

Geo-soundings

NEWSLETTER, DECEMBER 2014–FEBRUARY 2015



Welcome to Geo-soundings.

Welcome to this edition of Geo-soundings. Since our previous newsletter several publications and presentations have been completed as you will see below and we have welcomed new staff and visitors to the department. We look forward to keeping our readers informed of our future activities and hope that 2015 will be rewarding and productive for us all.

JOURNAL PUBLICATIONS

Shulakova, V., R. Pevzner, C. J. Dupuis, M. Urosevic, K. Tertyshnikov, D. E. Lumley and B. Gurevich, 2015. Burying receivers for improved time-lapse seismic repeatability: CO2CRC Otway field experiment. *Geophysical Prospecting*, 63(1), 55-69. Doi: 10.1111/1365-2478.12174.

Mikhaltsevitch, V., M. Lebedev and B. Gurevich, 2014, Measurements of the elastic and anelastic properties of sandstone flooded with supercritical CO₂. *Geophysical Prospecting*, 62, 1266 – 1277. Doi: 10.1111/1365-2478.12181.

Uvarova, Y., A. Yurikov, M. Pervukhina, M. Lebedev, V. Shulakova, B. Clennell and D. Dewhurst. 2014. Microstructural characterisation of organic-rich shale before and after pyrolysis. *APPEA Journal*, 54, 249-258.

Mikhaltsevitch, V., M. Lebedev and B. Gurevich. 2014. A laboratory study of the elastic and anelastic properties of the sandstone flooded with supercritical CO₂ at seismic frequencies. *Energy Procedia* 63, 4289-4296. Doi: 10.1016/j.egypro.2014.11.464.

Lebedev, M., S. Iglauer and V. Mikhaltsevich. 2014. Acoustic Response of Reservoir Sandstones during Injection of Supercritical CO₂. *Energy Procedia* 63, 4281-4288.

Lebedev, M., O. Bilenko, V. Mikhaltsevitch, M. Pervukhina and B. Gurevich. 2014. Laboratory measurements of ultrasonic velocities in CO₂ saturated brines. *Energy Procedia* 63, 4273-4280.

Iglauer, S., M. Sarmadivaleh, A. Al-Yaseri and M. Lebedev. 2014. Permeability evolution in sandstone due to injection of CO₂-saturated brine or supercritical CO₂ at reservoir conditions. *Energy Procedia* 63, 3051-3059.

Tertyshnikov, K., A. Bona and R. Pevzner. 2014. Prestack time imaging algorithm with simultaneous velocity estimation in hard rock environments. *Exploration Geophysics*, 45, 234-241. Doi: 10.1071/EG12080.

Seibert, S., H. Prommer, A. Siade, B. D. Harris, M. Trefry, and M. Martin. 2014. Heat and mass transport during a groundwater replenishment trial in a highly heterogeneous aquifer. *Water Resources Research* 50 (12), 9463-9483. Doi: 10.1002/2013WR015219.

Khair, F., M. Myers, A. Podolska, T. Sanders, M. V. Baker, B. D. Nener and G. Parish, 2014. Synchrotron-based XPS studies of AlGa_N and GaN surface chemistry and its relationship to ion sensor behaviour. *Applied Surface Science* 314, 850-857. Doi: 10.1016/j.apsusc.2014.07.002.

Druhan, J. L., S. Vialle, K. Maher, and S. Benson, 2014. A reactive transport model for geochemical mitigation of CO₂ leaking into a confined aquifer. *Energy Procedia* 63, 4620-4629.

Vialle, S., S. Contraires, B. Zinzner, J. Clavaud, K. Mahiouz, P. Zuddas, and M. Zamora, 2014. Percolation of a CO₂-enriched fluid in a limestone's core: evolutions of the hydraulic, chemical and structural properties. *Journal of Geophysical Research: Solid Earth*, 119 (4), 2828-2847.

CONFERENCE PRESENTATIONS

[The Greenhouse Gas Control Technologies \(GHGT-12\), Austin, Texas, October 2014](#)

Oral Presentations

Lebedev, M., O. Bilenko, V. Mikhaltsevitch, M. Pervukhina and B. Gurevich. 2014, Laboratory measurements of ultrasonic velocities in CO₂ saturated brines.

Lebedev, M., S. Iglauer and V. Mikhaltsevich. 2014, Acoustic response of reservoir sandstones during injection of supercritical CO₂.

Mikhaltsevitch, V., M. Lebedev and B. Gurevich. 2014, A laboratory study of the elastic and anelastic properties of the sandstone flooded with supercritical CO₂ at seismic frequencies.

Iglauer, S., M. Sarmadivaleh, A. Al-Yaseri and M. Lebedev. 2014, Permeability evolution in sandstone due to injection of CO₂-saturated brine or supercritical CO₂ at reservoir conditions.

Druhan, J. L., S. Vialle, K. Maher and S. Benson, 2014, A reactive transport model for geochemical mitigation of CO₂ leaking into a confined aquifer.

[Society of Exploration Geophysicists \(SEG\) 84th Annual Meeting, Denver, Colorado, October 2014](#)

Oral Presentations

Qi, Qiaomu., T. M. Muller and J. German Rubino, 2014, Incorporating capillarity into models for P-wave attenuation and dispersion in partially saturated rocks.

Sun, Baichun., A. Bona, B. Zhou and A. King, 2014, Coherent interferometry migration for hard rock diamond drill-bit seismic.

Pervukhina, M., Y. Uvarova, J. Dautriat, D. N. Dewhurst, N. Patrusheva and M. Lebedev, 2014, Effect of pyrolysis on elastic properties and microstructure of organic-rich Mancos shale.

Mikhaltsevitch, V., B. Gurevich and M. Lebedev, 2014. Low-frequency laboratory measurements of the acoustic parameters of Savonnières limestone.

Lebedev, M., V. Mikhaltsevitch, M. Carson, M. Pervukhina and B. Gurevich, 2014. Softening of rocks matrix due to water flood: experimental study.

Carson, M., and M. Lebedev, 2014. Ultrasonic measurements of S waves using laser interferometry.

Pethick, A., and B. D. Harris. 2014. Structural constraints in joint inversion of seismic and EM data: Analysis and visualization.

Takam Takougang, E., B. D. Harris and A. Kepic. 2014. Cooperative inversion of seismic and magnetotelluric data in complex areas: A workflow.

[Deep Exploration Technologies Corporative Research Centre \(DETCRC\) Annual Conference, Hahndorf, Adelaide, November 2014](#)

[Oral Presentations](#)

Kepic, A. 2014. Sonde and Shuttle – In the Hands of Drillers.

Harris, B. 2014. Program 2 Overview.

[Poster Presentations](#)

Kieu, D. T., and A. Kepic. 2014. Model based inversion using petro-physical constraint via fuzzy clustering technique.

Okans, E., A. Kepic, M. Urosevic and S. Ziramov. 2014. Feasibility of regional seismic reflection surveys to discover IOCG deposits in the Gawler craton.

Menu, F., A. Greenwood, A. Kepic, and E. Takam Takougang. 2014. The potential of cross-hole seismic reflection technique to delineate volcanogenic massive sulphide beds in shale host rock.

Ung, K., A. Bona and M. Madadi. 2014. Reciprocity principle in finite difference modelling of waves in elastic media.

Khoshnavaz, M. J., A. Bona and M. Urosevic. 2014. Detecting local heterogeneities, fracture zones and faults using pre-stack diffraction imaging.

Cuong, V. A., B. Harris, A. Pethick and E. Takam Takougang. 2014. Seismic Attributes and Cooperative Inversion of Magnetotelluric Data.

Kitzig, M. C., D. T. Kieu and A. Kepic. 2014. Semi-automated lithology interpretation using fuzzy cluster analysis.

Hossain, M., M. Urosevic and A. Kepic. 2014. Volumetric Interpretation of 3D Seismic Data from the Hillside IOCG Deposit in South Australia.

Hooshyari-Far, I., and A. Kepic. 2014. Volumetric Interpretation of 3D Seismic Data from the Hillside IOCG Deposit in South Australia.

Ahmadi, P., and M. Urosevic. 2014. Feasibility of multicomponent seismic for mineral exploration.

Bossilkov, V. 2014. Optical Frequency Domain Strain Sensors for use in Compact Pressure Detectors.

[Corporative Research Centre for Greenhouse Gas Technologies \(CO2CRC\) Symposium, Melbourne, November 2014](#)

Oral Presentations

Pevzner, R., B. Gurevich, V. Shulakova, M. Madadi, A. Bona and M. Urosevic. 2014. Otway Stage 3 well-based seismic monitoring: objectives and approaches.

Hortle, A., L. Richard, S. Whittaker, B. Harris, B. Freifeld and L. Stalker. 2014. Drilling wells to improve containment knowledge: data acquisition and well test options.

Pevzner, R., A. Bona, A. Mamdoh, K. Tertysnikov and M. Madadi. 2014. Diffracted waves analysis using passive seismic for imaging and CO₂ sequestration monitoring.

Harris, B., and A. Pethick. 2014. CO₂ geological storage and the potential for monitoring with in-hole/cross-well electromagnetic methods.

Lebedev, M., V. Mikhaltsevitch and B. Gurevich. 2014. CO₂ geosequestration in the laboratory: Can we trust experimental data?

Poster Presentations

Al Hosni, M., E. Caspari, R. Pevzner, T. Daley and B. Gurevich. 2014. Using time-lapse VSP data to constrain velocity-saturation relations.

Meira, M., B. Gurevich, J. Gunning, R. Pevzner and E. Caspari. 2014. Estimation of gas saturation from Otway Stage 2C time-lapse seismic data using stochastic inversion: feasibility study.

Vialle, S., J. L. Druhan, and K. Maher. 2014. Simulations of hydrogeochemical processes of CO₂ migration and mitigation strategies in a fractured caprock.

[American Geophysical Union \(AGU\), San Francisco, USA, December 2014](#)

Oral Presentations

Vialle, S., S. Contraires, B. Zinzner, J. Blavaud, K. Mahiouz, P. Zuddas and M. Zamora. 2014. Integrated geochemical and geophysical monitoring of CO₂-rich fluids in carbonate samples

HONOURS / GRANTS / AWARDS

Congratulations to Boris Gurevich for being a 2014 finalist for the John de Laeter Award for Research Leadership.

The WA Branch of the Australian Society of Exploration Geophysicists recently held its annual WA Honours and Masters Students Presentations. Each year the attendees vote on the best presentation.

This year the honour of best presenter goes to:

Matthew KOVACEVIC

Matthew presented the results of his research entitled "Seismic characterisation and tectonic significance of listric fault systems in the Ceduna subbasin." Congratulations to Matthew and thanks to the other

presenters, all of whom did a fantastic job:

Mahesh **RAGHVANI**

Vanessa Carolia **GUTIERREZ ACEVEDO**

Alexander **COSTALL**

Sandy **JONES**

Andrew Pethick was recipient of the 2015 Shanti Rajagopalan Memorial Award for Best Paper by a student in Exploration Geophysics. The paper was "Bathymetry, electromagnetic streamlines and the marine controlled source electromagnetic method" and co-authored by **Brett Harris**. He intends on using his prize towards a more suitable online server for his open source geoscience website www.DigitalEarthLab.com allowing people from around the world to model and invert EM datasets for free.

Konstantin Tertysnikov was the runner up for the 2015 Shanti Rajagopalan Memorial Award for his paper "Prestack time imaging algorithm with simultaneous velocity estimation in hard rock environments," co-authored by Andrej Bona and Roman Pevzner.

Dr Anousha Hashemi is currently appointed as one of our honorary Adjunct Associate Professors and is a member of some HDR student's supervisory panels. She is a finalist in the 2015 Women in Resources Awards. The finalist's profiles are available online. This is also the page where People's Choice votes can be placed. <https://www.cmewa.com/news-and-events/upcoming-events/2015-finalists>.

Australian patent no: 2011318229 "An apparatus for and a method of characterising mechanical properties of a sample" has been granted to Curtin University on 22nd of January 2015. The inventors are Maxim Lebedev, Vassili Mikhaltsevich, Mark Lwin and Boris Gurevich.

RESEARCH ACTIVITIES

Congratulations to **Milovan Urosevic** and **Anton Kepic** who's project "Assessment of Flood Damaged infrastructures in Bosnia, Herzegovina and Serbia" was successfully selected for funding by Geophysicists without borders. The aim of the project is to combine several methodologies in a time-lapse manner in order to establish the most effective methodology that could be applied country wide to understand present and prevent future landslides. A combination of geophysical methods such as, Multi-channel Analysis of Surface Waves (MASW), refraction and reflection, electrical, EM, satellite and ground GPS, will be used and the results will be presented to the relevant local authorities to direct the recovery procedure.

STAFF NEWS



Dr Stanislav Glubokovskikh commenced his 3 year appointment on the 12th January 2015 as a Research Fellow. He has a Diploma in Geophysics from the "International University of Nature, Society and Human of Dubna" (Russia, 2008). He combined his PhD study while working for the Russian State Research Institute of Geosystems - "VNIIGeosystem" (Moscow) laboratory of theoretical modelling of geophysical processes.

In 2012 he defended his thesis "Effective seismoacoustic characteristics of fractured reservoirs and their detection using 3C reflection seismology" at Lomonosov Moscow State University (LMSU), with a major in physics and mathematics. From the time of graduation through to 2013, the topic of his PhD thesis was his primary research interest. Recently he started to study stress-

dependency of seismic properties of rocks and unconsolidated sediments.

He resigned from the laboratory at “VNIIGeosystem” and “Centre for Seismic Data Analysis of LMSU” to accept the position in the Department of Exploration Geophysics at Curtin University. During his appointment he will be actively involved in theoretical and applied rock physics research for the CO2CRC and South West Hub Geosequestration projects. He has a strong interest in all kinds of sports, loves reading and contemporary jazz.



The Department of Exploration Geophysics welcomes Michael Carson back to the group on a Curtin Research Contract as a full time Research Fellow. Michael's training, publication record and positions in astrophysics have provided him with the required background and knowledge to work in the field of applied geophysics, specifically in the spectral gamma measurements of natural gamma activity in boreholes and developing borehole acoustic measurements. Michael has an MSc in Astronomy from the University College Galway and a PhD in Physics from the University College Dublin. His key research areas have been in neutrino astrophysics, direct dark matter detection, radiation physics, astronomy, scientific computing and rock physics. From 1998 – 2011, he has been involved in fieldwork postings at Mt Hopkins Observatory USA, Boulby Underground Laboratory UK, University of Uppsala Sweden and Amundsen-Scott South Pole Station Antarctica. He has also held research scientist positions at the University of Gent in Belgium and the University of Sheffield UK. He has been the lead and co-author of 51 publications and presented 15 Conference papers.

VISITORS



Anton recently arrived for a 3 month appointment as a visiting researcher with the Department of Exploration Geophysics. He has a BSc and MSc degrees from the Department of Seismometry and Geoacoustics, Moscow State University, and currently holds a position with GEOLAB LLC in Moscow as a geophysicist. GEOLAB LLC has a track record and strong capability in seismic imaging, traveltimes and full waveform inversion. Anton's visit is associated with establishing research cooperation with GEOLAB LLC in the area of viscoelastic full waveform inversion of borehole seismic data. During the visit Anton will collaborate closely with Boris Gurevich, Roman Pevzner, Maxim Lebedev and Stanislav Glubokovskikh.



Anastasia also recently arrived for a 3 month appointment as a visiting researcher with the Department of Exploration Geophysics. She has a BSc and MSc degrees from the Department of Seismometry and Geoacoustics, Moscow State University. During her MSc degree she spent 1 semester with Delft University of Technology.

Anastasia currently holds a position with the Centre of Seismic Data Analysis at Lomonosov Moscow State University as a junior seismic researcher. The Centre

for Seismic Data Analysis has a strong record in acquiring shallow marine seismic data which compliments Curtin's cutting edge research capability in rock physics. Anastasia's visit is associated with establishing cooperation which will benefit both parties in combining each groups expertise to build models of shallow marine sediments from shallow seismic data acquired in lakes and shallow seas. During the visit Anastasia will work closely with Boris Gurevich, Roman Pevzner, Maxim Lebedev and Stanislav Glubokovskikh.



Chao recently arrived to commence a 6 month occupational traineeship appointment and will be working on a research project entitled "***Estimation of the anisotropic parameters based on lab measurements of velocity***".

He will be supervised by Drs Mahyar Madadi, Andrej Bona and Maxim Lebedev. Chao is a student at the School of Petroleum Engineering at China University of Petroleum (East China).

OBITUARY

ROBERT EDWARD SHERIFF 1922 – 2014

Dr Robert E (Bob) Sheriff passed away peacefully at his home in Missouri City, Texas on November 19 2014 aged 92. In 1993, Bob and his wife Margaret came to Perth where he held the distinguished position of Haydn Williams Fellow at Curtin University of Technology in Perth.

UPCOMING EVENTS

ASEG-PESA 2015

15th–18th February, Perth, Australia

Australasian Oil & Gas Exhibition and Conference

11th–13th March, Perth, Australia

EGU General Assembly 2015

12th–17th April, Vienna, Austria

3rd International Rock Physics Workshop

13th–17th April, Perth, Australia

Offshore Technology Conference (OTC2015)

4th–7th May, Houston, Texas, USA

Careers & Education Expo

11th–17th May, Perth, Australia

APPEA Conference & Exhibition 2015

17th–20th May, Melbourne, Australia

77th EAGE Conference & Exhibition 2015

1st–4th June, Madrid, Spain

Near-Surface Asia Pacific Conference 2015

7th–10th July, Waikoloa, Hawaii

AAPG/SEG ICE 2015

13th–16th September, Melbourne, Australia

SEG Annual Meeting 2015

18th–23th October, Louisiana, USA

Educational Software Grants and Programs

A big thank you to all our software vendors who provide us with the continuing support and software resources we need for our teaching and research programs.

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