



# Geo-soundings

NEWSLETTER – DECEMBER 2007

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## WELCOME

Welcome to the last edition of Geosoundings for 2007. During this final and busy quarter there have been 3 Journal Publications, as well as several Conference and Public Presentations.

### ASEG Platinum Sponsor: Curtin University Exhibition Booth.

Curtin University of Technology was a Platinum Sponsor of the ASEG/PESA 19th International Geophysical Conference & Exhibition, which was held in Perth, 18-22 November 2007. As Western Australia's largest university with over 35,000 local and international students, it also has extensive research and development programs in the mining, petroleum and energy fields. Curtin was proud to be represented at the conference, which also demonstrated its commitment to productive relationships with industry, government groups and to our global reputation for resources and energy research initiatives.



## JOURNAL PUBLICATIONS

**Toms, J., Muller, T.M. & B. Gurevich**, (2007) *Seismic attenuation in porous rocks with random patchy saturation*: Geophysical Prospecting, Vol 55, p.671-678

**Dvorkin, J., Mavko, G. & B. Gurevich**, (2007) *Fluid substitution in shaley sediment using effective porosity*: Geophysics, Vol. 72(3), p.1-8

**Saenger, E.H., Ciz, R., Kruger, O.S., Schmalholz, S.M., Gurevich, B. & S.A. Shapiro**, (2007) *Finite-difference*

*modeling of wave propagation on microscale: A snapshot of the work in progress*: Geophysics, Vol. 72(5), p.SM293-SM300

## CONFERENCE PRESENTATIONS

ASEG 2007 Conference,  
18-23 November, Perth, Western Australia

### Oral presentations:

**Keshavarz, N. & B.J. Evans**, *Fundamental seismic parameters of injected CO<sub>2</sub>*

**Makarynska, D., Gurevich, B., Ciz, R., Osypov, K., Shapiro, S., & E. Saenger**, *Rock physics modelling of elastic properties of rocks saturated with heavy oils*

**Hatherley, P., Urosevic, M., Zhou, B., & T. Peters**, *Insight into seismic inversion for geotechnical property estimation in coal mining*

**Harrison, C., Urosevic, M., & N. Stolz**, *Processing and seismic inversion of the intrepid seismic line at the St. Ives Gold Camp, Western Australia.*

**Dodds, K., Sherlock D., & M. Urosevic**, *Geophysical imaging for CO<sub>2</sub> monitoring of OBPP*

**Sykes, M., Urosevic, M., Harris, B., Nartub, N., Kepic, A., & C. Xu**, *High resolution seismic survey of the proposed Beenyup wastewater injection site*

**Sherlock, D., Urosevic, M., Kepic, A., & K. Dodds**, *Land seismic acquisition repeatability for time-lapse monitoring of CO<sub>2</sub> sequestration*

**Harris, B., Sykes, M., Urosevic, M., Martin, M., Kepic, A., & C. Xu**, *High resolution seismic reflection and radar for hydrogeology: the Gnangara Mound, Perth Basin, Western Australia*

**Street, G.**, *Towards development of a risk management tool for roads affected by dryland salinity*

**Evans, B., McDonald, J. & W. French**, *Seismic physical modelling of reservoirs - its past, present and future*

**Nadri, D. & B. Hartley**, *Non-linear joint AVO inversion of PP and PS waves in a VTI medium*

**Saul, M., Hartley, B. & B. Evans**, *The virtual source method - verifying the concept using numerical and physical modelling*

**Evans, B., Xue, Z., Keshavarz, N., Battah, S. & B. Church**, *Some seismic experiments on supercritical CO<sub>2</sub>*

**Turner, G., Craske, T., Kepic, A., Stolz, E. & M. Urosevic**, *Seismic reflection surveys to assist nickel and gold exploration in the WA Goldfields*

**Street, G.**, *Study of groundwater flow in sediments and regolith defined by airborne geophysical surveys*

**Beckett, K.**, *Mapping porosity and density changes in soil and regolith from 256-channel radiometric data*

**Al Ramadhan, A., & B. Hartley**, *Reservoir imaging using induced microseismicity*

**Pervukhina, M., Dewhurst, D., B. Gurevich**, *Elastic properties of shales with respect to silt fraction*

**Evans, B. & N. Keshavarz**, *Fundamental seismic parameters of injected CO<sub>2</sub>*

**Semeniuk, C. & B. Harris**, *3D seismic reflection survey design and modelling at the Beenyup waste water treatment site, Western Australia*

**Harris, B., Squelch, A., & A. Kepic**, *4D representation of deep ocean controlled source electromagnetic data*

#### Poster presentations:

**Grochau, M., & B. Gurevich**, *Core damage: Can we calibrate pressure response with lab data?*

**Wisman, P., & M. Urosevic**, *Geophysical modelling comparison at varying saturation and pressure: CO<sub>2</sub> sequestration pilot project at Otway Basin*

**Brajanovski, M. & T. Muller**, *Huge wave attenuation in partially saturated fractured reservoirs*

**Curtin Reservoir Geophysics Consortium  
Annual General Meeting,  
Rottneest Island, November 15 & 16**

**Hartley, B.**, *Method of measurement of velocity dispersion using continuous signals*

**Nadri, D. & B. Hartley**, *Parameter estimation in transversely isotropic media*

**Al Ramadhan, A. & B. Hartley**, *3D tomography imaging using micro-seismic events*

**Bona, A., Bucataru, I. & M.A. Slawinski**, *Tomography problem for inhomogeneous media*

**Gurevich, B.**, *Wavefront curvature effects on AVO: physical and numerical modelling*

**Makarynska, D.**, *Rock physics modelling of elastic properties of rocks saturated with heavy oils*

**Grochau, M. & B. Gurevich**, *Investigation of core data reliability to support time-lapse interpretation in Campos Basin, Brazil*

**Brajanovski, M.**, *Characteristic frequencies of seismic attenuation in fractured porous rocks*

**Toms, J.**, *Attenuation and dispersion due to partial fluid saturation of porous rock*

**Lebedev, M.**, *Experimental observation of acoustic response of partially saturated rocks*

**Urosevic, M.**, *Azimuthal variation of AVO response of a fractured medium: experiment versus simulations*

**Bona, A., Bucataru, I. & M.A. Slawinski**, *Determination of symmetry planes for anisotropic media*

**Lwin, M., & B. Evans**, *Development of ultrasonic tomography system for use in laboratory studies of CO<sub>2</sub> injected into porous media*

**Evans, B.J.**, *Ultrasonic tomographic experiments injecting CO<sub>2</sub> into core*

**Karpfinger, F.**, *Borehole acoustic modelling with spectral method*

**Evans, B.J.**, *The SKI method - a field experiment for virtual source surveying*

**Hartley, B.**, *The Virtual Source Method - verifying the concept using numerical and physical modelling*

**Harris, B.**, *Methods for 4D representation of the electromagnetic fields generated during deep ocean CSEM surveys*

**Seismic Hard Rock Workshop,  
ARRC Building, Curtin University  
23 November 2007**

An all day course under the title "Seismic data processing in hard rock environment" has been organised following the ASEG conference, on the request of industry sponsors. The presenter was **Milovan Urosevic** with guest speakers **B. J. Evans** and **A. Kepic**. The course covered main data processing issues related to 2D, crooked and 3D seismic surveys. Two new methodologies were also presented, namely residual refraction statics and pseudo 3D PSDM of crooked seismic lines.

**Seismic methods for hard rock ore-body  
Pre-conference workshop, ASEG Conference,  
18 November, Perth**

**Milovan Urosevic, Anton Kepic** and **Brett Harris** presented the workshop with case histories of the application of seismic methods to imaging ore-bodies in hard rock terrane, both brown and green field. Other presenters from the industry, provided their own case histories.

**CO<sub>2</sub>CRC Research Symposium 07  
6-8 November, Swan Valley, WA**

#### Oral presentations:

**Hartley, B.**, *Physical properties of CO<sub>2</sub> near the critical point*

**Urosevic, M.**, (with contributions from Dodds, K. & D. Sherlock), *Time lapse VSP program Naylor field - CO<sub>2</sub> sequestration test site*

**Sherlock, D., Urosevic, M., Kepic, A. & K. Dodds**, *Time-lapse seismic monitoring of Otway Project: Planning and acquisition testing*

**Kepic, A., Friefeld, B., Daley T., Dodds, K., Greaney, T. & S. Sharma**, *Integrated geochemical and geophysical completion for Naylor-1*

#### Poster presentations:

**Hartley, B.M.**, *Measuring velocity changes using continuous acoustic signals*

**Lwin, M., Evans, B. & J. Xu**, *The study of CO<sub>2</sub> trapping in aquifer models, using ultrasonic tomography*

**Wisman, P. & M. Urosevic**, *4D seismic response due to varying pressure and saturation at Naylor-1 and CRC-1*

**Keshavarz Faraj Khah, N. & B.J. Evans**, *Changes in the seismic response as a function of variable phase CO<sub>2</sub> laboratory experiments*

### **PUBLIC & STUDENT PRESENTATIONS**

#### Honours Departmental Presentations, ARRC Lecture Room, Friday 5 October 2007

**Phillips, Sean**, *Feasibility of deep ocean electromagnetic exploration in Australia's offshore oil and gas basins.*

**Saul, Matthew**, *The virtual source method - verifying the concept using numerical and physical modelling.*

**Semeniuk, Christopher**, *3D seismic reflection survey design and modelling at the Beenyup Waste Water Treatment site, Western Australia.*

**Ursulic, Alexander**, *Investigation into the feasibility of a land streamer system.*

**Little, Matthew**, *Seismic refraction analysis for use in high resolution reflection processing: Perth Basin, Western Australia.*

**2007 ASEG Student Night, 24 October 2007**

Following the Departmental presentations on 5 October, **Sean Phillips, Matthew Saul, Christopher Semeniuk** and **Alex Ursulic's** presentations were presenting at the 2007 ASEG Student Night.

**AWARDS/PRIZES/SCHOLARSHIPS/GRANTS**

We congratulate **Prof Brian Evans** who has been reappointed as a member of the Minerals Research Advisory Committee (MRAC) for a further 3 year term expiring 1 July 2010.

**Dr. Milovan Urosevic** has been invited to become a member of the CO2REMOVE Scientific Committee, which he has accepted. CO2REMOVE which stands for CO2 research monitoring verification, is a large integrated project, which is funded by the European Commission and a Consortium of industrial companies. Their objective is to develop the technological basis for regulating monitoring and verification of underground CO2 storage, in particular with reference to the European Trading Scheme and European and National Health, Safety and Environment Regulations. Dr. Urosevic was selected by the CO2REMOVE Executive Board to become a member of the Scientific Committee, which will advise on very specific R&D matters, audit scientific performances, and link the work of the project to international networks of expertise such as are active in other areas and projects.

**Mohammed Al Hussain** obtained his PhD degree with title, *Spherical Wave AVO response of isotropic and anisotropic media: Laboratory experiment versus numerical simulations.*

**Nasser Keshavarz** obtained his PhD degree with the following title: *CO<sub>2</sub> quantification using seismic attributes in laboratory experiments.*

**Robert Galvin** obtained his PhD with the following title: *Elastic wave attenuation, dispersion and anisotropy in fractured porous media.*

**Prof Boris Gurevich** and **Dr Maxim Lebedev** have been awarded support with a total of \$725.2K, spread over the next 4 years. The funding will provide salary support for both Boris and Maxim.

**Prof. Brian Evans** along with other members of staff, have been awarded a total of \$275K, spread over the next 3 years. The funding will provide for support for the purchase of a Laser-Doppler and for technical support.

**Dr Milovan Urosevic** accepted an invited by the Technical Papers Committee of the 2007 ASEG, PESA, FESAus International Geophysical Conference and Exhibition, to chair a technical session for the Petroleum 1.12 and 1.13 sessions on 22 November 2007.

iVEC proudly announced four successful applicants of the iVEC Grant Scheme for projects to run in 2008. The grants totalling \$195K and \$195K in-kind were matched with \$1.3million by the successful applicants. The projects promote the uptake of high performance computing, advanced data visualisation and large scale storage in industry and in government. One of these applicants belonged to CSIRO Petroleum, and the funded project will increase the use of advanced computing technologies in the areas of oil and gas reservoir modelling, urban environment visualisation and monitoring, broadcast quality machinima and virtual drug screening. The project is: *Numerical simulation of petrophysical properties from microtomographic images of rocks.*

Following the ASEG Student Night Presentations, held on 24<sup>th</sup> October, it has been announced that **Mr Sean Phillips** was selected as the winner. Sean will be presented with a prize at the forthcoming ASEG WA Branch AGM on 12 December, which it to be held at the Chifley on the Terrace.

**Prof. Boris Gurevich**, together with Proff. MA Knackstedt and SA Shapiro have been awarded a \$147K grant (over 3 years) for their project, Computational Rock Physics. The proposed project aims to develop relationships by teaming up 2 Australian-based experts in 3D seismic image analysis and theoretical rock physics, with a global company at the forefront of the industry. By developing these relationships will be a cutting edge research achievement, will directly impact on exploration, interpretation and production decisions within the oil and gas industry in Australia and globally, and greatly advance Australia's reputation as a leader in petroleum research services and training.

**GRADUATION DINNER**

The Graduation dinner was held at Zebras African Steakhouse on November 28th. It was an enjoyable night, and we wish to extend our congratulations to all our graduating 3rd year and honours students who put in a lot of hard work throughout the year.

We congratulate each and every one of them.

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**Our wish to all our readers is a Merry Christmas  
and a Prosperous New Year.**