



# Geo-soundings

NEWSLETTER – JUNE 2009

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## WELCOME

Welcome to the second edition of *Geosoundings* for 2009. The past quarter has been very busy with a large contingent of academic staff and senior students representing the Department at several international conferences, as evidenced below. Five reviewed papers have been published in internationally recognised journals. We are also happy to report on some honours bestowed on a number of staff members. See further details below.

We hope you enjoy the contents of this newsletter and look forward to presenting our next edition at the end of September.

## JOURNAL PUBLICATION

**Karpfinger, F., Müller, T. M., & B. Gurevich**, 2008, *Green's functions and radiation patterns in poroelastic solids rationalized*, *Geophysical Journal International*, January 2009.

**Urosevic, M., Campbell, A.J., Dahlhaus, L., Gendrin, A., Leaney, W.S., Tcherkashnev, S., & M. Verliac**, *Seismic monitoring and verification for the CO2CRC Otway Basin Project, Part 2: acquisition and analysis of borehole seismic data*, *Energy Procedia*, Vol.1(1), pp. 3135-3140.

**Gurevich, B., Makarynska, D., & M. Pervukhina**, *Ultrasonic moduli for fluid-saturated rocks: Mavko-Jizba relations rederived and generalized*, *Geophysics*, Vol 74(4), July August 2009; pp. N25–N30.

Liu, J., Regenauer-Lieb, K., Hines, C., Liu, K., Gaede, O., & **A. Squelch**, *Improved estimates of percolation and anisotropic permeability from 3-D X-ray microtomography using stochastic analyses and visualization*. *Geochemistry Geophysics Geosystems (G3)*, Vol. 10(5), 29 May 2009.

**Toms-Stewart, J., Muller, T.M., Gurevich, B., & L. Paterson**, *Statistical characterization of gas-patch distributions in partially saturated rocks*, *Geophysics*, Vol. 74(2), pp. 51-64, March-April 2009.

## CONFERENCE PRESENTATIONS

**Karpfinger, F, Gurevich, B., & A. Bakulin**, *Modeling acoustic response of permeability variation in deepwater wells using spectral method*, Presented at the 157<sup>th</sup> ASA Meeting, Portland, Oregon, 18-22 May 2009.

**Squelch, A.**, *Computer simulation technologies*, Presented at the "Unearthing People for the Future Conference", UWA, Perth, 15-16 June 2009.

### EGU Conference, Vienna, 19-24 April 2009

**Bona, A., & D. Cooke**, *Velocity-less migration using horizontal slownesses*.

**Grochau, M., Muller, T.M., Campos, E., Clennell, B., & B. Gurevich**, *Climate cyclicity revealed from X-ray CT images of deep offshore sediment*. (Poster)

**Lebedev, M., Pervukhina, M., De Paula, O., Clennell, B., & B. Gurevich**, *Dynamic elastic properties from micro-CT images: modeling and experimental validation*.

**Lebedev, M., Clennell, B., Pervukhina, M., Shulakova, V., Mueller, T., & B. Gurevich**, *Direct laboratory observation of fluid distribution and its influence on acoustic properties of patchy saturated rocks*. (Poster)

Pervukhina, M., **Gurevich, B.**, Dewhurst, D.N., & A.F. Siggins, *Experimental verification of the physical nature of velocity-stress relationship for sandstones and shales*. (Poster)

Siggins, A.F., **Lwin, M., & P. Wisman**, *Laboratory calibration of the seismo-acoustic response of CO2 saturated sandstones* (Abstract).

Gendrin, A., Bouquet, S., **Urosevic, M.**, Bernth, H., Kostov, C., **Wisman, P.**, Labregere, D., & M. Verilac, *CO2 storage in the CO2CRC Otway project, Australia: Influence of geological and reservoir parameters on time-lapse seismic signal modeling*. (Abstract).

**Balkan Geophysical Society Conference,  
Belgrade, Serbia, 10-16 May 2009**

**Urosevic, M.**, *Seismic monitoring and verification of CO<sub>2</sub> storage process: phase I & II, Otway Basin Project.*

Gendrin, A., Bouquet, S., **Urosevic, M.**, Bernth, H., **Wisman, P.**, Labregere, D., & M. Verliac, *CO<sub>2</sub> storage in CO<sub>2</sub>CRC/Otway, Australia: sensitivity study on time-lapse seismic signal using finite difference modeling.*

**Brajanovski, M., Gurevich, B., Nadri, D., & M. Urosevic.** *Stress induced azimuthally anisotropic reservoir - AVO modeling.*

**Brajanovski, M., & T. Muller.** *Seismic attenuation in partially saturated fractured aquifers.*

Komatina-Petrovic, S., & **M. Urosevic.** *The Balkan sequestration hubs - a way towards an efficient CO<sub>2</sub> sequestration?*

**71st EAGE Conference & Exhibition  
Amsterdam, Netherlands, 8 - 11 June 2009**

**Oral presentations:**

**Gurevich, B., Makarynska, D., Pervukhina, M., & O. De Paula.** *A new model for squirt-flow attenuation and dispersion in fluid-saturated rocks.*

**Pevzner, R., Shulakova, V., Wisman, P., & M. Urosevic.** *Seismic monitoring feasibility study of CO<sub>2</sub> injection into Saline Aquifer - a case study from Otway Basin, Australia.*

**De Paula, O.,** *Ultrasonic velocities in carbonates: Laboratory data versus a new squirt-flow dispersion model.* (Presented at the Workshop).

**Poster presentations:**

Gendrin, A., **Urosevic, M.**, Bouquet, S., Bernth, H., **Wisman, P.**, Labragere, D., & M. Verliac, *CO<sub>2</sub>CRC/Otway project - influence of geological and reservoir parameters on expected time-lapse seismic signal.*

Nadri, D., **Bona, A., & M. Brajanovski.** *Elasticity tensor inversion from spherical sample measurements.*

**Pevzner, R., Gurevich B., & G. Duncan.** *Estimation of azimuthal anisotropy from VSP data using multicomponent velocity analysis.*

**Bona, A., & D. Cooke.** *Sensitivity of velocity-less imaging using horizontal slownesses in 3D.*

**Hartley, B.M., Palermo, A., & B.J. Evans.** *Physical modelling of the virtual source method.*

Shulakova, V., Pervukhina, M., Muller, T.M., **Lebedev, M., & B. Gurevich.** *Finite-difference numerical experiments and laboratory testing of attenuation and dispersion in patchy-saturated media.*

**Brajanovski, M., Gurevich, B., Lokajicek, T., Nadri, D., Bona A., & G. Duncan.** *Estimation of stress induced azimuthal anisotropy - AVO modeling.*

Shulakova, V., **Pevzner, R., & M. Urosevic.** *Processing of land 4D seismic data in case of limited area of repeated survey - a case study from Otway Basin, Australia.*

**Pevzner, R., Shulakova, V., Kepic, A., Al-Jabri, Y.Y.M., & M. Urosevic.** *Repeatability of land time-lapse seismic surveys - Otway project 2D test line case study.*

**Wisman, P., Urosevic, M., Dance, T., & D. Makarynska.** *Integrated rock physics models for improved 4D seismic monitoring of CO<sub>2</sub> sequestration in Otway Basin, Australia.*

**De Paula, O.B., Gurevich, B., Pervukhina, M. & D. Makarynska.** *Application of a new model of squirt-flow attenuation and dispersion in carbonates.* Presented at the Workshop.

**4<sup>th</sup> BIOT Conference on Poromechanics  
New York, 8 - 10 June 2009**

**Karpfinger, F., Gurevich, B., & A. Bakulin.** *Axisymmetric waves in fluid-saturated porous structures.*

**Gurevich, B., Makarynska, D., & M. Pervukhina.** *A new squirt-flow model of elastic wave attenuation and dispersion in fluid-saturated rocks.*

**Lebedev, M., Gurevich, B., Toms, J., Clennell, B., Pervukhina, M., & T.M. Muller.** *Laboratory observation of Velocity-saturation relation transition during water imbibition of porous rock.*

Galvin, R.J., & **B. Gurevich.** *Interaction of a longitudinal wave with a circular crack in a fluid-saturated porous medium.*

Shulakova, V., Pervukhina, M., Muller, T.M., **Lebedev, M., Wenzlau, F., Gurevich, B., & B. Clennell.** *Finite-difference simulations and laboratory measurements of attenuation and dispersion in patchy-saturated rocks.*

**PUBLIC PRESENTATIONS**

**Squelch, A.,** *X-Ray tomography - Software of visualisation and quantification.* Public presentation at a "Scientific Applications of X-ray Tomography in Perth" Workshop, 8th June, UWA.

**Roman Pevzner** was invited by Dr. Richard Xu from the Charles Sturt University (Bathurst, NSW) to give a talk on modern GPR techniques (application, hardware, processing). He went to Bathurst on 10-12 May.

**Lebedev, M.,** *Direct laboratory observation of fluid distribution and its influence on acoustic properties of patchy saturated rocks.* Presented at the Geophysics Friday Seminar, 15 May 2009, Perth.

## AWARDS/GRANTS/HONOURS

### *Congratulations to the following -*

**Milovan Urosevic** was selected to be Technical Chairperson at the 5th Congress of the Balkan Geophysical Society, held 10-16 May, Belgrade, Serbia.

**Milovan Urosevic** was also invited to be a guest speaker at a special event held by the Ministerial Round Table with the participation of Ministers responsible for Energy and Environment from South Eastern Europe. He presented an Australian CO2CRC sequestration prospective, 14-15 May, Mecavnik, Serbia.

**Milovan Urosevic** has been invited by the Faculty of Science and Technology at Uppsala University, Sweden, to serve as opponent at the forthcoming public defence of a doctoral thesis on 1<sup>st</sup> September.

**Boris Gurevich**, who is an Associate Editor of 'Geophysics', received an Honourable Mention in an article written by the Editor of Geophysics in *The Leading Edge*, May 2009, page 624. The Editor, Kees Wapenaar, stated -*"I wholeheartedly agree with the nominations of Boris Gurevich and Deyan Draganov as outstanding associate editors. Both of them constantly provide excellent reviews, helping authors to raise their paper to a higher level. Thanks for your excellent work, Boris and Deyan"*.

## RESEARCH HIGHLIGHTS

**Anton Kopic, Milovan Urosevic** and **Andrew Greenwood** (all are Centre for High Definition Geophysics researchers) visited Nevada, USA during April, and successfully demonstrated the use of the 2D seismic method to image Carlin style gold deposits. Barrick were so impressed with the trial results they have pledged to have Curtin return next year for follow-up trials. Previous trials by other organisations worked poorly or provided ambiguous results.

Time-lapse seismic imaging (performed by the Department of Exploration Geophysics) of CO2 injection at Australia's first CO2 sequestration test site provided clear images of changes in pore pressure near the monitoring well; thus vindicating the different approach taken by Curtin's researchers, which many industry and academic observers had predicted would fail.

## PUBLIC RELATIONS/EXPOS

The first **Curtin University Faculty Night** was held on Wednesday 10<sup>th</sup> June in the Brodie Hall building, Technology Park. The evening showcased the offerings from Curtin in the Faculty of Science and Engineering. The event was primarily designed for the mid year entry intake into Curtin University. **Dominic Howman** represented the Department at an information booth where course structure and

prerequisites were discussed (*see photo below*). A formal presentation was also given by Dominic that outlined our geophysics course offerings and discussed career paths.



The Department once again organized an ASEG booth for the **Careers, Education and Employment Expo**, held 15-17 May at the Perth Convention Centre. The event was a great success, with many potential students hearing about Exploration Geophysics for the first time. We would like to thank ASEG members and Curtin Exploration Geophysics staff for helping in the booth. In particular special thanks to **Sean Simpson** and **Andrew Squelch** who set up and dismantled the booth.

The **Geographical, Earth, Environmental Sciences Day 2009**, held on 27<sup>th</sup> March at the Perth Zoo, was organized by the Australian Association for Environmental Education (WA Chapter). **Dominic Howman** was invited to participate and he gave presentations to 4 different groups of students about how exploration geophysics is applied. A demonstration of how rocks take up magnetic fields was shown.

*Thank you to the staff members and students, and especially Dominic Howman for continuing to support these promotional activities each year. We are very grateful to each of you.*

## UPCOMING EVENTS

**SEG SUMMER RESEARCH WORKSHOP**  
Banff Canada, 23-27 August

**AAPG/SEG JOINT WORKSHOP**  
Galveston, U.S.A., 26-27 August

**EAGE NEAR SURFACE**  
Dublin Ireland, 7-9 September

**EAGE/SEG RESEARCH WORKSHOP 2009**  
Barcelona Spain, 14-17 September

**AAPG/SEG FALL STUDENT EXPO**  
Houston Texas, 21-22 September