

# Geo-soundings

NEWSLETTER – DECEMBER 2015



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## WELCOME

Welcome to the final edition of Geo-soundings for 2015. During this last quarter, staff and students have been very active, receiving awards and prizes in recognition of their worthy achievements. In addition there have been journal publications and conference presentations. We hope you have enjoyed our activities throughout 2015 and we sincerely wish for the new year to be rewarding and productive for all.

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## JOURNAL PUBLICATIONS

**Glubokovskikh, S., B. Gurevich, M. Lebedev, V. Mikhailsevitch,** and S. Tan, 2015, Effect of asperities on stress dependency of elastic properties of cracked rocks: *International Journal of Engineering Science*. Doi:10.1016/j.ijengsci.2015.09.001.

Sun, Z., and **A. Squelch**, 2015, 3D printed models of complex anatomy in cardiovascular disease: *Heart Research Open Journal*, **2**, no. 3, 103–108. Doi: dx.doi.org/10.17140/HROJ-2-118.

Caspari, E., **R. Pevzner, B. Gurevich**, T. Dance, J. Ennis-King, Y. Cinar, and M. Lebedev, 2015, Feasibility of CO<sub>2</sub> plume detection using 4D seismic: CO<sub>2</sub>CRC Otway project case study - Part 1: Rock-physics modeling: *Geophysics*, **80**, no. 4, B95–B104. Doi: 10.1190/geo2014-0459.1.

Altowairqi, Y., **R. Rezaee**, B. Evans, and M. Urosevic, 2015, Shale elastic property relationships as a function of total organic carbon content using synthetic samples: *Journal of Petroleum Science and Engineering*, **133**, 392–400. Doi:10.1016/j.petrol.2015.06.028.

Zhou, B., **M. Urosevic**, and B. Shen, 2015, Subsidence Assessment Using 3-D Seismic Data at Collingwood Park, Brisbane: *Journal of Environmental and Engineering Geophysics*, **20**, no. 3, 257–272. Doi: 10.2113/JEEG20.3.257.

Nourollah H., **M. Urosevic**, and J. Keetley, 2015, Seal potential of shale sequences through seismic anisotropy: Case study from Exmouth Sub-basin, Australia: *Interpretation*, **3**, no. 4, T257–T267. Doi: 10.1190/INT-2014-0284.1.

**Yavuz, S., J. Kinkela, A. Dzunic,** M. Penney, R. Neto, V. Araujo, **S. Ziramov, R. Pevzner,** and **M. Urosevic**, 2015, Physical property analysis and preserved relative amplitude processed seismic imaging of volcanogenic massive sulfides—a case study from Neves–Corvo, Portugal: *Geophysical Prospecting*, **63**, no. 4, 798–812. Doi: 10.1111/1365-2478.12269.

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## EXPANDED ABSTRACTS

**Pevzner, R., K. Tertyshnikov, V. Shulakova, M. Urošević, A. Kepic, B. Gurevich,** and R. Singh, 2015, Design And Deployment of a Buried Geophone Array for CO<sub>2</sub> Geosequestration Monitoring: CO<sub>2</sub>CRC Otway Project, Stage 2C: SEG Technical Program Expanded Abstracts 2015, 266–270. Doi: 10.1190/segam2015-5902309.1.

**Meira, M. G. C.,** J. Gunning, **B. Gurevich,** and **R. Pevzner,** 2015, Implications of Noise Contamination In Stochastic Time Lapse Inversion: SEG Technical Program Expanded Abstracts 2015, 5513–5517. Doi: 10.1190/segam2015-5796670.1.

**Egorov, A., S. Glubokovskikh, A. Bóna, R. Pevzner, B. Gurevich,** and **M. Tokarev,** 2015, Influence of Rough Sea Surface on Sea Surface Reflections: Deep Towed High-Resolution Marine Seismic Case Study: SEG Technical Program Expanded Abstracts 2015, 3661–3665. Doi: 10.1190/segam2015-5897880.1.

**Vialle, S.,** and **M. Lebedev,** 2015, Heterogeneities in the Elastic Properties of Microporous Carbonate Rocks at the Microscale from Nanoindentation Tests. SEG Technical Program Expanded Abstracts 2015, 3279–3284. Doi: 10.1190/segam2015-5885016.1.

Komatina, S., K. Suto, and **M. Urošević,** 2015, Assessment of Flood Damaged Infrastructures in Bosnia & Herzegovina and Serbia: An SEG Geoscientists without Borders Project: SEG Technical Program Expanded Abstracts 2015, 4968–4972. Doi: 10.1190/segam2015-5903074.1.

**Khoshnavaz, M. J., A. Bóna,** and **M. Urošević,** 2015, Passive Seismic Localization Without Velocity Model: Application and Uncertainty Analysis: SEG Technical Program Expanded Abstracts 2015, 2467–2472. Doi: 10.1190/segam2015-5915362.1.

**Mikhailsevitch, V., M. Lebedev,** and **B. Gurevich,** 2015, A Laboratory Study of Attenuation and Dispersion Effects in Glycerol-Saturated Berea Sandstone at Seismic Frequencies: SEG Technical Program Expanded Abstracts 2015, 3085–3089. Doi: 10.1190/segam2015-5898429.1.

**Glubokovskikh, S., B. Gurevich, M. Lebedev,** and **V. Mikhailsevitch,** 2015, Stress-Dependence Of Elastic Properties of Rock Containing Finite Cracks With Contacting Surfaces: SEG Technical Program Expanded Abstracts 2015, 3229–3233. Doi: 10.1190/segam2015-5905971.1.

Pirogova, A., M. Tokarev, and **S. Glubokovskikh,** 2015, AVA-Study of Shallow Marine Unconsolidated Sediments Using UHR Multichannel Seismoacoustic Dataset Acquired with a Deep-Towed System: SEG Technical Program Expanded Abstracts 2015, 2327–2331. Doi: 10.1190/segam2015-5899855.1.

**Kieu, D.T.,** and **A. Kepic,** 2015, Incorporating Prior Information Into Seismic Impedance Inversion Using Fuzzy Clustering Technique. SEG Technical Program Expanded Abstracts 2015, 3451–3455. Doi: 10.1190/segam2015-5922589.1.

**Menu, F., A. Kepic,** and **A. Greenwood,** 2015, Crosshole Seismic Reflection to Delineate Rosebery Type Volcanogenic Massive Sulphide Ore Lens. SEG Technical Program Expanded Abstracts 2015, 2037–2041. Doi: 10.1190/segam2015-5915575.1.

**Al-Hosni, M., S. Vialle, B. Gurevich,** and T. Daley, 2015, Effect of CO<sub>2</sub> on Rock Properties: Frio Crosswell Case Study: Third EAGE Workshop on Rock Physics. Doi: 10.3997/2214-4609.201414393.

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## CONFERENCE PRESENTATIONS

### The 2015 TIGeR Conference, Perth, Western Australia, 23<sup>rd</sup>–25<sup>th</sup> September 2015

**Vialle, S.**, 2015, Geophysical signature of fluid-rock interactions: Core-flooding experiments of CO<sub>2</sub>-rich fluids in carbonate rocks.

### SEG International Exposition and 85th Annual Meeting, New Orleans, 18<sup>th</sup>–23<sup>rd</sup> October 2015

#### Presentations

**Mikhailtsevitch, V., M. Lebedev, and B. Gurevich**, 2015, A Laboratory Study of Attenuation and Dispersion Effects in Glycerol-Saturated Berea Sandstone at Seismic Frequencies.

Komatina, S., K. Suto, and **M. Urošević**, 2015, Assessment of Flood Damaged Infrastructures in Bosnia & Herzegovina and Serbia: An SEG Geoscientists without Borders Project.

**Khoshnavaz, M. J., A. Bóna, and M. Urošević**, 2015, Passive Seismic Localization Without Velocity Model: Application and Uncertainty Analysis.

#### Posters

**Kieu, D.T., and A. Kepic**, 2015., Incorporating Prior Information Into Seismic Impedance Inversion Using Fuzzy Clustering Technique.

**Menu, F., A. Kepic, and A. Greenwood**, 2015, Crosshole Seismic Reflection to Delineate Rosebery-Type Volcanogenic Massive Sulphide Ore Lens.

**Egorov, A., S. Glubokovskikh, A. Bóna, R. Pevzner, B. Gurevich, and M. Tokarev**, 2015, Influence of Rough Sea Surface on Sea Surface Reflections: Deep Towed High-Resolution Marine Seismic Case Study.

**Glubokovskikh, S., B. Gurevich, M. Lebedev, and V. Mikhailtsevitch**, 2015, Stress-Dependence Of Elastic Properties of Rock Containing Finite Cracks With Contacting Surfaces.

**Pevzner, R., K. Tertyshnikov, V. Shulakova, M. Urošević, A. Kepic, B. Gurevich, and R. Singh**, 2015, Design And Deployment of a Buried Geophone Array for CO<sub>2</sub> Geosequestration Monitoring: CO<sub>2</sub>CRC Otway Project, Stage 2C.

Pirogova, A., M. Tokarev, and **S. Glubokovskikh**, 2015, AVA-Study of Shallow Marine Unconsolidated Sediments Using UHR Multichannel Seismoacoustic Dataset Acquired with a Deep-Towed System.

**Meira, M. G. C., J. Gunning, B. Gurevich, and R. Pevzner**, 2015, Implications of Noise Contamination In Stochastic Time Lapse Inversion.

**Vialle, S., and M. Lebedev**, 2015, Heterogeneities in the Elastic Properties of Microporous Carbonate Rocks at the Microscale from Nanoindentation Tests.

## Deep Exploration Technologies CRC (DET CRC) Annual Conference 'Uncovering the Future V', Perth, Western Australia, 18<sup>th</sup>–20<sup>th</sup> November 2015

### Presentations

**Harris, B.**, 2015, Program 2: Logging and sensing.

### Posters

**Menu, F., A. Kepic, and A. Greenwood**, 2015, Borehole-borehole seismic reflection: A potential tool to delineate Rosebery-type volcanogenic massive sulphide or lenses.

**Ung, K., and A. Bóna**, 2015, 2D acoustic re-datuming for complex wave propagation.

**Khoshnavaz, M. J., A. Bóna, and M. Urosevic**, 2015, Diffractivity, a strong seismic attribute in exploration of mineral deposits.

**Ahmadi, P., and M. Urosevic**, 2015, Feasibility of multicomponent seismic for mineral exploration.

**Ahmed, Z., M. Lebedev, and M. Madadi**, 2015, Inverting dynamic elastic moduli of rock powders for shear modulus of the grains.

**Hossain, M.**, 2015, Volumetric interpretation of 3D hard rock seismic data.

**Hooshyari Far, I., A. Kepic, and M. Carson**, 2015, Gamma ray Spectroscopy for logging while drilling in mineral exploration.

**Kieu, D. T., and A. Kepic**, 2015, Using borehole data to constrain seismic impedance inversion via fuzzy clustering.

## Curtin Reservoir Geophysics Consortium (CRGC) Annual Meeting, Rottnest Island, 3rd–4th December 2015

### Presentations

**Bóna, A., and R. Pevzner**, 2015, Imaging of diffractors.

**Khoshnavaz, M. J., A. Bóna, and M. Urosevic**, 2015, Velocity-independent estimation of kinematic attributes in VTI medium using local slopes and predictive painting.

**Collet, O., M. Lebedev, A. Bóna, and B. Gurevich**, 2015, Laboratory measurements of stress-induced anisotropy.

**Madadi, M., C. Cui, A. Bóna, and B. Gurevich**, 2015, Anisotropy estimation using scaled down seismic 3D survey in laboratory.

**Vialle, S., and M. Lebedev**, 2015, Quantitative microstructure characterisation and elastic properties upscaling of carbonate rocks.

**Mikhailsevitch V., M. Lebedev, and B. Gurevich**, 2015, Advances in seismic-frequency laboratory measurements on sandstones and shales.

**Gurevich, B., S. Glubokovskikh**, and N. Saxena, 2015, A Simple Recipe For Solid Substitution at Low Frequencies and Application to Heavy Oil Rocks.

**Glubokovskikh, S., B. Gurevich, M. Lebedev**, and V. Mikhaltsevitch, 2015, Stress-Dependence of Elastic Properties of Rock Containing Finite Cracks with Contacting Surfaces.

**Glubokovskikh, S., R. Pevzner, T. Dance, E. Caspari, D. Popik, A. Shulakova**, and B. Gurevich, 2015, Seismic monitoring of CO<sub>2</sub> geosequestration: CO<sub>2</sub>CRC Otway case study using full 4D FDTD approach.

Pirogova, A., **B. Gurevich**, and **S. Glubokovskikh**, 2015, Feasibility study of Q-inversion from zero-offset VSP and sonic log.

**Urosevic, M.**, 2015, Seismic response of organic rich shales.

**Egorov, A., S. Glubokovskikh, A. Bóna, R. Pevzner**, and **B. Gurevich**, 2015, Influence of Rough Sea Surface on Seafloor Reflections: Deep Towed High-resolution Marine Seismic Case.

**Meira, M. G. C.**, J. Gunning, **B. Gurevich**, and **R. Pevzner**, 2015, Implications of Noise Contamination in Stochastic Time-lapse inversion.

**Pevzner, R., K. Tertysnikov**, S. Shulakova, **M. Urosevic, A. Kepic**, and **B. Gurevich**, 2015, Design and Deployment of a Buried Geophone Array for CO<sub>2</sub> Geosequestration Monitoring: CO<sub>2</sub>CRC Otway Project, Stage 2C.

**Beloborodov, R.**, M. Pervukhina, V. Luzin, C. Delle Piane, and **M. Lebedev**, 2015, Compaction of quartz-kaolinite mixtures: effects of elongated inclusions and composition of pore fluid on elastic properties.

## Posters

**Khoshnavaz, M. J., A. Bóna**, and **M. Urosevic**, 2015, Microseismic location without velocity model; application and uncertainty analysis.

**Yurikov, A.**, and **M. Lebedev**, 2015, Ultrasonic measurements on thin samples.

**Ahmed, Z., M. Lebedev**, and **M. Madadi**, 2015, Inverting dynamic elastic moduli of rock powders for shear modulus of the grains.

**Vialle, S.**, and **M. Alhosni**, 2015, Estimation of nonelastic weakening of the rock frame using time-lapse crosswell: Frio brine pilot project case study.

**Dzunic, A.**, 2015, 2D2RL© – Introducing 3rd dimension into 2D reflective seismic exploration in the complex hard rock environment.

**Ziramov, S.**, 2015, Analysis of "nested" high resolution 3D seismic volume within the existing regional 3D survey area at Harvey, WA.

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## HONOURS / GRANTS / AWARDS

We wish to congratulate **A/Prof Anton Kepic** who was selected as an Emerging Innovation Category finalist in the **2015 WA Innovator of the Year Program**. The awards ceremony to

announce the overall winner was held on the **4<sup>th</sup> of November 2015**, and although Anton ultimately missed out on the final prize, his inclusion as one of only four finalists is a significant achievement in itself and a great success for the Department of Exploration Geophysics.

We congratulate **Dr Mamdoh ALAJMI** on being awarded his PhD which was officially approved on the **9<sup>th</sup> October 2015**. Mamdoh returned home to Saudi Arabia earlier this year to resume his employment with King Abdulaziz City for Science and Technology (KACST). On behalf of all members of the Department we offer our Congratulations to Mamdoh and his supervisor – Andrej Bona and all panel members on this achievement.

We congratulate **Dr Olivia COLLET** on being awarded her PhD which was officially approved on the **9<sup>th</sup> October 2015**. Olivia is now living and working in Canada with Hampson-Russell, Calgary. On behalf of all members of the Department we offer our Congratulations to Olivia and her supervisor – Boris Gurevich and all panel members on this achievement.

We congratulate **Mr Mohammed ALKAFF** on being awarded his Master of Philosophy which was officially approved on the **23<sup>rd</sup> October 2015**. Mohammed returned home to Saudi Arabia earlier this year to resume his employment with Saudi Aramco. On behalf of all members of the Department we offer our Congratulations to Mohammed and his supervisor – Boris Gurevich and all panel members on this achievement.

**M. Javad Khoshnavaz** presented "Prestack diffraction imaging, a robust attribute in the exploration of mineral deposits in hard-rock environment" at the DET CRC sponsors meeting, held 18<sup>th</sup>–19<sup>th</sup> November 2015. His presentation was runner-up for best presentation among 40 PhD students sponsored by DET CRC.

### **ASEG WA Event – December Technical Meeting - 2015 Student Presentations – held Wednesday, 2<sup>nd</sup> December 2015.**

The following Curtin Geophysics Honours and MSc students gave presentations their research project work to ASEG WA Branch members:

#### **Jacob William JACKSON (MSc)**

*The application of super long offset refraction tomography to delineation of the Wanneroo fault*

#### **Jennifer NEILD (MSc)**

*A multi-attribute analysis of Kevista 3D seismic data*

#### **Bryce TEO (Hons)**

*Permeability changes in Leederville aquifer core induced by transient physicochemical conditions*

#### **Benjamin STEPIN (MSc)**

*Decimation of 2D land seismic data to illustrate the effect of spatial sampling on key processing stages*

Winner of the **Best Presentation** was **Jacob Jackson**.

The winners of the **ASEG WA Branch Student Awards** were:

\$1500 to **Jacob Jackson**

\$1250 to **Tom Horrocks**

\$750 to **Lee Tasker**

\$500 to **Dane Padley**

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## RESEARCH ACTIVITIES

### Curtin Reservoir Geophysics Consortium (CRGC) - Hosts Geophysics Research at SEG 2015 in New Orleans

On Thursday 22<sup>nd</sup> October 2015, around forty leading geophysicists, researchers and oil industry executives attended an “Open CRGC Meeting”, aimed at promoting Curtin geophysics research, followed by a social networking function. The event was held in New Orleans during the SEG 2015 International Exposition and 85th Annual Meeting. Attendees included management and geophysicists from CRGC Consortium sponsor partners (e.g. ExxonMobil, CGG, Saudi Aramco), potential partner organisations and leading academics involved in geophysics research from around the world. Exploration Geophysics Department staff and PhD students provided the attendees with fourteen brief presentations and six posters to highlight recent advances in geophysics research at Curtin. The showcase provided a forum for Curtin staff to meet face to face with researchers, academics, sponsors and potential partners and to discuss further collaboration opportunities. Attendees at the function enjoyed traditional New Orleans refreshments.

### Curtin University Exploration Geophysics and CRGC - Prominent Presence at the SEG 2015, USA



From left to right: Dr Stanislav Glubokovskikh, Associate Professor Andrej Bona, Professor Boris Gurevich, Mr Rob Ross and Mr Mohammad Javad Khoshnavaz.

From 18<sup>th</sup>–21<sup>st</sup> October 2015, the Department of Exploration Geophysics/Curtin Reservoir Geophysics Consortium (CRGC) maintained a prominent presence in the ‘University Exhibition Area’ at the SEG 2015 International Exposition and 85th Annual Meeting in New Orleans. The booth displayed posters highlighting the research activities of the Department/CRGC and proved to be very popular with visitors, industry, academia and professionals. All staff and PhD students attending took turns to assist with booth duties in between the presentation of their research papers and posters while at the conference.

**M. Javad Khoshnavaz**, a PhD candidate in the Department of Exploration Geophysics at Curtin University, received an invitation from the University of Texas at Austin (UT Austin) to visit Professor Sergey Fomel from September to November 2015, as a visiting researcher/PhD. Professor Fomel, who is one of the pioneers in the area of seismic imaging around the globe,

reviewed and confirmed Javad's research material. As a result of this collaboration/visit, development of new algorithms in microseismic imaging, seismic extrapolation and seismic anisotropy has been achieved.

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## STAFF NEWS

### Congratulations

**Dr Vassili Mikhaltsevitch's** application for promotion to **ALC Level - Senior Lecturer** has been approved by the University Academic Promotions Committee and will take effect from 1 December 2015.

**Dr Konstantin Tertyshnikov's** application for promotion to **ALB Level - Lecturer** has been approved by the Pro-Vice Chancellor for Science & Engineering.

**Dr Andrew Pethick's** application for promotion to **ALB Level - Lecturer** has been approved by the Pro-Vice Chancellor for Science & Engineering.

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## VISITORS

**Tahlia Downes** has been awarded a Curtin HIVE Research Internship entitled: *Interactive visualisation of 3D hydrogeology model of Perth Basin*.

Curtin University has partnered with the WA Department of Water (DoW) in a project to acquire and process new modern geophysical data across 2,000 km<sup>2</sup> of the Perth Basin. The 3D data and images being generated are starting to reveal new significant details about Perth's multilevel aquifer systems throughout hundreds of cubic kilometres of the subsurface.

A primary output of the DoW project is to produce a digital 3D model and a 3D printed model of the Perth Basin geology and hydrogeology, for example, aquifers and faults.

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## UPCOMING EVENTS

### [AGU Fall Meeting](#)

**14<sup>th</sup>–18<sup>th</sup> December**, San Francisco, USA.

### [Australasian Oil & Gas Exhibition and Conference 2016](#)

**24<sup>th</sup>–26<sup>th</sup> February**, Perth, Western Australia.

### [12<sup>th</sup> Middle East Geosciences Conference and Exhibition \(GEO2016\)](#)

**7<sup>th</sup>–10<sup>th</sup> March**, Bahrain.

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~ We wish a Happy and Prosperous ~  
New Year to our readers

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## 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.

[ALT - WellCAD](#)

[CGGVeritas - Hampson Russell Software](#)

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