2009. We apologise for any inconvenience this may cause.

Christmas closure of Londonderry drill core library

The W.B. Clarke Geoscience Centre located at 947–953 Londonderry Rd, Londonderry will be closed over Christmas from 24th December 2008 to 9th January 2009 inclusive. All Drill Core Library services such as viewing and sampling core will not be available for this period. Your visits to the centre should be planned accordingly. We apologise for any inconvenience this may cause.

Contact: Steve Hall, Core Library Manager, (02) 4777 0322, steve.hall@dpi.nsw.gov.au

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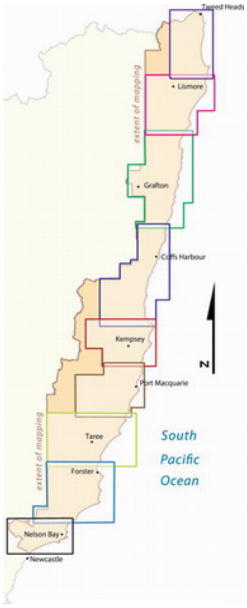
NEW PRODUCTS AND SERVICES

Coastal Quaternary geology map series



GSNSW released a series of 1:100 000 and 1:25 000 glossy hard copy maps for nine areas of the NSW north coast. The maps are double sided: one side is a 1:100 000 overview of the area's Quaternary geology. The reverse side has two to four maps of key areas at 1:25 000. The maps use a unique methodology that enables the simultaneous mapping of surface and shallow sub-surface sedimentary deposits. Also depositional units have been differentiated to a much greater degree than previous mapping. The maps are accompanied by a well illustrated set of explanatory notes and a DVD with GIS data. An equivalent set of maps and notes for the South Coast is planned for release in 2009.

The Quaternary geology is combined with existing 1:250 000 bedrock mapping, and the GIS-based map product is complemented by linked databases, such as the locations of past mineral sands mines, mining and quarrying activity, field sampling data and sediment characteristics. Information contained in the mapping can assist with land use planning and natural resource management issues, for example, through conversion to predictive maps of geological hazards, land use capability, or location of extractive resources.

The report 'Coastal Quaternary geology – north and south coast of New South Wales' is Bulletin 34.

New MinView release

The new version of MinView was released in July and has already attracted over 400 registered users. It features a facility for online application for new mineral exploration licences; access to the MetIndEx mineral occurrence database; email reminders and alerts on changes to title attributes of current mineral exploration licences; customisable legends; bookmarking facilities; and improved image rendering, zoom and pan functions.

Advanced Mineral Projects & Exploration Highlights in NSW map

The free A3 map shows recent exploration results in NSW, in the form of drilling intercepts and resource figures, and resource figures for operating mines. The information on this map is current for August 2008.

The Mineral Systems in New South Wales poster is available online at:

http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0015/230631/Mineral_System_Poster.pdf

See details about the poster in Quarterly Notes No. 128

PROJECT HIGHLIGHTS

COLLABORATIVE PROJECTS CONDUCTED THROUGH INITIATIVES

The GSNSW works cooperatively with a number of institutions through initiatives committed to projects that benefit the minerals and energy industries. These initiatives are the:

- National Virtual Core Library (NVCL)
- Former Cooperative Research Centre for Landscape Evolution and Mineral Exploration (CRC LEME)

- Former Cooperative Research Centre for Predictive Mineral Discovery (*pmd**CRC)
- Onshore Energy Security Initiative (OESI)

NVCL project

This collaborative project between GSNSW and the CSIRO is one part of the National Virtual Core Library project (NVCL). The NVCL is a joint project with AuScope (an NCRIS funded program — part of the Federal government's Backing Australia's Ability: Building Our Future through Science and Innovation package).

The aim of the NVCL project is to use the CSIRO-developed Hylogger™ spectroscopic core scanning technology to generate digital information on rock, ore and alteration minerals in drill core. The information will be stored in a state-based network of digital core libraries which will provide digital assay, high resolution hyperspectral data and corresponding photo-logs of drill holes via the web. This will allow core to be viewed remotely and increase access for the exploration industry and for researchers.

GSNSW is in the final stages of planning the installation of the Hylogger™ at its W.B Clark Geoscience Centre at Londonderry. Infrastructure and a science program are in place and database development is underway. The HyLogger2 core scanner will be delivered in January 2009.

Initially, a key set of mineral systems types from across NSW will be scanned to demonstrate the capabilities of the new machine. The NVCL project will extend into the GSNSW Minerals Systems project and will look at industry-supported collaborative studies. Funding for involvement by GSNSW is through the New Frontiers initiative. A data demonstrator is available at: http://nvcl.csiro.au/

Contact: Bill Reid, Senior Geologist: william.reid@dpi.nsw.gov.au, 02 4931 6731 or Rob Barnes, Chief Geoscientist – Minerals, rob.barnes@dpi.nsw.gov.au, 02 4931 6697

CRC LEME project: Exploration through cover in the Thomson Orogen (completed)

CRC LEME established the Thomson Orogen project with NSW DPI-Mineral Resources, Geoscience Australia, Australian National University and Adelaide University as participants. This project also formed part of a major ongoing initiative by NSW DPI in the Thomson Orogen which includes regional mapping, seismic, drilling, gas geochemistry, gravity and airborne geophysics. Although the CRC LEME project has concluded, GSNSW is continuing work on the Thomson Orogen under the New Frontiers initiative.

The primary objective of the project was to develop an effective means of exploring through the cover of the Thomson Orogen. The CRC LEME project had three main components:

- Low density geochemical surveys employing overbank sediment, lag and vegetation samples. Analysis involved a number of techniques such as NITON, MMI partial leach, XRF and ICPMS.
- Regional regolith mapping to provide a basis for interpretation of surface and near-surface material influencing geochemical results.
- Detailed regolith mapping and geochemical studies aimed at providing more accurate regional regolith maps by generating a better understanding of post-Palaeozoic landscape evolution and its influence on geochemistry.

Two recent highlights are:

Low density geochemical survey:

The results of the baseline survey showed that there was a negative correlation of metal content with depth to the base of the Cretaceous basement. The survey also indicated elevated base metal values in areas of base metal mineralisation in the Bourke area. Other techniques, such as lag and vegetation sample analysis, were shown to have good vectoring capability in gold and copper rich areas in the Tibooburra–Milparinka region of the western Thomson Orogen.

The final report is 41.5 Mb and can be downloaded from the CRCLEME website at:

http://www.crcleme.org.au/Pubs/OPEN%20FILE%20REPORTS/OFR%20145/OFR%20145.pdf.

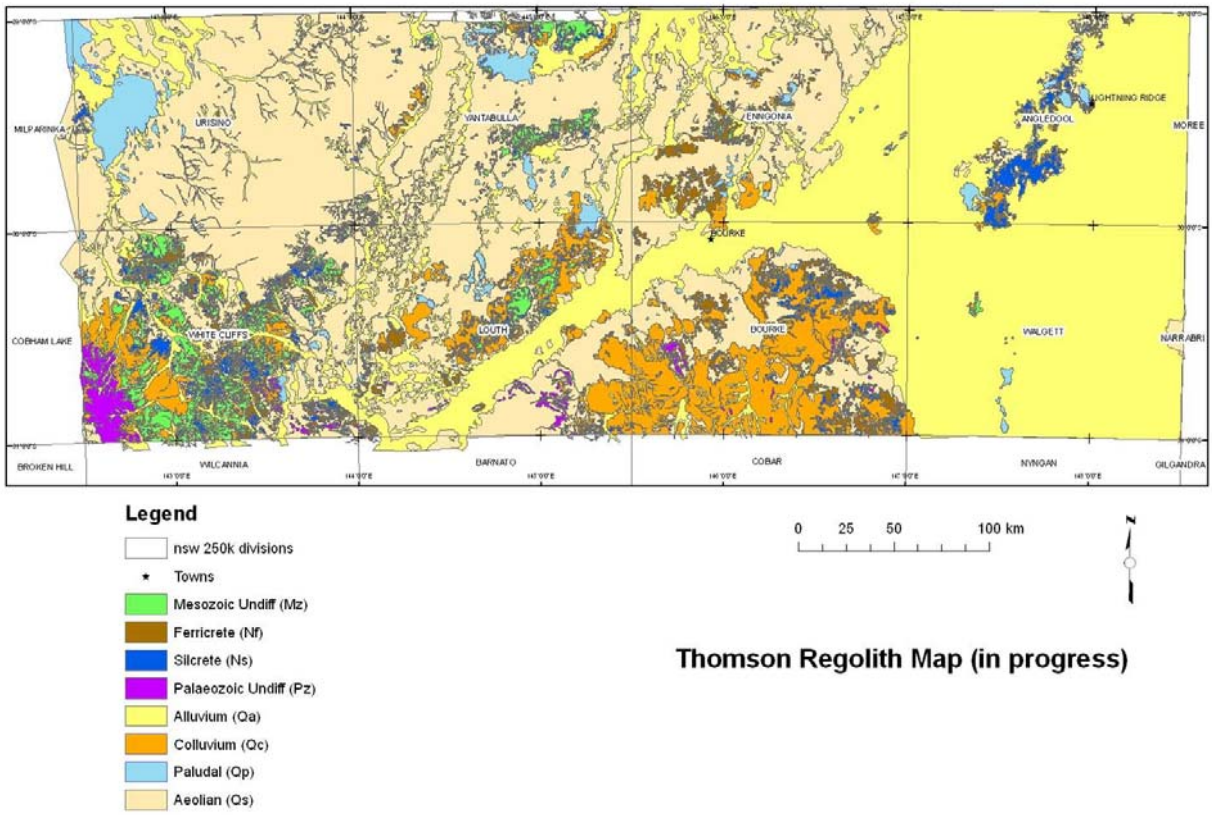
The CRC LEME Explorers' Guide to the regolith in the Cobar region is a product of the project and is available as a free download at http://www.crcleme.org.au/Pubs/monographs.html. Free printed copies are available from: John Watkins: john.watkins@dpi.nsw.gov.au.

A guide for mineral exploration through the regolith in the Thomson Orogen will be available shortly.

Thomson Orogen1:2500 000 Regolith Map:

Marta Vega-Faundez has completed a draft of a desktop, spectral-response based regolith map (below) covering the Thomson Orogen in NSW. Quaternary alluvium was derived from Geoscience Australia's 1:1 million scale geology and was used as a mask during a supervised classification of seven key regolith units.

Contact: John Greenfield, Team Leader – Regional Mapping: john.greenfield@dpi.nsw.gov.au, 02 4931 6728



*pmd**CRC Tasmanides T5 project (completed):
Crustal architecture, 3D geological map and mineralisation in the Tasmanides of eastern Australia

The GSNSW became a sponsor of this project in order to increase the prospectivity of the complex mineralised East Lachlan Orogen (ELO). The ELO records the development, accretion and post-collisional evolution of a now fragmented, multiphase, intra-oceanic arc (the Macquarie Arc) on the palaeo-Pacific margin of east Gondwana, from the Early Ordovician to the early Carboniferous. The starting point of the project was the development of a seamless bedrock interpretation which was then used as a basis for the construction of cross sections. Although the formal project has been completed, geological, geochronological, geophysical, palaeontological and cross-section datasets are being refined, re-analysed, and integrated prior to the development of the model itself. Improvements to our understanding of ELO geology include recognition that:

- quartz-rich turbidites of the Kirribilli Formation, formerly correlated with Lachlan Orogen Ordovician turbidites, may be Silurian. This places them into the Cowra Trough stratigraphy and removes the need to emplace these turbidites tectonically between the two western belts of the Macquarie Arc.
- some parts of the Rockley–Gulgong Volcanic Belt of the Macquarie Arc may be part of the extensive Silurian–Devonian rift sequence, thereby enhancing the economic significance of Silurian–Devonian bimodal volcanics in the ELO.
- mafic volcaniclastic rocks of the Kabadah Formation, which were inferred to be imbricated with the Canowindra Volcanics, are now constrained to part of a Silurian bimodal sequence.

GSNSW is continuing to improve the tectonic models, to increase the prospectivity of both the Macquarie Arc and the intervening Silurian–Devonian rifts.

Contact: Cameron Quinn, Geologist: cameron.quinn@dpi.nsw.gov.au 02 4931 6730

*pmd**CRC Tasmanides T11 project (completed): Cobar regional 3D model and predictive mineral systems analysis

This project produced an integrated 3D geological and geophysical model of a 240x440x40 km volume of central NSW, extending from Bourke to Cargelligo and from Nyngan to Barnato. Detailed models were constructed through the deposits at Elura/Endeavour, Tritton, Cobar (CSA to Peak), Mineral Hill and Mt Hope.

The project targeted geodynamics, fault architecture, fluid flow drivers and pathways, fluid reservoirs and depositional mechanisms. New aeromagnetic and gravity data were integrated with available 1:100 000 scale geology maps. Seamless regional geology was prepared for the construction of geological cross-sections and new time–space plots were developed. Mapped or inferred geophysical and 'worm' attributes of the main faults were integrated with 29 serial cross-sections and 5 detailed cross-sections through the main mineral deposits. ASTER and PIMA data helped to define alteration corridors, and potential field inversions were used to map alteration systems in 3D. Fluid reservoirs were constrained from paragenesis studies, fluid inclusions and sulphur and lead isotopes. Zoned mineral deposits and mineral textures were used to develop models for mineral transport and deposition. The project is completed but results are still confidential except to sponsoring organisations.

Contact: Dick Glen, Principal Research Scientist: dick.glen@dpi.nsw.gov.au, 02 4931 6722

Onshore Energy Security Initiative: Geochemical Survey of NSW

The Geochemical Survey of NSW is part of the National Geochemical Survey of Australia project established under the Australian Government's Onshore Energy Security Initiative and is part of the initiative's five year work plan. The primary aim of the national geochemical survey is to provide pre-competitive data and knowledge to support exploration for energy resources in Australia. In particular, it will improve the existing knowledge of the concentration and distribution of energy-related elements such as uranium and thorium at the national scale.

147 samples have been collected for NSW. The resulting geochemical database will:

- allow calibration and ground-truthing of airborne radiometric data
- fill gaps in the current airborne radiometric and geochemical coverages
- allow multi-element characterisation and ranking of radiometric anomalies
- aid in first order investigation of the nature of geothermal hot spots
- have application for mineral exploration as well as environmental assessment and management

Contact: John Greenfield, Team Leader – Regional Mapping: john.greenfield@dpi.nsw.gov.au, 02 4931 6728

Onshore Energy Security Initiative: Rankins Springs and Yathong Trough seismic survey

GSNSW conducted the Rankins Springs and Yathong Trough seismic survey in March 2008. The results will be interpreted in conjunction with Geoscience Australia, for release at the ASEG Conference in Adelaide, February 2009. GSNSW acquired 220 km of high resolution reflection seismic along two lines across the Rankins Springs and Yathong Trough in the southeastern Darling Basin in March 2008. A study by FrOG Tech showed the area comprises an extensive sediment-filled structural low, a large part of which has basement depths in excess of 3500 m.

Contact: Dave Robson, Chief Geophysicist, Regional Mapping and Exploration Geoscience: david.robson@dpi.nsw.gov.au, 02 4931 6717

OTHER PROJECTS

Teleseismic survey — Murray Basin

The teleseismic survey completed over the Murray Basin in 2007 will be published in Quarterly Notes 129 out this month. It was conducted through a contract with the Australian National University and in collaboration with National Research Facility for Earth Sounding (ANSIR). A main result is that the transition from Precambrian to Palaeozoic lithosphere appears to occur much further east than previously reported. This

boundary is distinguished by a clear contrast between higher velocities in the west and lower velocities in the east. Consequently, the Stawell Zone, traditionally seen as part of the Lachlan Orogen, is now interpreted, at upper mantle depths, to have closer affinities with the Delamerian Orogen.

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Geophysical/geological interpretation map series at 1:250 000

GSNSW has initiated a series of 1:250 000 geological/geophysical interpretation maps of regional NSW where surface geology is dominated by Quaternary and Tertiary cover. The maps integrate a number of geophysical techniques involving data from ground-based, airborne and satellite surveys and present an interpretation of subsurface geology and structures. Completed interpretations from the far northwest of NSW include the Milparinka, Cobham Lake and Bourke sheets and those in process are Louth, White Cliffs, Urisino, Yantabulla and Enngonia sheets. In the far southwest of NSW, the Hay and Balranald sheets are completed to a provisional level and the Deniliquin, Booligal, Ana Branch and Pooncarie sheets are in process.

Data sets from government surveys and private industry were incorporated to build the best possible resolution of subsurface imagery using various filters used to highlight gravitational and magnetic areas of interest. The latest advance uses Intrepid Geophysics' WormE software which generates multiscale edge detection imagery of potential field data to help define the shape, depth and dips of the interpreted sources of anomalies.

Contact: Dave Robson, Chief Geophysicist: david.robson@dpi.nsw.gov.au, 02 4931 6717

New gravity data from central NSW

GSNSW conducted a helicopter-borne gravity survey over the southern Gunnedah Basin in eastern NSW to collect precise measurements of the Earth's gravity field. This survey will assist with better 3D understanding of the lithology and structure of the area. It involved reading the Earth's gravity field on a regular 2 x 2 km grid over a 20 000 sq km area using approximately 5 500 gravity stations. Located and gridded data, together with enhanced computer generated images of the data, are expected to be released by NSW DPI in late 2008.

Contact: Dave Robson, Chief Geophysicist: david.robson@dpi.nsw.gov.au, 02 4931 6717

RECENT EVENTS

Government Geoscience Information Committee hosted by GSNSW

The GGIC comprises representatives from State, Northern Territory and Commonwealth government geoscience agencies and New Zealand. The GGIC is a sub-committee which reports to the Chief Government Geologists Committee, at whose request it facilitates national geoscience information standards and data models, data access and delivery solutions. It meets twice yearly with the chair rotating each year between representatives. Graham Butt, Manager, Geoscience Information, NSWGS, is chairing the meetings for 2008–2009. The first meeting for this period was held in Newcastle and committee members also visited the NSW DPI building in Maitland for presentations by geoscientists on the work performed there.

33rd International Geological Conference, Oslo

GSNSW geologists attended the 33rd International Geological Conference (IGC) held in Oslo, Norway on 6–14 August. The primary purpose was to represent the NSW DPI as part of 'Team Australia' since the 34th IGC will be held in Brisbane in August 2012. Dick Glen and Bob Musgrave participated in discussions about the role NSW could play in the 2012 meeting. Dick Glen also gave an invited address on the Tasmanides of eastern Australia as part of the special Oceania Symposium that presented insights into 'down under' geology and technology for delegates planning to come to Brisbane. Bob presented a paper on the potential field inversion and 3D modelling of the Koonenberry Belt. Bob and Dick also presented other papers, and Dick received the tick of approval from the IGCP 524 committee for the proposed program for the international Macquarie Arc 2009 Conference to be held in Orange, 2009.

Gary Colquhoun attended the IGC to scope changes in the way international geological surveys were managing geoscience information, data collection and delivery. He concluded that generally the GSNSW DIGS system compares favourably with similar international systems. Gary also found that free open-source software was being used by many developed countries. He also reported that presentations on the rapidly developing area of 3D geological modelling show that while it is currently good for demonstrating broad

geological concepts, it still has a long way to go before it is a truly useful tool for depicting complex regional geology.

'OneGeology', a major international initiative of worldwide geological surveys, was heavily promoted at the IGC. OneGeology aims to make a web-accessible 1 million scale geological map of the entire Earth. GeoSciML, an XML based schema for representing and exchanging geological data, is being used as the common format for OneGeology.

National Australian Mining award presented to Director, Geological Survey of NSW

Lindsay Gilligan, Director GSNSW, received the 'Most Outstanding Contribution to Mining' award, sponsored by Siemens, at the Australian Mining Prospect Awards 2008. The award is given to an individual from industry or government who has significantly influenced positive change in mining or minerals processing in Australia. The national public award recognises his leadership in NSW DPI and New Frontiers exploration programs that stimulate mineral exploration and investment in NSW, particularly in the state's southwest and remote northwest.

Gold mineralisation study published in *Mineralogy and Petrology*

Sulfur- and lead-isotope signatures of orogenic gold mineralisation associated with the Hill End Trough, Lachlan Orogen, New South Wales, Australia by P. M. Downes (GSNSW), P. K. Seccombe (University of Newcastle), and G. R. Carr (CSIRO), was published online in the May 2008 issue of *Mineralogy and Petrology*. The paper looks at the source of sulphur in the host systems of gold deposits from the Bodangora, Hargraves, Napoleon Reefs, Springfield, Sofala–Wattle Flat, Stuart Town and Windeyer areas using sulphur- and lead isotope signatures. Sulfur- and lead-isotopic results suggest that gold was sourced from mantle-derived magmatic units beneath the HET. The study supports earlier studies at Hill End, concluding that the majority of orogenic gold mineralisation in and adjacent to the HET formed during the Early Carboniferous period.

NSW DPI opens up for Earth Science Week

NSW DPI at Maitland opened its doors to the public as one of its activities for Earth Science week. A team led by Trisha Moriarty, GSNSW, manned a series of hands-on displays representing the various branches of Environment, Coal and Petroleum, Titles, Library, Corporate Services, Communications and the Geological Survey of NSW. Activities at other venues included displays at East Maitland Library of fossils and minerals demonstrating the Hunter Valley Permian palaeoenvironment and mineral wealth, and a Science in the Suburbs event held in collaboration with the Australian Museum at the W B Clarke Geoscience Centre in Londonderry. The events raised awareness of the geosciences as a career amongst young students and gave the Maitland community a better idea of the work performed by the Minerals Resources division of NSW DPI.

NBN ran a news item which can be viewed at:

http://www.nbntv.com.au/index.php/2008/10/14/digging-up-some-rock-stars/

GSNSW promotion of NSW exploration opportunities at conferences

Lindsay Gilligan, Director, GSNSW joined representatives from Geoscience Australia and other States and the Northern Territory in Team Australia delegations to India and China over the first half of November. Lindsay gave presentations on NSW exploration investment opportunities to an Australia–India investment seminar and attended the IMME exhibition and the Global Mining Summit in Kolkata. Subsequently, he gave presentations on exploration investment at the Australia–China investment seminar and the China Mining Conference in Beijing.

Coastal geology map series released at Coastal Conference

The coastal Quaternary map series and report were released at the 17th NSW Coastal Conference in Wollongong on 4th November as part of GSNSW contribution to the Comprehensive Coastal Assessment project. This conference was attended by federal, state and local governments, coastal and marine consultants, planners, engineers and representatives from community organisations. The new dataset will be essential for regional natural resource assessment, land use planning, identification of natural hazards and conservation management along our coastal region. Much of the audience was concerned with how the maps could be used to determine potential impacts of sea-level rise and possible effects from global warming.

Hunter Earth Sciences Discussion Group (HEDG)

HEDG was initiated by the GSNSW earlier this year to increase the interaction between geoscientists from GSNSW, industry and the University of Newcastle. Three well attended talks were held in 2008.

What is an island arc–continent collision anyway? The Taiwan example (Dick Glen)
Lithosphere from top to bottom: geophysical images and new tectonic interpretations of western NSW and Victoria (Bob Musgrave)
Can we say that the 1989 Newcastle Earthquake was caused by coal mining? A critical synopsis of the arguments so far (Cameron Quinn)

From 2009, the GSA (Geological Society of Australia) – Hunter Branch will organise HEDG speakers and events. The talks are held at Customs House, Newcastle with 6/7 presentations currently being planned for 2009. If you want to receive notices of the HEDG events contact:

Phil Gilmore, Geologist, phil.gilmore@dpi.nsw.gov.au, 02 4931 6533

STAFF MOVEMENTS

Cameron Ricketts has accepted the position of Assistant Director, Minerals and Land Use Assessment

John Greenfield has accepted the position of Team Leader – Regional Mapping

Malcolm Osborn has commenced as Geologist with Knowledge Management

Dan Wittman has returned to Knowledge Management after an absence on leave

Weiping Zhang has commenced as acting Map Production Specialist with Geospatial Sciences

Meagan Clissold has commenced as Geoscientist, Virtual Core Library

Kingsley Mills is retiring from his position of Senior Geologist, Broken Hill office

Trevor Hegvold is leaving his position of Technical Officer at the Orange office

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PRODUCTS AND ENQUIRIES

Internet product catalogue

The online Geoscience Products Catalogue includes over 240 hard copy maps and over 70 geoscience data packages (including geophysical data) on CD or DVD ROM. Information about ordering or downloading these products is supplied on each product page.

Enquiries about purchasing products

Maps and data packages: geoscience.products@dpi.nsw.gov.au: Tel: 02 4931 6503

Geophysical images and data to geophysics.products@dpi.nsw.gov.au: Tel: 02 4931 6717

Counter sales to mineralpublication.orders@dpi.nsw.gov.au Freecall: 1300 736 122 Tel: 02 4931 6666

General enquiries about products and services

Contact: Michael Hallett, michael.hallett@dpi.nsw.gov.au: Tel: 02 4931 6724

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