



Geo-soundings

NEWSLETTER – JUNE 2006

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WELCOME

Welcome to the 2nd edition of Geosoundings for 2006. During the past quarter, 4 journal publications have been accomplished and 15 conference papers were presented.

You will also note that during this past quarter, students and staff have been very actively involved with fieldwork. The Department acknowledges the support provided by the relevant research partners.

AWARDS/PRIZES/SCHOLARSHIPS/GRANTS

We would like to announce the winners of the business card draw, held at our Booth at the EAGE Conference in Austria. The winners are:

Goncharov Ivan, JSC "TomskNIPIneft VNK", Russia
Penny Barton, University of Cambridge, UK
Grant A Gist, ExxonMobil, USA

Thank you to all of those who participated

ASEG RESEARCH FOUNDATION GRANT - 2005:

Awarded to MSc Student – **Christopher Harrison**
Awarded to Honours Student – **Jennie Powell**

CONFERENCE PRESENTATIONS

68th European Association of Geoscientists and Engineers Conference and Exhibition, Vienna, 12-15 June

Vermeulen, J., *Fault detection and mapping using 3D diffraction imaging and coherency analysis*

Saenger, E.H., Ciz, R., Gurevich, B., and Shapiro, S.A., *Slow compressional wave in porous media – Finite difference simulations on micro-scale*

Mueller, T., and Gurevich, B., *Effective diffusivity of heterogeneous porous rocks*

Galvin, R., and Gurevich, B., *Attenuation and dispersion in fluid-saturated rocks due to circular cracks*

Ciz, R., Gurevich, B., Siggins, A.F., and Dvorkin, J., *Effective of microheterogeneity on the effective stress coefficient for elastic properties of rocks*

Ziatdinov, S.R., Bakulin, A.V., Gurevich, B., and Ciz, R., *Interaction of low-frequency tube waves with poroelastic reservoirs containing perforations*

Karpfinger, F., Muller, T., and Gurevich, B., *Radiation characteristics of seismic waves in poroelastic structures*

Brajanovski, M., Mueller, T.M., and Gurevich, B., *Fracture related cross-over frequencies of seismic attenuation in porous rocks*

Muller, T., Lambert, G., and Gurevich, B., *Dynamic permeability of thin layered media- Theory vs numerical simulations*

Bayat, B., and Kepic, A., *Using gravity gradiometry to find gold deposits in weathered terrains*

Wandler, A., Evans, B.J., and Link, C., *Physical modelling of AVO responses*

Hartley, B., *Numerical simulation of the use of continuous repetitive noise signals as seismic sources*

Toms, J., Krzikalla, F., Muller, T., Gurevich, B., and Johnson, D.L., *Attenuation and dispersion in partially saturated porous rock – Random vs periodic models*

Krzikalla, F., Muller, T., Hardy, B., and Gurevich, B., *Seismic wave attenuation and dispersion in patchy-saturated rocks – numerical experiments*

Wandler, A., Evans, B., and Link, C., *Physical modeling of AVO responses*

PUBLIC PRESENTATIONS

Evans, B., *The science of geosequestration: storing greenhouse gases underground for thousands of years;* 27th Conference of the Science Teachers Association of WA, Muresk College, Northam, 27 May

JOURNAL PUBLICATIONS

Ciz, R., Gurevich, B., and Markov, M., *Seismic attenuation due to wave-induced fluid flow in a porous rock with spherical heterogeneities;* Geophysical Journal International, Volume 165, p957-968

Lambert, G., Gurevich, B., and Brajanovski, M., *Attenuation and dispersion of P-waves in porous rocks with planar fractures: Comparison of theory and numerical simulations;* Geophysics, Volume 71, pN41-N45

Li R., Dodds K., Siggins A.F., and Urosevic M., 2006, *A rock physics simulator and its application for CO2 sequestration process;* Exploration Geophysics, 37, 67-72.

Li, Q., Harris, B., Aydogan, C., Ang, M., and Tade, M., *Feasibility of recharging reclaimed wastewater to the coastal aquifers of Perth, Western Australia;* Trans IChemE, Part B, Process Safety and Environment Protection, Volume 84(B4):1-10

DEEP OCEAN CONTROLLED SOURCE ELECTROMAGNETIC METHODS WORKSHOP

During May a one day controlled source electromagnetic method workshop was jointly hosted by the Department of Exploration Geophysics – Curtin University, CSIRO and the ASEG. The presenters included Niels Christensen (CSIRO), Brett Harris (Department of Geophysics – Curtin University), Ben Clennel (CSIRO), and Andrew Lockwood (Woodside Petroleum). The course organizers were Kevin Dodds (CSIRO) and Megan Evans (ASEG). The attendees included 40 industry professionals, mostly from large oil companies.

The workshop focused on the newly developed high powered deep ocean electromagnetic methods. The workshop was well received, with over 95% of participants selecting 'agree' or 'strongly agree' that the instructors were well prepared, the information was communicated effectively, and that they would recommend the workshop to others.

PHYSICAL MODELLING LABORATORY

The departments' physical modelling laboratory has recently demonstrated the capacity to obtain good quality 2D and AVO data on CO₂ injected beneath an impermeable membrane in an unconsolidated sand model at 7MPa. Current work includes calibration experiments, which are intended to allow the measurement of reflection coefficients and the addition of further instrumentation to allow measurements to be performed above the critical temperature.

TURI PROJECT

Brian Evans and Milovan Urosevic attended the TURI sponsors meeting on the 24th and 25th of April. The meeting was held in New Plymouth, New Zealand.

The 2D seismic acquisition program was completed successfully. Some of the processed data was viewed at the meeting. The seismic work coincided with stratigraphic fieldwork and additional structural fieldwork. Both of these activities were successful, despite some limitations as a result of the tides.

CRC LEME

Rural Towns Liquid Assets

Geophysical work for the Rural Towns Liquid Assets project has been recently been progressing on Dowerin, Pingelly and Wongan Hills. At Dowerin we successfully shot a high resolution seismic line to find depth to bedrock and near surface structures. At Pingelly we have done magnetics and gravity to trace faults and dykes in the town area which are important in the local hydrogeology. At Wongan Hills a contract high resolution gravity survey was undertaken as a pre-cursor to drilling to establish boreholes for groundwater pumping. The Dowerin and Pingelly surveys involved staff members and students.



Erik Kristiansen, Magnetic Survey at Pingelly



A look down the line of the DEG distributed seismic system in use, near the town of Dowerin

Burdekin Area

After our work at the Ravenswood mine Dr Anton Kepic and Christian Dupuis were joined by Dr Brett Harris to perform geophysical tests in the Burdekin Area (near Ayr, Qld). The focus of the tests was to evaluate vertical seismoelectric profiling within shallow boreholes. Using instruments from both Curtin and the University of New Brunswick the tests at three different locations demonstrated that the method shows a lot of promise in resolving important hydrogeological boundaries



Christian Dupuis, from the University of New Brunswick, operating UNB seismoelectric experiment in field trials in the Burekin Delta area, QLD

CENTRE OF EXCELLENCE IN HIGH DEFINITION GEOPHYSICS

Four 2-D lines of seismic reflection data were collected for Resolute at the Ravenswood gold mine. The six line km of data was collected with our new weight drop source, which produced good quality data in trying conditions. Jacob Smith, one of our honours students, will seek to image the shear structures that host gold from this data. Jacob was assisted in gathering this data by Dr Anton Kepic, and Christian Dupuis, a visiting PhD student from the University of New Brunswick (Canada).

UPCOMING EVENTS

The Department of Exploration Geophysics will be represented at the following events. Feel free to visit, as we would love to speak to you.

CURTIN UNIVERSITY OPEN DAY, Bentley campus – August 13