SECTION 4

POSTER ABSTRACTS

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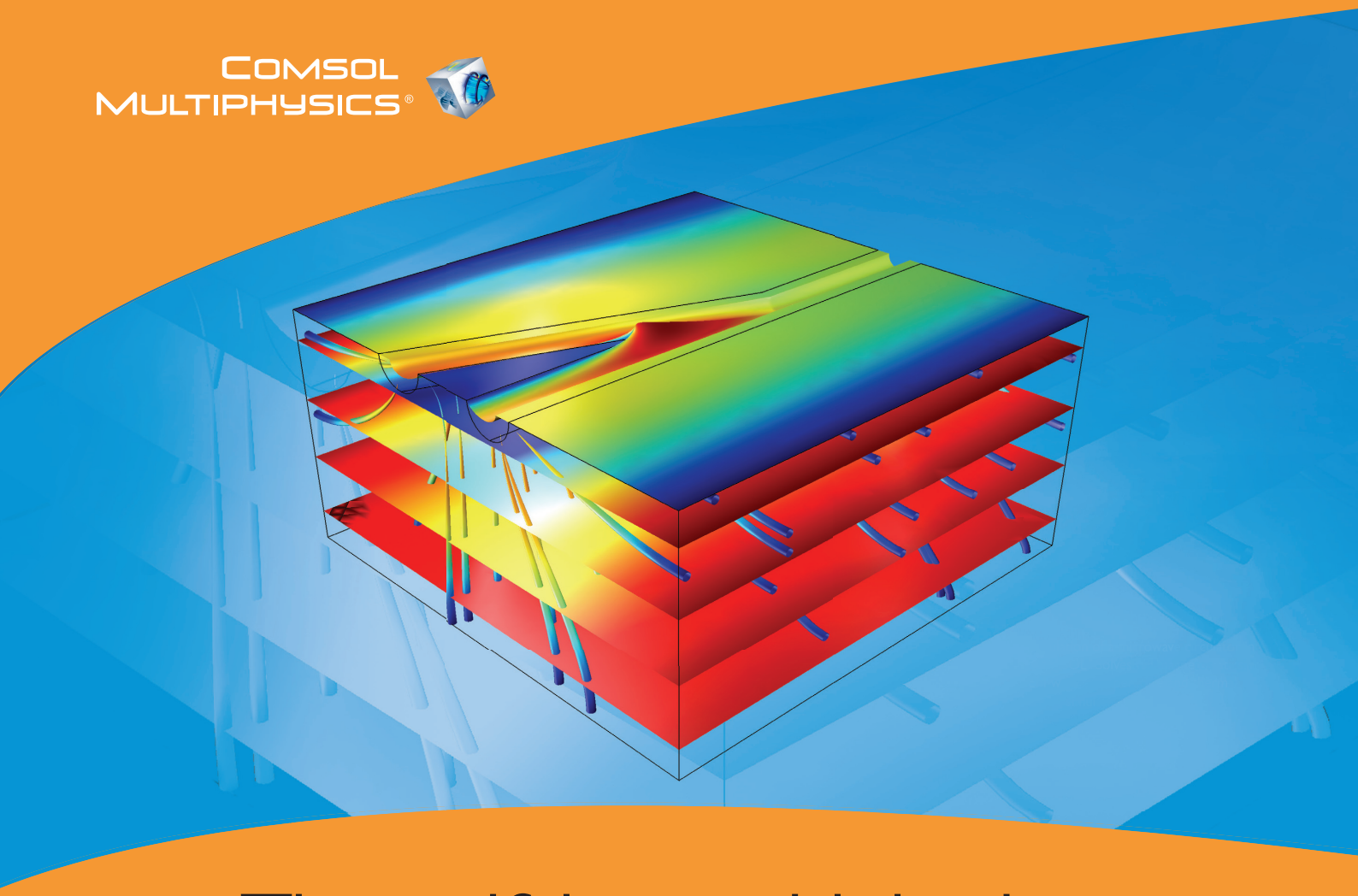

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LIST OF POSTERS

All the posters will be displayed for three days: the whole of Monday, Tuesday and Wednesday.

The roster for when the presenters will be available to talk about their posters will be available at the Convention.

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2	Noor Alamsyah AND Sihman Marmosuwito	Petrochina International Jabung Ltd	Reservoir differentiation using the Threshold-Inversion Method in the Lower Talang Akar Formation, West Betara Field, South Sumatra Basin, Indonesia
3	Anghel Sorin	National Institute of Marine Geology and Geoecology – Geoecomar	Magnetometric researches used in the archaeological studies of the Greek Roman fortress located on the shore of Razelm Lake
4	Carlos Cevallos	NSW Department of Primary Industries, Geological Survey of NSW	Defining a hypothetical boundary between two phases of the Braidwood Granodiorite
5	Marina Costelloe, Camilla Sorensen AND Pauline English	Geoscience Australia	Pine Creek Airborne Electromagnetic Survey, Onshore Energy and Minerals, Geoscience Australia
6	Tania Dhu, Gary Reed, Wayne Cowley and Martin Fairclough	Minerals and Energy Resources, PIRSA	Mapping depth to crystalline basement in South Australia
7	Tanya Fomin, Erdinc Saygin, Bruce Goleby and Tony Meixner	Geoscience Australia	Advances in combining wide-angle and reflection Vibroseis surveys from the latest experiments, onshore Australia
8	Alexey Goncharov, Joanne Whittaker, Hannah Lane, Jennifer Totterdell, Dietmar Müller and German Leitchenkov	Geoscience Australia; School of Geosciences, University of Sydney; Vniiokeangeologia	Australian–Antarctic Rifting: new insights from plate tectonic reconstructions of total sediment thickness and crustal seismic velocity grids
9	Rosemary Hegarty	Geological Survey of New South Wales, NSW Department of Primary Industries	Gravity gradients and aeromagnetic textures – unlocking the structural architecture of the boundary between the Thomson and Lachlan Orogens in the Bourke Region, NSW
10	Laszlo Katona,Tania Dhu, Gary Reed and Martin Fairclough	Mineral and Energy Resources, PIRSA	Mapping iron oxide copper gold prospectivity, South Australia
11	Allan Campbell, Leon Dahlhaus, Aline Gendrin, Scott Leaney, Shoichi Nakahishi, Kapil Seth, Sergei Tcherkashnev, Don Sherlock and Milovan Urosevic	Schlumberger; Chevron; Curtin University	Seismic monitoring for the Otway CO_2 Sequestration: acquisition and analysis of borehole seismic data
12	Yun Wang and Junjie Yin	Institute of Geology and Geophysics, Chinese Academy of Sciences	The numerical simulation and imaging of seismic scattered waves applied to base metal exploration
13	David Love	Primary Industries and Resources South Australia	Focal mechanism – Flinders Ranges Earthquake ML 4.7, 26 December 2007
14	Hyoungrae Rim, Yeoung-Sue Park, Muteak Lim, Sung Bon Koo and Byung Doo Kwon	Korea Institute of Geoscience and Mineral Resources, Seoul National University	New separation method of regional-residual gravity anomalies by means of geostatistical filtering
15	Peter Petkovic, Ron Hackney and Michael Morse	Geoscience Australia	Geophysical mapping strategy for Australia's remote eastern deep-water frontier: the Capel and Faust Basins
16	Bambang Prasetiyo and Trisakti Kurniawan	Pertamina EP, BU Tanjung Raya Block	Optimising oil production in low permeability oil reservoir at Tanjung Field, Barito Basin – South Kalimantan Indonesia
17	Jonathan Ross and Graham Heinson	University of Adelaide	Viva La Resistance! The utility of cross-hole electrical resistivity tomography to image resistive pathways

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TRIALS OF SPECTRAL DOMAIN TECHNIQUES TO DETERMINE CURIE-POINT DEPTHS UNDER THE COOPER BASIN, AUSTRALIA

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Measurement of the thermal structure of the crust is essential for several geodynamic investigations, such as identifying heat-flow anomalies, determining mechanical strength and tectonic setting, and locating prospective regions for mature hydrocarbon deposits in sedimentary basins. Depth estimates to the Curie Point isotherm (CPD) can assist this measurement. The CPD is the depth at which both induced and remanent magnetisation of ferromagnetic minerals is lost due to temperatures being reached in excess of the Curie Temperature (traditionally 580°C). Spectral domain techniques are widely used to measure the CPD from magnetic anomaly data. Under certain conditions, the slope – and in some cases, the long-wavelength peak – of radially averaged spectra are related to the depth-to-top, depth-to-centroid, and depth-to-bottom of prismatic magnetic bodies. The accuracy of such depth determinations is important, because measuring the depth-to-bottom of crustal magnetic sources is fundamentally difficult. Where possible, the depth estimates are calibrated with other independent data, such as bore-hole depth and temperature measurements, seismic interpretations, and other modelling. Tests of spectral domain techniques were conducted in the Cooper Basin (with significant geothermal and petroleum prospectivity) as part of Geoscience Australia's Onshore Energy Security Program.

RESERVOIR DIFFERENTIATION USING THRESHOLD-INVERSION METHOD IN LOWER TALANG AKAR FORMATION, WEST BETARA FIELD, SOUTH SUMATRA BASIN INDONESIA

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The threshold-inversion method has been applied on 30 km^2 of West Betara (WB) Field generated from 3D post-stack seismic data with the WB-1, WB-3 and WB-4 wells as the control. Different reservoir properties and facies in WB structure becomes a challenge for the team to find relevant geophysical study on this field.

Threshold-inversion method is the interpretation methods which are the combination between threshold attribute and amplitude of seismic inversion cube. The purposes of this method are to distinguish and define the reservoir distribution within certain cut-off value.

The result has been successfully used to distinguish and to define the distribution of Lower Talang Akar Formation (LTAF) reservoir where showing the conglomeratic and coarse grained sandstones reservoirs delineation which is consistent with well data. Technically, the above methods give better contribution in development and production strategies in Jabung block especially WB field. It can minimise the risk of proposing additional development well locations to maximise the oil production in LTAF formation in this fields and it is proven by development drilling program which showing significant success ratio.

MAGNETOMETRIC RESEARCHES USED IN THE ARCHAEOLOGICAL STUDIES OF THE GREEK ROMAN FORTRESS LOCATED ON THE SHORE OF RAZELM LAKE

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In Romania, geophysical methods are normally used to estimate the distribution of cultural relics, before digging. Objects of archaeological interest are usually located within a few metres of the surface.

The geophysical studies were carried out within the archaeological site both in 2005 as well as in 2006.Geophysical works were conducted using Geometrics equipment (G856 proton procession magnetometer) with a 0.1nT precision. This allowed for a highly detailed local morphology of the geomagnetic field and for the mapping of the magnetic anomaly. The working technology has been chosen to emphasise mainly abnormal effects produced by sources located at depths of 0–5 m.

On the south side of the late Roman fortification, outside the precinct wall, an artisanal area including a furnace for manufacturing building materials dated from the late Roman period, was found as well as some Greek furnaces for manufacturing ordinary brick.

The south area of the site has been studied within this research project using the magnetometrics. Geophysical studies will prove very useful for further archaeological diggings, supplying them with a more clearly defined image on the substratum situation.

Magnetometric researches are usually carried out with gradient devices, which imply performing certain simultaneous measurements of the total intensity or of the vertical component of geomagnetic field at two levels, and are usually used within any archaeo-geophysical study. There is a growing involvement lately, in matters related to archaeogeophysics, of electromagnetic methods, which also have an extremely high productivity.

Geophysical works have been carried out using Geometrics equipment with a 0.1nT precision, which allowed for highly detailed images of the local morphology of geomagnetic field and drawing of maps presenting the magnetic anomaly.

The working technology has been chosen to enable to emphasise mainly abnormal effects produced by sources located at depths of 0–5 m. Under the circumstances, taking into account works carried out in 2005 and the previous experience gained during other archaeo-magnetism contracts, the same equipment and magnetometrical mapping method have been used.

DEFINING A HYPOTHETICAL BOUNDARY BETWEEN TWO PHASES OF THE BRAIDWOOD GRANODIORITE

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In support of reconnaissance regional mapping, the geophysical interpretation of Total Magnetic Intensity (TMI), Landsat7, gravity and radiometric data has defined a hypothetical boundary between two texturally different hornblende–biotite phases on the northern part of the Braidwood Granodiorite. The western phase has acicular hornblende up to about 10 mm long and in the eastern phase the hornblende is always more equant and no more than 2 mm long.

Distinguishing the different phases of the Braidwood Granodiorite is important, as most mineral occurrences are hosted by the western phase.

The interpretation relies mainly on two sets of images, particularly the first one:

(1) The pseudocolour image with zenithal sunshade illumination of the TMI Reduced to Pole.
(2) Supervised classification scheme images of all the channels of the Landsat7 data using broad nonparametric spectral signatures (large training polygons).

In the first image, the unusual illumination direction shows that the western phase has a higher density of fractures. In the second set of images, the use of large training polygons allows the classification schemes to proceed without the need to know the precise location of the different phase outcrops. This procedure is novel as it differs from the normal procedure of trying to pinpoint the best training polygons.

Currently, field observations are being carried out to test the position of the boundary; if found accurate, it will greatly aid the regional mapping of the area.

PINE CREEK AIRBORNE ELECTROMAGNETIC SURVEY, ONSHORE ENERGY AND MINERALS, GEOSCIENCE AUSTRALIA

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The Pine Creek Airborne Electromagnetic (AEM) survey is the second regional AEM survey funded by the Onshore Energy Security Program (OESP) at Geoscience Australia. The Pine Creek AEM survey is the largest AEM survey to be undertaken in the Northern Territory covering more than 71 000 km^2. In 2008 Geoscience Australia, through Fugro Airborne Surveys and Geotech Airborne Geophysical Surveys, acquired both TEMPEST and VTEM data with broad line spacings (up to 5 km). Three survey areas were defined, the Woolner Granite, Rum Jungle and Kombolgie. The survey areas covered sections from the Fog Bay, Darwin, Coburg Peninsula, Junction Bay, Alligator River, Milingimbi, Mount Evelyn, Katherine, Pine Creek, Cape Scott, Port Keats, Fergusson River 1:250 000 Map Sheets. The survey results have helped to improve our understanding of the area's geology and mineral potential by mapping the conductivities of different geological and hydrogeological units under cover. The datasets will contribute to interpretations regarding the presence of conductive units in the Pine Creek Orogen; depth to the unconformity between the Pine Creek Orogen and the Kombolgie Subgroup; depth and extent of the Woolner Granite and Koolpinyah Dolomite and the location of major structures. This poster outlines the survey specifications and objectives, and describes some of the geophysical modelling and processing methods being developed by Geoscience Australia.

MAPPING DEPTH TO CRYSTALLINE BASEMENT IN SOUTH AUSTRALIA

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An accurate understanding of the depth to basement is important in many mineral exploration activities. One example is the search for unconformity related uranium within South Australia. On the eastern margin of the Gawler Craton, imaging of the unconformity at the top of Palaeo- to Mesoproterozoic uraniferous basement below the Mesoproterozoic Pandurra Formation has yielded several constraints of interest to uranium explorers, i.e. unconformity geometry and basement faults propagating into overlying sediments. However, what is actually defined as economic basement varies depending on the target, what is defined as basement in paleochannel hosted uranium exploration differs from that for base metals exploration, changing what petrophysical properties can be used to estimate depth. As large regions of South Australia are under cover this becomes an important problem to untangle.

In this study various techniques (Euler, spectral and basic curvature analysis) are applied to magnetic and gravity data in different regions across the state. Originally test cases are undertaken on small data sets in well constrained regions to test the applicability of different techniques on different regions. These are then applied across the entire region and the subsequent depth to basement grids merged together.

The depth to basement map is then weighted using drill-hole data to estimate depth to crystalline rather than economic basement – a unit that has been objectively defined for the different geological regions within South Australia. This map is again refined using structural information and outcrop polygons to create a state image of approximate depth to crystalline basement that is geologically constrained but relies on geophysical data in those areas of minimal known geology.

ADVANCES IN COMBINING WIDE-ANGLE AND REFLECTION VIBROSEIS SURVEYS FROM THE LATEST EXPERIMENTS, ONSHORE AUSTRALIA

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The Vibroseis wide-angle refraction seismic survey is coincident with a regional reflection transect through the Tanami Region. High-quality Vibroseis wide-angle seismic data were collected to offsets of 70 km simultaneously with a deep reflection survey using the same Vibroseis sources. The 2D velocity model derived from wide-angle data shows velocity variations in the upper crust and can be constrained down to a depth of 15 km.

This transect crossed the granites, which have previously been interpreted as structural domes. The base of granites at 1 to 3 km was interpreted from reflection data based on changes in reflectivity pattern from low reflectivity to high reflectivity. Gravity modeling suggested that the depth of the granites are approximately 6 to 8 km, and are therefore much thicker than the seismic reflection interpretation. The granite-gneissic layer modeled from wide-angle data at a depth of 3.5 to 6 km is more consistent with the gravity modeling. We conclude, therefore, that the granite bodies in the Tanami region do not always have a low reflectivity seismic signature as has been interpreted in other regions.

Wide-angle reflections from steeply dipping structures associated with the interpreted granites were observed in wide-angle data. Ray-tracing modeling of these steeply dipping boundaries suggests that dipping reflectors mapped in the reflection data do not have an associated bulk velocity contrast in the wide-angle model.

Combined interpretation of the Vibroseis wide-angle and deep seismic reflection data with gravity modeling demonstrates the benefit of using multi-discipline techniques resulting in a better geological interpretation.

AUSTRALIAN–ANTARCTIC RIFTING: NEW INSIGHTS FROM PLATE TECTONIC RECONSTRUCTIONS OF TOTAL SEDIMENT THICKNESS AND CRUSTAL SEISMIC VELOCITY GRIDS

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Estimates of total sediment thickness on both conjugate margins were obtained on the basis of detailed analysis of seismic velocity-depth functions. This required calibration of stacking-derived velocities against refraction velocities from data recorded by sonobuoys. Refraction-derived velocities were further analyzed to produce velocity slices through the consolidated crust at a set of fixed depths down to 15 km.

New magnetic anomaly identifications, using data recently acquired by Russian Antarctic Expeditions, were integrated with earlier interpretations thus enabling calculation of the new poles of rotation. These poles were then used to reconstruct plate tectonically velocity slices data, and to generate velocity grids at a sequence of time markers. Analysis of these grids shows that there is a change in velocity zonation at ~125°E, possibly indicative of decoupling between the upper and lower crust in the process of rifting.

First-pass analysis of total sediment thicknesses suggests that sediment distribution is grossly asymmetric. The thickest sediment accumulation (not less than 14 km) occurs on the Australian Margin within the Ceduna Sub-basin. Sediments on the Antarctic Margin only reach thickness of 8 km. Some asymmetry in sediment distribution can be expected due to differences in pre-breakup and post-breakup evolution of the margins. However, further research is needed to accurately estimate pre- and post-breakup sediment thicknesses, and to ascertain what fraction of this asymmetry is due to geological factors rather than due to differences in seismic interpretations on respective margins. Such work has recently been completed and its first results are presented.

GRAVITY GRADIENTS AND AEROMAGNETIC TEXTURES – UNLOCKING THE STRUCTURAL ARCHITECTURE OF THE BOUNDARY BETWEEN THE THOMSON AND LACHLAN OROGENS IN THE BOURKE REGION, NSW

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While the Lachlan Orogen in eastern and central NSW has been an extensively mapped and explored terrane hosting major copper and gold deposits, its northern extent and relationship with the 'frontier' Thomson Orogen are obscured by younger sedimentary rocks and regolith. The Bourke 1:250 000 map sheet area is situated in a critical area – straddling the boundary between the two Palaeozoic orogens – and potential field data currently provide almost all the information about the geometry of this complex structural transition zone.

A regional geophysical/geological interpretation study of this area is underway. Information from existing mapping and drilling in the Bourke area has been integrated with regional aeromagnetic and gravity data to define mappable Palaeozoic units at surface and within basement. Striking variations in aeromagnetic character are evident for Siluro-Devonian plutons, and their distribution has been related to limited available geochemical sampling and age dating. Subtle variations in aeromagnetic image texture allowed interpretation of units within Ordovician metasediments previously mapped as the Girilambone Group. Recent geological mapping indicates that these units reflect both original lithology and the degree of metamorphism.

A detailed structural framework for the region has been generated from aeromagnetic trends and discontinuities. Multiscale edge detection analysis ('worming') of significant potential field gradients was used to indicate the morphology of some major structures and intrusions at depth. Finally, geophysical modelling of key sections has enabled examination of the transition zone to visualise its deeper structural architecture.

MAPPING IRON OXIDE COPPER GOLD PROSPECTIVITY, SOUTH AUSTRALIA

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Iron oxide copper gold (IOCG) mineralising systems are associated with spatially offset gravity and magnetic highs related to the presence/absence of magnetite and hematite. The offset can be considered to reflect a fundamental metallogenic zonation in the mineral system, differentiating it from other possible geological solutions. Therefore techniques for combining and comparing gravity and magnetic geophysical data can be used as criterion for mapping IOCG prospectivity.

The regional fields are removed from magnetic and gravity data over different trial areas within South Australia. Worming and depth slicing are then used to highlight anomalies which are mapped via shape and position. These resultant data sets are then integrated using a proximity analysis which relates the spatial size, magnitude of anomaly and resultant offset. Finally this information is combined with depth to basement knowledge to create an image of one measure of IOCG prospectivity.

SEISMIC MONITORING FOR THE OTWAY CO_2 SEQUESTRATION: ACQUISITION AND ANALYSIS OF BOREHOLE SEISMIC DATA

Allan Campbell[1], *Leon Dahlhaus*[1], *Aline Gendrin*[1], *Scott Leaney*[1], *Shoichi Nakahishi*[1], *Kapil Seth*[1], *Sergei Tcherkashnev*[1]*, *Don Sherlock*[2], *Milovan Urosevic*[3]
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The Australian Cooperative Research Centre for Greenhouse Gas Technologies (CO_2CRC) is currently undertaking the Otway

Project, which involves the injection and storage of 100 000 tonnes of carbon dioxide within the subsurface. CO_2 injection will be into Naylor onshore depleted gas reservoir and, therefore, the project will provide important experience for monitoring and verification under these conditions. The overall complexities of the field, its deep, small size and in particular the presence of both free and residual gas zones present a serious challenge for time-lapse seismic monitoring.

Borehole seismic has a strong advantage over surface seismic: energy crosses surface layers only once, and hence is much less sensitive to the variations in the weathered layer properties than surface seismic. Consequently a comprehensive borehole seismic observational program was designed at the Otway project. In the initial phase a Zero Offset VSP, an Offset VSP, and walkaway VSP data were acquired with a minivibroseis (6000 lb) seismic source in the Naylor-1 well in May 2006. In 2007, in the newly drilled injection well (CRC-1) a series of wireline logs, a Zero Offset, an Offset VSP and the first 3DVSP was acquired with a weight drop source simultaneously with 3D surface seismic.

The results of VSP data analysis will be shown and discussed in light of its improved repeatability and image resolution in comparison to surface seismic data. We will also discuss evolving workflows developed to overcome inherently poor land seismic repeatability which is mainly related to changes in the near surface layer conditions.

THE NUMERICAL SIMULATION AND IMAGING OF SEISMIC SCATTERED WAVES APPLIED TO BASE METAL EXPLORATION

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The seismic data collected during the base metal exploration can be hampered by a variety of non-reflecting signals because of the heterogeneity of ore bodies and host rocks. It is difficult to produce a high-quality seismic profile when conventional seismic processing algorithms are applied to the data. According to the Huygens–Fresnel principle, every grid node can be considered as a vibrating source, and geological model can be discrete within the grids. Therefore we have stacked all kinds of waves, including scattered waves from these grids. It seems that more scattered signals are used and the better the migrated section is. Two geological models are simulated and tested, one is the Tongling copper mine in the eastern China, and another is Gegeo tin mine in Yunnan Province of the south-western China. We have simulated the seismic scattering wave, and thus generated the high-quality migrated seismic profiles, which match the geological models very well. It proves that imaging of the seismic scattered wave may be appropriate tool to process the seismic data related to the base metal exploration.

FOCAL MECHANISM – FLINDERS RANGES EARTHQUAKE ML 4.7, 26 DECEMBER 2007

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Despite regular earthquakes in the Flinders Ranges, there are few focal mechanisms, and most of these are not well constrained. We examine the Cradock earthquake of 2007-12-26, Magnitude 4.7. By using aftershock data from a temporary deployment combined with mainshock data, we produce an approximate focal mechanism. It shows thrust and strike-slip motion, but is not well constrained.

To collect more focal mechanism information, we need to focus more accurately on the requirements, and design surveys accordingly. Large earthquakes are too few, and existing deployments have always had too few instruments, or too wide spacing to get useful information. Two particular strategies will supply useful data. For moderate magnitude, shallow earthquakes, both within the ranges and elsewhere, rapid deployment of about 12 instruments with very close spacing (0.2 to 5 km) will usually produce results from aftershocks. For the Flinders Ranges, where regular activity occurs from near surface to about 25 km depth, grid deployments of 20 or more instruments with spacing of 5 to 10 km will produce fairly rapid results. The use of very high sample rates for aftershocks of shallow events has the possibility of mapping the fault plane. The use of broadband sensors may be of value for occasional moderate sized events, to model the rupture.

NEW SEPARATION METHOD OF REGIONAL-RESIDUAL GRAVITY ANOMALIES BY MEANS OF GEOSTATISTICAL FILTERING

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In this paper, we propose a spatial filtering scheme using factorial kriging, a kind of geostatistical filtering method in order to separate regional and residual gravity anomaly. Spatial filtering assumes that regional anomalies have longer distance relation and residual anomalies have effected on smaller range. Gravity anomaly was decomposed into two variogram models depending on long and short effective ranges. And best-fitted variogram models produced the separated regional-residual anomalies by means of factorial kriging. This algorithm was examined with synthetic gravity data, and also applied to a real microgravity data to figure out abandoned mineshaft.

GEOPHYSICAL MAPPING STRATEGY FOR AUSTRALIA'S REMOTE EASTERN DEEP-WATER FRONTIER: THE CAPEL AND FAUST BASINS

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The frontier Capel and Faust Basins, 800 km east of Brisbane in water depths of 1000–3000 m, are generating interest in light of Australia's energy security concerns. The basins are a focus of Geoscience Australia's efforts to provide pre-competitive knowledge of offshore frontier regions to the petroleum exploration industry. This presentation reviews the geophysical data recently obtained over these basins and outlines the strategy used to further our understanding of basin structure in this remote frontier region.

A regional-scale residual gravity map, prepared from satellite-altimetry data and upward continuation, highlighted a series of N–S elongate gravity lows interpreted to represent basin depocentres. A 2D reflection seismic survey was designed on the basis of this inferred basin distribution. The survey was conducted during the summer of 2006/07 and provided 106-fold data to 12 s

TWT on 5920 km of dip and strike lines spaced 20–50 km apart. Sonobuoy data were recorded for velocity information. Gravity and magnetic data were collected during the seismic survey and on a subsequent swath bathymetry and geological sampling survey in late 2007. The latter survey focussed on the north-western part of the seismic grid where depocentres are best developed. The presence of small depocentres with limited strike extent means that 2.5D potential field modelling is not appropriate. However, potential field data are being used as constraints to interpolate horizon and basement picks between the seismic lines. 3D gravity modelling is being developed as a means to assist determination of the sediment thickness and prospectivity of these deep-water basins on Australia's remote eastern frontier.

OPTIMISING OIL PRODUCTION IN LOW PERMEABILITY OIL RESERVOIRS AT TANJUNG FIELD, BARITO BASIN – SOUTH KALIMANTAN INDONESIA

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Tanjung Field is Pertamina EP's own operation located in the Barito Basin, South Kalimantan which is known as the largest basin in Southest Kalimantan. The main reservoir is the Eocene age Lower Tanjung formation (LTF), which was deposited on rifted series of NW-SE horst and graben structures as a transgressive sequence of alluvial fans in the lower part, to shallow marine deposits at the top. It was discovered in 1937 by Shell with successfully discovery well T-001. Recently, production performance is achieved up to 5200 BOPD from 88 production wells.

The focus of this study is to derive optimisation production from low permeability in tight formation. This study also provides a summary of recent work which has been conducted in the diagnosis and remediation of problems associated with tight conglomeratic reservoirs. Low permeability zone occur in the main reservoir sand A and B from the lower part of LTF. Low permeability caused by significant concentration of clay. Smectite and kaolinite was present due to reduce rock–fluid interaction and high concentration of radioactive content comes from plagioclase (feldspar) will also brought a problem to evaluate volume of shale. Low salinity water, which indicates the possibility of a two water system in the reservoirs, makes interpretation even more complicated.

In summary, when petrophysics has a limitation for predicting log properties in identifying facies changes, then stochastic mineral modelling is then applied to give more opportunities to identify reservoir connectivity and reduce the uncertainty.

VIVA LA RESISTANCE! THE UTILITY OF CROSS-HOLE ELECTRICAL RESISTIVITY TOMOGRAPHY TO IMAGE RESISTIVE PATHWAYS

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The aims of this study were to test the application of cross-hole electrical resistivity tomography to image the resistive sand layer between the two conductive clay layers of the Beverley uranium deposit and to determine continuity of the sand layer between holes with the use of pole-pole and dipole-dipole array configurations. Grids of synthetic pole-pole data are used to show how raw pole-pole data can express information about structure and continuity between holes.

Cross-hole measurements were made across 15 different borehole separations – nine of 25 m, three of 43 m, and three of 50 m width. Pole-pole data across all 15 borehole separations and dipole-dipole data across one 25 m separation were inverted. Inversions of the pole-pole data imply that there is a resistive layer between two conductive layers across each borehole separation. A discontinuity in the sand layer is imaged on the dipole-dipole inversion much more distinctively than on the corresponding pole-pole inversion. It is on this borehole separation that the pole-pole and dipole-dipole configurations are analysed.

The error in the pole-pole data was estimated by considering variation between reciprocal potential measurements (1.88%) and spatial uncertainties in measuring the electrode depths (2%, approx.). Comparing these estimated errors to the absolute error in the inversion (1.00%) implies that the inversion is reliable. However, the ambiguities between the sands and clays on the inversion and between continuity and discontinuity on the data grid suggest a limitation of the pole-pole set and that the dipole-dipole configuration may be capable of greater sensitivity.

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