

## **CURRICULUM VITAE – David W. Eaton, PhD**

*Updated 2020/11/30*

### **EDUCATION**

<b>Degree</b>	<b>University</b>	<b>Department</b>	<b>Year</b>
B.Sc.	Queen's University	Geological Sciences	1984
<i>Supervisor: E. Farrar</i>			
<i>Thesis: Applications of the three-dimensional Fourier Transform to reflection seismic processing</i>			
M.Sc.	University of Calgary	Geology and Geophysics	1988
<i>Supervisor: F.A. Cook</i>			
<i>Thesis: An integrated geophysical study of Valhalla gneiss complex, southeastern British Columbia</i>			
Ph.D.	University of Calgary	Geology and Geophysics	1992
<i>Supervisor: R.R. Stewart</i>			
<i>Thesis: Seismic migration/inversion for transversely isotropic elastic media</i>			

### **EMPLOYMENT HISTORY**

<b>Date</b>	<b>Position</b>	<b>Department</b>	<b>Institution</b>
09/84-01/86	Geophysicist	Plains Exploration	Chevron Canada Resources Ltd.
01/92-03/93	Research Geophysicist	Exploration Research	Arco Exploration and Production Technology
03/93-03/95	Research Scientist I	Continental Geoscience	Geological Survey of Canada
04/95-12/96	Research Scientist II	Continental Geoscience	Geological Survey of Canada
01/97-06/00	Assistant Professor	Earth Sciences	University of Western Ontario
06/00-06/06	Associate Professor	Earth Sciences	University of Western Ontario
07/06-10/07	Professor	Earth Sciences	University of Western Ontario
10/07 – 06/12	Professor and Head	Geoscience	University of Calgary
07/12 – 06/15	Professor	Geoscience	University of Calgary
07/15 – 06/20	NSERC/Chevron Industrial Research Chair in Microseismic System Dynamics	Geoscience	University of Calgary
07/20 – present	Professor	Geoscience	University of Calgary

### **AWARDS & DISTINCTIONS**

2020	NSERC Synergy Award of Excellence for Innovation (2 or more companies)
2020	J. Tuzo Wilson Medal, Canadian Geophysical Union
2019	CSEG Distinguished Lecturer, Canadian Society of Exploration Geophysicists Foundation
2019	Distinguished Collaborator, Schulich School of Engineering, University of Calgary

2019	Supervised student team to \$30K prize in Energy Innovators Pitch Competition
2017	Established Career Research Excellence Award, Faculty of Science, University of Calgary
2016	Co-recipient of David Elliot Prize for Best paper in Canadian Structure and Tectonics
2016	Great Supervisor Award, Faculty of Graduate Studies, University of Calgary
2015	Department of Geoscience Research Excellence Award, University of Calgary
2012	Benjamin Meaker Visiting Fellow, University of Bristol
2011	NSERC Discovery Accelerator Award
2007	Faculty Scholar, University of Western Ontario
2005	Honorary Professor, Dublin Institute for Advanced Studies
2002	Research Associate, Institute for Catastrophic Loss Reduction
2001	R. Lumsden Research Fellowship, University of Western Ontario
2000	Premier's Research Excellence Award, Province of Ontario
1999	Co-recipient of David Elliot Prize for Best paper in Canadian Structure and Tectonics
1992	Outstanding Ph.D. thesis, University of Calgary
1990	Canadian Society of Exploration Geophysicists Best Paper Award
1984	Outstanding graduating student in Geological Sciences, Queen's University

#### LEADERSHIP AND SERVICE TO THE SCIENTIFIC COMMUNITY

- Invited Member of EPOS ERIC (European Plate Observing System — European Research Infrastructure Consortium) Scientific Advisory Board (2020-)
- Member of Distributed Acoustic Sensing (DAS) Research Community Network (RCN) Working Group (NORSAR) (2020-)
- Member of Canadian Geodetic Science and Applications Committee (CGSAC) committee (national scientific advisory committee for the Canadian Geodetic Survey) (2019-)
- Member of Society of Exploration Geophysicists (SEG) Research Committee (2018-)
- Scientific Lead, Theme 2 (Tight Oil and Gas), \$75M CFREF program at the University of Calgary (Global Research Initiative in Sustainable Low-Carbon Unconventional Resources) (2017-2023)
- Member of international review panel for GFZ Potsdam (2018)
- Chair of national steering committee for the CCArray and EON-ROSE initiatives
- Member of Organizing Committee, Banff International Workshop on Induced Seismicity (2018)
- Chair of international panel on managing risks of induced seismicity, for Mission Innovation workshop on Carbon Capture, Utilization and Storage (2017)
- Expert input to the Newfoundland Hydraulic Fracturing Review Panel, Government of Newfoundland and Labrador (2016)
- Chair, Strategic Target Area Renewal - Natural Resources, Natural Sciences and Engineering Research Council of Canada (2015)
- Chair, Organizing Committee, National workshop on traffic light protocols for injection induced seismicity (2015)
- Committee Member, External Review Panel, Queen's University Department of Geological Sciences, Queen's University at Kingston (2014)
- Chair, External Review Panel, University of Toronto Department of Earth Sciences, University of Toronto (2013)

- Canadian Senior Delegate, International Association of Seismology and Physics of Earth's Interior (2010-2018)
- Head, University of Calgary Department of Geoscience (2007-2012)
- President of the Eastern Section of the Seismological Society of America (2005-2007)
- Vice-president of the Eastern Section of the Seismological Society of America (2003-2005)
- Associate Editor, Geological Society of America Bulletin (2003-2008)
- President, Canadian Geophysical Union (2001-2003)
- Member, CGU Board of Directors (1996-2003)
- Member of NSERC Grant Selection Committee 08 (Solid Earth Sciences) (2001-2003)
- Member, NSERC Earth Sciences Liaison Committee (1998-1999)
- Member, LITHOPROBE Pan-Lithoprobe Synthesis Committee (1999-2002)

## PUBLICATIONS

**Total citations: 8163, h-index: 52** (*Google Scholar – 2020/11/18*)

### Summary

Articles in peer-reviewed journals	176
Books and theses	4
Book chapters (peer reviewed)	7
Peer-adjudicated conference proceedings	125
Conference abstracts	196
Patents	1
Invited seminars, webinars and lectures	105
Technical reports	208
Articles with editorial review	20

**Total peer-reviewed or peer-adjudicated contributions** **308**

# citations shown for selected publications, **key** contributions highlighted in **bold**

### Articles in peer-reviewed journals

- 176 E Atdayev, R Wong, DW Eaton, 2020. A Novel Equivalent Continuum Approach for Modelling Hydraulic Fractures. *Energies*, accepted for publication.
- 175 P Wozniakowska, DW Eaton, 2020, Machine learning-based analysis of geological susceptibility to induced seismicity in the Montney Formation, Canada. *Geophysical Research Letters*, e2020GL089651. doi.org/10.1029/2020GL089651.
- 174 N Riazi, DW Eaton, Anatomy of a buried thrust belt activated during hydraulic fracturing. *Tectonophysics*, 795, 228640.
- 173 M Venieri, PK Pedersen, R Weir, S McKean and DW Eaton, 2020, Determining elastic properties of organic-rich shales from core, wireline logs and 3-D seismic: A comparative study from the Duvernay play, Alberta, Canada: *Journal of Natural Gas Science and Engineering*, 84, 103637.
- 172 M Venieri, PK Pedersen, and DW Eaton, 2020, Predicting unconventional reservoir potential from wireline logs: a correlation between compositional and geomechanical properties of the Duvernay Shale Play of Western Alberta, Canada: *AAPG Bulletin*, doi.10.1306/10262019042.
- 171 X Bao, X Song, DW Eaton, Y Xu, H Chen, 2020, Episodic lithospheric deformation in eastern Tibet inferred

- from seismic anisotropy: *Geophysical Research Letters* 47 (3), e2019GL085721.
- 170 **GM Atkinson, DW Eaton, N Igonin, 2020, Developments in understanding seismicity triggered by hydraulic fracturing: *Nature Reviews Earth & Environment*, 1-14.**
- 169 **R Schultz, RJ Skoumal, MR Brudzinski, DW Eaton, B Baptie, W Ellsworth, 2020, Hydraulic Fracturing-Induced Seismicity: *Reviews of Geophysics* 58 (3), e2019RG000695.**
- 168 G Rodriguez-Pradilla, DW Eaton, 2020, Ground-Motion Analysis of Hydraulic-Fracturing Induced Seismicity at Close Epicentral Distance: *Bulletin of the Seismological Society of America* 110 (1), 331-344.
- 167 N Riazi, DW Eaton, A Aklilu, A Poulin, 2020, Application of Focal-Time Analysis for Improved Induced Seismicity Depth Control: A Case Study from the Montney Formation, British Columbia, Canada: *Geophysics* 85 (6), 1-70.
- 166 G Rodriguez-Pradilla, DW Eaton, 2020, Automated Microseismic Processing and Integrated Interpretation of Induced Seismicity during a Multistage Hydraulic-Fracturing Stimulation, Alberta, Canada: *Bulletin of the Seismological Society of America*, 110 (5): 2018–2030.
- 165 M Zecevic, TS Eyre, DW Eaton, 2020, Static ground displacement for an induced earthquake recorded on broadband seismometers: *Bulletin of the Seismological Society of America*, 110 (5): 2216–2224.
- 164 TS Eyre, M Zecevic, RO Salvage, DW Eaton, 2020, A long-lived swarm of hydraulic fracturing-induced seismicity provides evidence for aseismic slip: *Bulletin of the Seismological Society of America*, 110 (5): 2205–2215.
- 163 Y Chen, H Zhang, DW Eaton, 2020, Real-time earthquake location based on the Kalman filter formulation: *Geophysical Research Letters* 47 (11), e2019GL086240.
- 162 L DiCaprio, T Maiti, J Dettmer, DW Eaton, 2020, Moho Structure Across the Backarc-Craton Transition in the Northern US Cordillera: *Tectonics* 39 (2), e2019TC005489.
- 161 H Zhang, DW Eaton, G Rodriguez, SQ Jia, 2019, Source-Mechanism Analysis and Stress Inversion for Hydraulic-Fracturing-Induced Event Sequences near Fox Creek, Alberta: *Bulletin of the Seismological Society of America* 109 (2), 636-651.
- 160 **TS Eyre, DW Eaton, DI Garagash, M Zecevic, M Venieri, R Weir and DC Lawton, 2019, The role of aseismic slip in hydraulic fracturing-induced seismicity: *Science Advances* 5 (8), eaav7172.**
- 159 **TS Eyre, DW Eaton, M Zecevic, D D'Amico, D Kolos, 2019, Microseismicity reveals fault activation before Mw 4.1 hydraulic-fracturing induced earthquake: *Geophysical Journal International* 218 (1), 534-546.**
- 158 R Weir, D Lawton, L Lines, T Eyre, DW Eaton, 2019, Application of structural interpretation and simultaneous inversion to reservoir characterization of the Duvernay Formation, Fox Creek, Alberta, Canada: *The Leading Edge* 38 (2), 151-160.
- 157 **A Poulin, R Weir, DW Eaton, N Igonin, Y Chen, L Lines, D Lawton, 2019, Focal-time analysis: A new method for stratigraphic depth control of microseismicity and induced seismic events: *Geophysics* 84 (6), KS173-KS182.**
- 156 G Rodriguez-Pradilla, DW Eaton, 2019, The application of coda and energy methods for magnitude estimation of microseismic events: *Seismological Research Letters* 90 (3), 1296-1307.
- 155 M AbuAisha, DW Eaton, J Priest, R Wong, B Lorent, AH Kent, 2019, Fully coupled hydro-mechanical controls on non-diffusive seismicity triggering front driven by hydraulic fracturing: *Journal of Seismology* 23 (1), 109-121.
- 154 DW Tan, F., Kao, H., Nissen, E. and Eaton, DW, 2019, Seismicity-Scanning based on Navigated Automatic Phase-picking: *Journal of Geophysical Research - Solid Earth* 124, <https://doi.org/10.1029/2018JB017050>.
- 153 SH McKean, JA Priest, J Dettmer, DW Eaton, 2019, Quantifying fracture networks inferred from microseismic point clouds by a Gaussian mixture model with physical constraints: *Geophysical Research Letters* 46 (20), 11008-11017.
- 152 B Maulianda, A Prakasan, RCK Wong, DW Eaton, ID Gates, 2019, Integrated approach for fracture

- characterization of hydraulically stimulated volume in tight gas reservoir: *Journal of Petroleum Exploration and Production Technology* 9 (4), 2429-2440.
- 151 J Akram, D Peter, DW Eaton, 2019, A k-mean characteristic function for optimizing short- and long-term-average-ratio-based detection of microseismic events: *Geophysics* 84 (4), KS143-KS153.
- 150 R Schultz, G Atkinson, DW Eaton, YJ Gu, H Kao, 2018, Hydraulic fracturing volume is associated with induced earthquake productivity in the Duvernay play: *Science* 359 (6373), 304-308. (91 citations)
- 149 **DW Eaton, N Igonin, A Poulin, R Weir, H Zhang, S Pellegrino, G Rodriguez, 2018, Induced seismicity characterization during hydraulic-fracture monitoring with a shallow-wellbore geophone array and broadband sensors: *Seismological Research Letters* 89 (5), 1641-1651.**
- 148 Eaton, D. W., & Igonin, N. (2018). What controls the maximum magnitude of injection-induced earthquakes? *The Leading Edge*, 37(2), 135-140.
- 147 DW Eaton, R Schultz, 2018, Increased likelihood of induced seismicity in highly overpressured shale formations: *Geophysical Journal International* 214 (1), 751-757.
- 146 RM Weir, DW Eaton, LR Lines, DC Lawton, E Ekpo, 2018, Inversion and interpretation of seismic-derived rock properties in the Duvernay play: *Interpretation* 6 (2), SE1-SE14.
- 145 N Igonin, M Zecevic, DW Eaton, 2018, Bilinear magnitude-frequency distributions and characteristic earthquakes during hydraulic fracturing: *Geophysical Research Letters* 45 (23), 12,866-12,874.
- 144 SQ Jia, DW Eaton, RCK Wong, 2018, Stress inversion of shear-tensile focal mechanisms with application to hydraulic fracture monitoring: *Geophysical Journal International* 215 (1), 546-563.
- 143 **KJE Boggs, RC Aster, P Audet, G Brunet, RM Clowes, CD de Groot-Hedlin, E Donovan, DW Eaton, J Elliott, JT Freymueller, and MA Hedlin, 2018, EON-ROSE and the Canadian Cordillera Array: Building Bridges to Span Earth System Science in Canada: *Geoscience Canada*, 97-109.**
- 142 YK Yong, B Maulianda, SC Wee, D Mohshim, KA Elraies, RCK Wong, I Gates and DW Eaton 2018, Determination of stimulated reservoir volume and anisotropic permeability using analytical modelling of microseismic and hydraulic fracturing parameters: *Journal of Natural Gas Science and Engineering* 58, 234-240.
- 141 S Maghsoudi, J Baro, A Kent, DW Eaton, J Davidsen, 2018, Interevent Triggering in Microseismicity Induced by Hydraulic Fracturing: *Bulletin of the Seismological Society of America* 108 (3A), 1133-1146.
- 140 H Zhang, DW Eaton, 2018, A regularized approach for estimation of a composite focal mechanism from a set of microearthquakes: *Geophysics* 83 (5), KS65-KS75.
- 139 MK MacKay, DW Eaton, PK Pedersen, CR Clarkson, 2018, Integration of outcrop, subsurface, and microseismic interpretation for rock-mass characterization: An example from the Duvernay Formation, Western Canada: *Interpretation* 6 (4), T919-T936.
- 138 PK Pedersen, DW Eaton, 2018, Introduction to special section: Low-permeability resource plays of the Western Canada Sedimentary Basin: Defining the sweet spots: *Interpretation* 6 (2), SEi-SEii.
- 137 JIJ Duhault, DW Eaton, PK Pedersen, 2018, Microseismic monitoring of a tight light oil reservoir: A case history in the Cardium Halo Play, Alberta: *Interpretation* 6 (2), SE39-SE48.
- 136 M AbuAisha, DW Eaton, J Priest, R Wong, 2017, Hydro-mechanically coupled FDEM framework to investigate near-wellbore hydraulic fracturing in homogeneous and fractured rock formations: *Journal of Petroleum Science and Engineering* 154, 100-113.
- 135 J Akram, DW Eaton, 2017, 1D layered velocity models and microseismic event locations: synthetic examples for a case with a single linear receiver array: *Journal of Geophysics and Engineering* 14 (5), 1215-1224.
- 134 **X Bao, DW Eaton, 2016, Fault activation by hydraulic fracturing in western Canada: *Science* 354 (6318), 1406-1409. (279 citations)**
- 133 **GM Atkinson, DW Eaton, H Ghofrani, D Walker, B Cheadle, R Schultz, R Shcherbakov, K Tiampo, J Gu,**

- RM Harrington, Y Liu, 2016, Hydraulic fracturing and seismicity in the Western Canada Sedimentary Basin: Seismological Research Letters 87 (3), 631-647. (258 citations)**
- 132 **J Akram, DW Eaton, 2016, A review and appraisal of arrival-time picking methods for downhole microseismic data Arrival-time picking methods: Geophysics 81 (2), KS71-KS91. (118 citations)**
- 131 H Zhang, DW Eaton, G Li, Y Liu, RM Harrington, 2016, Discriminating induced seismicity from natural earthquakes using moment tensors and source spectra: Journal of Geophysical Research: Solid Earth 121 (2), 972-993. (71 citations)
- 130 E Caffagni, DW Eaton, JP Jones, M van der Baan, 2016, Detection and analysis of microseismic events using a Matched Filtering Algorithm (MFA): Geophysical Journal International 206 (1), 644-658.
- 129 M AbuAisha, B Lorent, DW Eaton, 2016, Enhanced Geothermal Systems (EGS): Hydraulic fracturing in a thermo-poroelastic framework: Journal of Petroleum Science and Engineering 146, 1179-1191.
- 128 **M van der Baan, DW Eaton, G Preisig, 2016, Stick-slip mechanism for anthropogenic fluid-induced tensile rock failure: Geology 44 (7), 503-506. (Awarded David Elliot prize by GAC)**
- 127 X Bao, DW Eaton, YJ Gu, 2016, Rayleigh wave azimuthally anisotropic phase velocity maps beneath western Canada: Journal of Geophysical Research: Solid Earth 121 (3), 1821-1834.
- 126 J Akram, DW Eaton, 2016, Refinement of arrival-time picks using a cross-correlation based workflow: Journal of Applied Geophysics 135, 55-66.
- 125 S Maghsoudi, DW Eaton, J Davidsen, 2016, Nontrivial clustering of microseismicity induced by hydraulic fracturing: Geophysical Research Letters 43 (20), 10,672-10,679.
- 124 A Rafiq, DW Eaton, A McDougall, PK Pedersen, 2016, Reservoir characterization using microseismic facies analysis integrated with surface seismic attributes: Interpretation 4 (2), T167-T181.
- 123 JP Jones, DW Eaton, E Caffagni, 2016, Quantifying the similarity of seismic polarizations: Geophysical Journal International 204 (2), 968-984.
- 122 X Bao, X Sun, M Xu, DW Eaton, X Song, L Wang, Z Ding, N Mi, H Li, D Yu, and Z Huang, 2015, Two crustal low-velocity channels beneath SE Tibet revealed by joint inversion of Rayleigh wave dispersion and receiver functions: Earth and Planetary Science Letters 415, 16-24. (118 citations)
- 121 R Schultz, S Mei, D Pana, V Stern, YJ Gu, A Kim, DW Eaton, 2015, The Cardston earthquake swarm and hydraulic fracturing of the Exshaw Formation (Alberta Bakken play): Bulletin of the Seismological Society of America 105 (6), 2871-2884.
- 120 DW Eaton, AB Mahani, 2015, Focal mechanisms of some inferred induced earthquakes in Alberta, Canada: Seismological Research Letters 86 (4), 1078-1085.
- 119 R Schultz, V Stern, YJ Gu, DW Eaton, 2015, Detection threshold and location resolution of the Alberta Geological Survey earthquake catalogue: Seismological Research Letters 86 (2A), 385-397.
- 118 ID Bastow, DW Eaton, JM Kendall, G Helffrich, DB Snyder, DA Thompson, J Wookey, FA Darbyshire, and AE Pawlak. 2015, The Hudson Bay Lithospheric Experiment (HuBLE): Insights into Precambrian plate tectonics and the development of mantle keels: Geological Society, London, Special Publications 389 (1), 41-67.
- 117 E Caffagni, DW Eaton, M van der Baan, JP Jones, 2015, Regional seismicity: A potential pitfall for identification of long-period long-duration events: Geophysics 80 (1), A1-A5.
- 116 X Bao, DW Eaton, 2015, Large variations in lithospheric thickness of western Laurentia: Tectonic inheritance or collisional reworking? Precambrian Research 266, 579-586.
- 115 DW Eaton, JL Rubinstein, 2015, Preface to the focus section on injection-induced seismicity: Seismological Research Letters 86 (4), 1058-1059.
- 114 H Zuhair, S McKnight, DW Eaton, 2015, Historical seismicity of the Jordan Dead Sea Transform region and seismotectonic implications: Arabian Journal of Geosciences 8 (6), 4039-4055.
- 113 R Steffen, H Steffen, DW Eaton, PPC Wu, 2015, Reply to comment by Hampel et al. on Stress and fault parameters affecting fault slip magnitude and activation time during a glacial cycle: Tectonics.

- 112 ZH El-Isa, DW Eaton, 2014, Spatiotemporal variations in the b-value of earthquake magnitude-frequency distributions: Classification and causes: *Tectonophysics* 615, 1-11. (87 citations)
- 111 **X Bao, DW Eaton, B Guest, 2014, Plateau uplift in western Canada caused by lithospheric delamination along a craton edge: *Nature Geoscience* 7 (11), 830-833. (69 citations)**
- 110 **DW Eaton, M van der Baan, B Birkelo, JB Tary, 2014, Scaling relations and spectral characteristics of tensile microseisms: Evidence for opening/closing cracks during hydraulic fracturing: *Geophysical Journal International* 196 (3), 1844-1857.**
- 109 **DW Eaton, J Davidsen, PK Pedersen, N Boroumand, 2014, Breakdown of the Gutenberg-Richter relation for microearthquakes induced by hydraulic fracturing: influence of stratabound fractures: *Geophysical Prospecting* 62(53), 806-818.**
- 108 X Sun, X Bao, M Xu, DW Eaton, X Song, L Wang, Z Ding, N Mi, D Yu, H Li, 2014, Crustal structure beneath SE Tibet from joint analysis of receiver functions and Rayleigh wave dispersion: *Geophysical Research Letters* 41 (5), 1479-1484.
- 107 JB Tary, M Van der Baan, DW Eaton, 2014, Interpretation of resonance frequencies recorded during hydraulic fracturing treatments: *Journal of Geophysical Research: Solid Earth* 119 (2), 1295-1315.
- 106 R Steffen, P Wu, H Steffen, DW Eaton, 2014, The effect of earth rheology and ice-sheet size on fault slip and magnitude of postglacial earthquakes: *Earth and Planetary Science Letters* 388, 71-80.
- 105 RH Herrera, JB Tary, M Van der Baan, DW Eaton, 2014, Body wave separation in the time-frequency domain: *IEEE Geoscience and Remote Sensing Letters* 12 (2), 364-368.
- 104 R Steffen, P Wu, H Steffen, DW Eaton, 2014, On the implementation of faults in finite-element glacial isostatic adjustment models: *Computers & Geosciences* 62, 150-159.
- 103 R Steffen, H Steffen, P Wu, DW Eaton, 2014, Stress and fault parameters affecting fault slip magnitude and activation time during a glacial cycle: *Tectonics* 33 (7), 1461-1476.
- 102 JB Tary, M Van der Baan, B Sutherland, DW Eaton, 2014, Characteristics of fluid-induced resonances observed during microseismic monitoring: *Journal of Geophysical Research: Solid Earth* 119 (11), 8207-8222.
- 101 **FA Darbyshire, DW Eaton, ID Bastow, 2013, Seismic imaging of the lithosphere beneath Hudson Bay: Episodic growth of the Laurentian mantle keel: *Earth and Planetary Science Letters* 373, 179-193. (60 citations)**
- 100 **DW Eaton, HKC Perry, 2013, Ephemeral isopycnicity of cratonic mantle keels: *Nature Geoscience* 6 (11), 967-970.**
- 99 N Boroumand, DW Eaton, 2013, Energy-based hydraulic fracture numerical simulation: Parameter selection and model validation using microseismicity: *Geophysics* 80 (5), W33-W44.
- 98 DW Eaton, N Boroumand, 2013, Estimating energy balance for hydraulic fracture stimulations: Lessons Learned from Basel: *GeoConvention 2013, Integration: Geoscience Engineering Partnership*, 6-10.
- 97 A Pawlak, DW Eaton, F Darbyshire, S Lebedev, ID Bastow, 2012, Crustal anisotropy beneath Hudson Bay from ambient noise tomography: Evidence for post-orogenic lower-crustal flow? *Journal of Geophysical Research: Solid Earth* 117(B8), <https://doi.org/10.1029/2011JB009066>.
- 96 R Steffen, DW Eaton, P Wu, 2012, Moment tensors, state of stress and their relation to post-glacial rebound in northeastern Canada: *Geophysical Journal International* 189 (3), 1741-1752.
- 95 C Hogan, D Eaton, 2012, Path effects in subsurface microseismic monitoring, *The Leading Edge* 31 (11), 1326-1329.
- 94 **DW Eaton, F Forouhideh, 2011, Solid angles and the impact of receiver-array geometry on microseismic moment-tensor inversion: *Geophysics* 76 (6), WC77-WC85. (77 citations)**
- 93 A Pawlak, DW Eaton, ID Bastow, JM Kendall, G Helffrich, J Wookey, D Snyder, 2011, Crustal structure beneath Hudson Bay from ambient-noise tomography: implications for basin formation: *Geophysical*

- Journal International 184 (1), 65-82.
- 92 ID Bastow, DA Thompson, J Wookey, JM Kendall, G Helffrich, DB Snyder, DW Eaton and FA Darbyshire, 2011, Precambrian plate tectonics: Seismic evidence from northern Hudson Bay, Canada: *Geology* 39 (1), 91-94.
- 91 DA Thompson, G Helffrich, ID Bastow, JM Kendall, J Wookey, DW Eaton and DB Snyder, 2011, Implications of a simple mantle transition zone beneath cratonic North America: *Earth and Planetary Science Letters* 312 (1-2), 28-36.
- 90 S Ma, DW Eaton, 2011, Combining double-difference relocation with regional depth-phase modelling to improve hypocentre accuracy: *Geophysical Journal International* 185 (2), 871-889.
- 89 ID Bastow, JM Kendall, GR Helffrich, DA Thompson, J Wookey, A Horleston, AM Brisbourne, D Hawthorn, DW Eaton, DB Snyder. 2011, The Hudson Bay Lithospheric Experiment: *Astronomy & Geophysics* 52 (6), 6.21-6.24.
- 88 FA Cook, DJ White, AG Jones, DW Eaton, J Hall, RM Clowes, 2010, How the crust meets the mantle: Lithoprobe perspectives on the Mohorovic discontinuity and crust-mantle transition: *Canadian Journal of Earth Sciences* 47 (4), 315-351. (95 citations)
- 87 DA Thompson, ID Bastow, G Helffrich, JM Kendall, J Wookey, DB Snyder and DW Eaton, 2010, Precambrian crustal evolution: seismic constraints from the Canadian Shield: *Earth and Planetary Science Letters* 297 (3-4), 655-666. (83 citations)
- 86 MS Miller, DW Eaton, 2010, Formation of cratonic mantle keels by arc accretion: Evidence from S receiver functions: *Geophysical Research Letters* 37 (18), <https://doi.org/10.1029/2010GL044366>. (67 citations)
- 85 **DW Eaton, F Darbyshire, 2010, Lithospheric architecture and tectonic evolution of the Hudson Bay region: *Tectonophysics* 480 (1-4), 1-22. (55 citations)**
- 84 C Alexandrakis, DW Eaton, 2010, Precise seismic-wave velocity atop Earth's core: No evidence for outer-core stratification: *Physics of the Earth and Planetary Interiors* 180 (1-2), 59-65.
- 83 FA Darbyshire, DW Eaton, 2010, The lithospheric root beneath Hudson Bay, Canada from Rayleigh wave dispersion: no clear seismological distinction between Archean and Proterozoic mantle: *Lithos* 120 (1-2), 144-159.
- 82 **DW Eaton, E Adam, B Milkereit, M Salisbury, B Roberts, D White, J Wright, 2010, Enhancing base-metal exploration with seismic imaging: *Canadian Journal of Earth Sciences* 47 (5), 741-760.**
- 81 MG Bostock, DW Eaton, DB Snyder, 2010, Teleseismic studies of the Canadian landmass: Lithoprobe and its legacy: *Canadian Journal of Earth Sciences* 47 (4), 445-461.
- 80 S Dineva, DW Eaton, 2010, Reply to, Comment on The October 2005 Georgian Bay, Canada, Earthquake Sequence: Mafic Dykes and Their Role in the Mechanical Heterogeneity of Precambrian Crust.: *Bulletin of the Seismological Society of America* 100 (1), 406-407.
- 79 **DW Eaton, F Darbyshire, RL Evans, H Grutter, AG Jones, X Yuan, 2009, The elusive lithosphere-asthenosphere boundary (LAB) beneath cratons: *Lithos* 109 (1-2), 1-22. (343 citations)**
- 78 AG Jones, RL Evans, DW Eaton, 2009, Velocity-conductivity relationships for mantle mineral assemblages in Archean cratonic lithosphere based on a review of laboratory data and Hashin-Shtrikman extremal bounds: *Lithos* 109 (1-2), 131-143. (103 citations)
- 77 S Ma, DW Eaton, 2009, Anatomy of a small earthquake swarm in southern Ontario, Canada: *Seismological Research Letters* 80 (2), 214-223.
- 76 WN Edwards, PG Brown, DW Eaton, 2009, Frequency-Dependent Acoustic-Seismic Coupling of Meteor Shock Waves: *Bulletin of the Seismological Society of America* 99(5), 3055-3066.
- 75 WN Edwards, DW Eaton, PG Brown, 2008, Seismic observations of meteors: Coupling theory and observations: *Reviews of Geophysics* 46 (4), <https://doi.org/10.1029/2007RG000253>.
- 74 P Brown, DO ReVelle, EA Silber, WN Edwards, S Arrowsmith, LE Jackson Jr., G Tancredi and DW Eaton



- 2008, Analysis of a crater-forming meteorite impact in Peru: *Journal of Geophysical Research: Planets* 113 (E9), <https://doi.org/10.1029/2008JE003105>.
- 73 S Ma, DW Eaton, J Adams, 2008, Intraplate seismicity of a recently deglaciated shield terrane: A case study from Northern Ontario, Canada: *Bulletin of the Seismological Society of America* 98 (6), 2828-2848.
- 72 GM Atkinson, SLI Kaka, DW Eaton, A Bent, V Peci, S Halchuk, 2008, A very close look at a moderate earthquake near Sudbury, Ontario: *Seismological Research Letters* 79(1), 119-131.
- 71 FA Darbyshire, DW Eaton, AW Frederiksen, L Ertolahti, 2007, New insights into the lithosphere beneath the Superior Province from Rayleigh wave dispersion and receiver function analysis: *Geophysical Journal International* 169(3), 1043-1068. (86 citations)
- 70 **DW Eaton, A Frederiksen, 2007, Seismic evidence for convection-driven motion of the North American plate: *Nature* 446(7134), 428-431. (83 citations)**
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## Peer-adjudicated conference proceedings

- 125 Z Esmailzadeh, DW Eaton, 2020, Fault Slip Analysis in the Presence of Stress Barrier Using Integrated Reservoir Modeling, 82nd EAGE Annual Conference & Exhibition 2020 (1), 1-5.
- 124 P Wozniakowska, DW Eaton, 2020, Analysis of Geological Susceptibility to Induced Seismicity in the Montney Formation Using Supervised Machine Learning, 82nd EAGE Annual Conference & Exhibition 2020 (1), 1-5.
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- 122 N Igonin, JP Verdon, M Kendall, DW Eaton, 2019, The role of parallel fracture networks for induced seismicity in the Duvernay Formation, 81st EAGE Conference and Exhibition 2019 Workshop Programme 2019 (1), 1-5.
- 121 S Jia, R Wong, DW Eaton, 2019, Examining Hydraulic Fracture Characteristics Based on Induced Microseismicity: A Barnett Shale Case Study, SPE Annual Technical Conference and Exhibition.
- 120 SQ Jia, RCK Wong, DW Eaton, 2019, Acoustic Emission Monitoring of a Laboratory Hydraulic Fracturing Experiment on Montney Shale, 53rd US Rock Mechanics/Geomechanics Symposium.
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- 113 DW Eaton, N Igongin, A Poulin, R Weir, H Zhang, S Pellegrino and G Rodriguez-Pradilla , 2018, Tony Creek Dual Microseismic Experiment (ToC2ME), CSPG/CSEG/CWLS Geoconvention 2018, May 7-11 Calgary, Alberta.
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- 111 S Jia, R Wong, DW Eaton, 2018, A Laboratory Acoustic Emission Experiment on Montney Shale, CSPG/CSEG/CWLS Geoconvention 2018, May 7-11 Calgary, Alberta.
- 110 A Kent and DW Eaton, 2018, Utilizing Seismic attributes and the Microseismic response to characterize a region of the Horn River Basin, CSPG/CSEG/CWLS Geoconvention 2018, May 7-11 Calgary, Alberta.
- 109 M MacKay, DW Eaton and C Clarkson, 2018, Time-Frequency Analysis of Treatment Pressure, CSPG/CSEG/CWLS Geoconvention 2018, May 7-11 Calgary, Alberta.
- 108 S McKean, JA Priest, DW Eaton, J Phillips, M van der Baan, 2018, An Industry Perspective on Induced Seismicity, CSPG/CSEG/CWLS Geoconvention 2018, May 7-11 Calgary, Alberta.
- 107 S McKean, JA Priest and DW Eaton, 2018, A geomechanical comparison of the Duvernay and the Montney, CSPG/CSEG/CWLS Geoconvention 2018, May 7-11 Calgary, Alberta (awarded best student presentation).
- 106 R Weir, A Poulin, N Igonin, DW Eaton, 2018, Focal-time estimation: A new method for stratigraphic depth control of induced seismicity, CSPG/CSEG/CWLS Geoconvention 2018, May 7-11 Calgary, Alberta.
- 105 H Zhang, DW Eaton, 2018, Induced Seismicity Near Fox Creek, Alberta: Interpretation of Source Mechanisms, Unconventional Resources Technology Conference (URTEC).
- 104 BK Hosseini, DW Eaton, 2018, Fluid flow and thermal modeling for tracking induced seismicity near the Graham disposal well, British Columbia, Canada, SEG Technical Program Expanded Abstracts 2018, 4987-4991.
- 103 TS Eyre, DW Eaton, T Tyrrell, 2018, Persistent post-injection induced seismicity near Fox Creek, Alberta, SEG Technical Program Expanded Abstracts 2018, 4982-4986.
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- 101 M MacKay, B Zanganeh, DW Eaton, C Clarkson, 2018, Time-Frequency Analysis of Treatment Pressure from Hydraulic Fracturing, 2nd International Discrete Fracture Network Engineering Conference, DFNE 18-1377 .
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- 99 V Vragov, DW Eaton, 2018, DuverNet: Neural network for induced-seismicity detection in the Kaybob Duvernay, Canada production region, SEG Technical Program Expanded Abstracts 2018, 4992-4996.
- 98 R Weir, A Poulin, N Igonin, DW Eaton, L Lines, D Lawton, 2018, Focal-time estimation: A new method for stratigraphic depth control of induced seismicity, SEG Technical Program Expanded Abstracts 2018, 2977-2981.
- 97 H Zhang, DW Eaton, 2018, Moment tensor and stress inversion based on hydraulic-fracturing induced events, SEG Technical Program Expanded Abstracts 2018, 4967-4971.
- 96 CK Wong, B Li, DW Eaton, RG Wan, RCK Wong, 2018, Criterion for Crack Initiation in Brittle Rock Under

- Pore Pressure Elevation, 52nd US Rock Mechanics/Geomechanics Symposium.
- 95 G Rodriguez-Pradilla, DW Eaton, 2018, Reservoir Characterization of a Shale-Gas Play in the Duvernay Formation using Seismic, Microseismic, and Well Log Data, 80th EAGE Conference and Exhibition 2018 2018 (1), 1-5.
- 94 M MacKay, B Zanganeh, DW Eaton, C Clarkson, 2018, Time-Frequency Analysis of Treatment Pressure from Hydraulic Fracturing, In 2nd International Discrete Fracture Network Engineering Conference. American Rock Mechanics Association.
- 93 S McKean, JA Priest, DW Eaton, 2018, Identifying Discrete Fracture Networks by Clustering with Microseismic Data, 71st Canadian Geotechnical Conference and the 13th Joint CGS/IAH-CNC Groundwater Conference, 23rd – 26th Sept, Edmonton, Canada.
- 92 SQ Jia, RCK Wong, DW Eaton, TS Eyre, 2018, Investigating fracture growth and source mechanisms in shale using acoustic emission technique, 52nd US Rock Mechanics/Geomechanics Symposium, ARMA 18–176 .
- 91 A Kent, DW Eaton, S Maxwell, 2017, Microseismic response and geomechanical principles of short interval re-injection (SIR) treatments, Unconventional Resources Technology Conference, Austin, Texas, 24-26 July, URTEC: 2697370 .
- 90 N Igonin, A Poulin, DW Eaton, 2017, A comparison of surface and near surface acquisition techniques for induced seismicity and microseismic monitoring, 79th EAGE Conference and Exhibition 2017 2017 (1), 1-5.
- 89 R Weir, DW Eaton, L Lines, D Lawton, 2017, The application of seismic-derived rock properties in predicting Duvernay-induced fractures, SEG Technical Program Expanded Abstracts 2017, 574-579.
- 88 M Zecevic, S Grant, DW Eaton, J Davidsen, 2017, How do seismic event sizes scale in the microseismic range?, CSPG CSEG CWLS Convention, Calgary.
- 87 A Biryukov, E Chzen, J. Dettmer and DW Eaton, 2017, Event origin depth uncertainty – estimation and mitigation using waveform similarity, CSPG CSEG CWLS Convention, Calgary.
- 86 N Boroumand and DW Eaton, 2017, Strain residual during hydraulic fracturing: an elastic model scenario with microseismicity, CSPG CSEG CWLS Convention, Calgary.
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- 84 S Jia, DW Eaton and R Wong, 2017, New stress inversion method for microseismic data, CSPG CSEG CWLS Convention, Calgary.
- 83 G Rodriguez-Pradilla and DW Eaton, 2017, Finite-difference simulation of microseismic events associated with hydraulic-fracturing stimulation: Case study in a CBM reservoir, CSPG CSEG CWLS Convention, Calgary.
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- 81 M Zecevic and DW Eaton, 2017, Differentiating Between Shear and Tensile Events Using Spectral Parameters, CSPG CSEG CWLS Convention, Calgary.
- 80 AJG Ferrebus, DC Lawton, DW Eaton, 2017, VSP Azimuthal Travel Time Analysis at the Field Research Station near Brooks, AB, EAGE/SEG Research Workshop 2017, cp-522-00014.
- 79 N Igonin, DW Eaton, 2017, On The Depth Discrepancies between Downhole and Surface Monitoring, 79th EAGE Conference and Exhibition 2017 2017 (1), 1-5.
- 78 H Zhang, DW Eaton, 2017, Calculation of the Focal Mechanism for Composite Microseismic Events, 79th EAGE Conference and Exhibition 2017 2017 (1), 1-5.
- 77 DW Eaton, 2017, Maximum Magnitude .. & Other Conundrums of Injection-Induced Seismicity, 79th EAGE Conference and Exhibition 2017 2017 (1), 1-5 (invited keynote).

- 76 J Akram, Z Chen, DW Eaton, X Wei, 2016, Time-frequency denoising of microseismic data, SEG Technical Program Expanded Abstracts 2016, 2750-2754.
- 75 K Hall, H Isaac, J Wong, K Bertram, M Bertram, D Lawton, X Bao, DW Eaton, 2016, Initial 3-C-2D surface seismic and walkaway VSP results from the 2015 Brooks SuperCable experiment, SEG Technical Program Expanded Abstracts 2016, 157-161.
- 74 E Caffagni, DW Eaton, 2016, Enhanced Detection and Location of Microseismic Events Using a Novel Matched Filtering Method, 78th EAGE Conference and Exhibition 2016 2016 (1), 1-5.
- 73 M AbuAisha, DW Eaton, J Priest, R Wong, 2016, Simulating hydraulic fracturing using finite-discrete element method (FDEM): Effects of pre-existing joints and lateral stress gradient, CSPG CSEG CWLS Convention, Calgary.
- 72 Z Anderson and DW Eaton, 2016, Induced Seismicity Due to Wastewater Injection Near Peace River, Alberta, CSPG CSEG CWLS Convention, Calgary.
- 71 DW Eaton, 2016, Dots in a box transcended: Strategies for integrating microseismic data with geomechanics and reservoir models, CSPG CSEG CWLS Convention, Calgary.
- 70 DW Eaton, 2016, Managing risks of anomalous induced seismicity: An evidence based approach, CSPG CSEG CWLS Convention, Calgary.
- 69 M MacKay, DW Eaton and C Clarkson, 2016, Predicting the microseismic response in a naturally fractured shale reservoir using a discrete fracture network model, CSPG CSEG CWLS Convention, Calgary.
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- 113 K Vasudevan, DW Eaton, R Steffen, 2011, Analysis of Queen Charlotte Islands Region earthquakes and aftershocks from 2004 to the present, Canadian Geophysical Union Annual Meeting.
- 112 Eaton, D., 2011, Isopycnicity and secular thermal evolution of cratonic mantle keels, Earthscope Workshop on the Lithosphere-Asthenosphere Boundary, Portland, September 19-21.
- 111 F Forouhideh, DW Eaton, 2010, Are double-couples over-represented in microseismic focal mechanism

- studies? GeoCanada, Working with the Earth, 10-14.
- 110 K Vasudevan, DW Eaton, A Iverson, 2010, Did the November 17, 2009 Queen Charlotte Island (QCI) earthquake fill a predicted seismic gap? AGUFM 2010, S43A-2036.
- 109 MS Miller, DW Eaton, Y Rong, 2010, Imaging continental lithospheric structure from S receiver functions: evidence of arc accretion for formation of cratonic keels, AGUFM 2010, DI32A-07.
- 108 DW Eaton, ID Bastow, JM Kendall, C Perry, 2010, Isopycnicity, Thermal State and Secular Evolution of Cratonic Mantle Keels, AGUFM 2010, DI11A-1836.
- 107 FA Darbyshire, DW Eaton, ID Bastow, JM Kendall, GR Helffrich, J Wookey, ..., 2010, Shear Wave Velocity Structure and Azimuthal Anisotropy of Hudson Bay, AGUFM 2010, T33D-2287.
- 106 AW Frederiksen, M Olaleye, DA Toni, FA Darbyshire, DW Eaton, 2010, Accretion, modification and erosion of Archean lithosphere: evidence from the Superior Province and adjacent regions, AGUFM 2010, T31F-01.
- 105 ID Bastow, DA Thompson, JM Kendall, GR Helffrich, J Wookey, .., 2010, Precambrian Plate Tectonics and the Formation of the Canadian Shield: Seismic Evidence from Hudson Bay, AGUFM 2010, T31F-04.
- 104 DA Thompson, GR Helffrich, ID Bastow, JM Kendall, J Wookey, DW Eaton, .., 2010, Mantle transition zone structure beneath the Canadian Shield, AGUFM 2010, DI51C-1883.
- 103 K Vasudevan, DW Eaton, J Davidsen, 2010, Intraplate seismicity in Canada: Complex network analysis of spatio-temporal recurrences, EGUGA, 12895.
- 102 DW Eaton, M Miller, F Darbyshire, 2010, The cratonic mantle keel beneath Laurentia: New evidence for assembly by slab accretion, EGUGA, 10396.
- 101 R Steffen, DW Eaton, P Wu, 2010, Moment tensors and state of stress in Hudson Bay, Eastern Section Seismological Society of America Annual Meeting.
- 100 FA Darbyshire, ID Bastow, JM Kendall, GR Helffrich, J Wookey, .., 2009, Variations in Lithospheric Structure Across Northern Hudson Bay From Rayleigh Wave Array Tomography, AGUFM 2009, T33C-1936.
- 99 ID Bastow, JM Kendall, GR Helffrich, J Wookey, DA Thompson, .., 2009, HuBLE-UK, the Hudson Bay Lithospheric Experiment: Insights into the Formation of the Canadian Shield From Seismic Tomography and Shear-Wave Splitting, AGUFM 2009, T33C-1934.
- 98 DW Eaton, K Vasudevan, 2009, Skeleton-migration: Applications in deep crustal reflection seismic profiling, AGUFM 2009, T33A-1873.
- 97 KF Tiampo, A Dwivedi, G Kapp, Y Toya, FA Darbyshire, DW Eaton, 2009, Initial results from continuous GPS stations at Hudson Bay, AGUFM 2009, T33C-1935.
- 96 N Saxena, DW Eaton, HW van Gent, JL Urai, 2009, Biot Theory Frequency Dependent Seismic Attributes, AGUFM 2009, S33A-1751.
- 95 DA Thompson, ID Bastow, GR Helffrich, JM Kendall, J Wookey, .., 2009, Precambrian Crustal Evolution of the Hudson Bay Region: Insights from Receiver Function Analysis, AGUFM 2009, T42B-04.
- 94 AE Pawlak, DW Eaton, FA Darbyshire, S Lebedev, 2009, Crustal Anisotropy of Hudson Bay from Ambient-Noise Tomography, AGUFM 2009, T33C-1937.
- 93 DA Thompson, G Helffrich, ID Bastow, J Kendall, J Wookey, DW Eaton, .., 2009, Crustal Structure of the Hudson Bay Region: Insights from Receiver Function Analysis, AGUSM 2009, CG21A-07.
- 92 A Pawlak, DW Eaton, 2009, Structure of the Crust and Uppermost Mantle Beneath Hudson Bay Based on Ambient-Noise Tomography, AGUSM 2009, CG21A-08.
- 91 DW Eaton, F Darbyshire, 2009, Lithospheric Architecture of the Hudson Bay Region, AGUSM 2009, CG73B-01.
- 90 M Al Ibrahim, DW Eaton, 2009, A Teleseismic Transect across Canada: Shear-Wave Splitting and Receiver



- Function Analyses, Geocanada 2010.
- 89 A Pawlak, DW Eaton, 2008, Structure of the Crust and Uppermost Mantle Beneath Hudson Bay Based on Ambient-Noise Tomography, AGUFM 2008, U51B-0036.
- 88 ID Bastow, J Kendall, G Helffrich, J Wookey, D Thompson, DW Eaton, .., 2008, HuBLE-UK, the Hudson Bay Lithospheric Experiment: Insights into the formation of the Canadian Shield, AGUFM 2008, U51B-0034.
- 87 C Alexandrakis, DW Eaton, 2008, Seismic Wave Velocity in Earth's Shallow Core, AGUFM 2008, DI43A-1769.
- 86 DA Thompson, G Helffrich, ID Bastow, J Kendall, J Wookey, DW Eaton, ..., 2008, Discontinuity Structure Beneath the North American Craton and the Signature of Continental Roots, AGUFM 2008, U51B-0037.
- 85 A Tyagi, DW Eaton, G Plint, D McNeil, 2008, Regional Tectonic Controls on Sedimentation during the Cenomanian-Turonian Time in the Western Interior Basin (WIB), Canada, 2008 Joint Meeting of The Geological Society of America, Soil Science.
- 84 S Dineva, DW Eaton, D Mihaylov, 2008, Borehole seismography network for microearthquake monitoring near Bruce nuclear site (Ontario, Canada), Seismological Research Letters 79 (1), 138-139.
- 83 D Mihaylov, S Dineva, DW Eaton, 2008, Site response effects and noise attenuation at the seismic stations of Bruce borehole network (Ontario, Canada), Seismological Research Letters 79 (1).
- 82 B Bayer, C Muller, DW Eaton, WH Geissler, A Eckstaller, W Jokat, 2007, Crust and upper mantle in Dronning Maud Land/Antarctica retrieved from shear-wave splitting, receiver functions, refraction seismics and 3-D gravity modelling, The 10th International Symposium on Antarctic Earth Sciences.
- 81 DW Eaton, C Alexandrakis, 2007, Empirical transfer functions: Application to the determination of outermost core velocity structure using teleseismic SmKS phases, AGUSM 2007, S31B-03.
- 80 D Mihaylov, HM Naggar, S Dineva, DW Eaton, 2007, Microseismic noise measurements for microzonation of Great Toronto Area (GTA), Seismological Research Letters 78 (1), 168.
- 79 S Dineva, DW Eaton, D Mihaylov, 2007, Design of borehole seismograph network for microearthquake monitoring near Bruce Nuclear Site (Ontario, Canada), Seismological Research Letters 78 (1), 167.
- 78 DW Eaton, 2006, The Great Meteor Hotspot Track and its Role in Seismogenesis and Mantle Shear, AGUFM 2006, T53C-1633.
- 77 D Snyder, DW Eaton, M Kendall, G Rumpker, F Darbyshire, A Frederiksen, .., 2006, The Hudson Bay Lithospheric Experiment, AGUFM 2006, S41A-1312.
- 76 Dineva, S., Eaton, D., Ma, S. and Mereu, R., 2006, Georgian Bay (Ontario) earthquake with magnitude mN 4.3 (October 20, 2005) and its foreshock-aftershock sequence: Tectonic implications, Seismological Society of America, Annual Meeting, San Francisco, 18-22 April.
- 75 Ma., S., Eaton, D. and Dineva, S., 2006, The Western Quebec Seismic Zone (eastern Canada): Seismic clustering along an ancient hotspot track, Seismological Society of America, Annual Meeting, San Francisco, 18-22 April.
- 74 Eaton, D., 2006, New insights on the lithospheric evolution of southeastern Laurentia, CGU Annual Scientific Meeting, 14-17 May.
- 73 Dineva, S., Eaton, D., Ma, S. and Mereu, R., 2006, The 20 October, 2005 Georgian Bay earthquake: A postglacial rebound event? , CGU Annual Scientific Meeting, 14-17 May.
- 72 Bentham, H. and Eaton, D., 2006, Performance of various shear-wave splitting techniques in the presence of noise: Examples from POLARIS stations in Ontario, Canada, CGU Annual Scientific Meeting, 14-17 May.
- 71 Wagstaffe, J. and Eaton, D., 2006, Seismicity of Southeastern Vancouver Island as Detected using the British Columbia POLARIS Array, CGU Annual Scientific Meeting, 14-17 May (Winner of Chevron Canada Best Student Seismology Paper).
- 70 Pinnegar, R. and Eaton, D., 2006, Measuring fundamental-mode Rayleigh group velocities and wavefronts using the S-transform, CGU Annual Scientific Meeting, 14-17 May .

- 69 Ma, S. and Eaton, D., 2006, Western Quebec Seismic Zone: Mid-crustal seismicity along a Mesozoic hotspot track., CGU Annual Scientific Meeting, 14-17 May.
- 68 Alexandrakis, C. and Eaton, D., 2006, Constraints on outer core velocity structure from array analysis of SmKS phases, CGU Annual Scientific Meeting, 14-17 May (Winner of Shall Canada Best Study Poster Award).
- 67 Eaton, D., 2006, The Great Meteor hotspot track and its role in seismogenesis and mantle shear, 78th annual meeting of the Eastern Section, Seismological Society of America, Ottawa, 1-4 October.
- 66 Eaton, D., 2006, Dispersion analysis of intermediate-period surface waves using the S-transform., 78th annual meeting of the Eastern Section, Seismological Society of America, Ottawa, 1-4 October.
- 65 Eaton, D., 2006, The Hudson Bay Lithospheric Experiment., 78th annual meeting of the Eastern Section, Seismological Society of America, Ottawa, 1-4 October.
- 64 Read, K., Eaton, D. and El Naggar, H., 2006, Site response spectra for POLARIS stations in southern Ontario and Quebec, 78th annual meeting of the Eastern Section, Seismological Society of America, Ottawa, 1-4 October.
- 63 Eaton, D., 2006, The Great Meteor Hotspot Track and its Role in Seismogenesis and Mantle Shear, American Geophysical Union, Fall Meeting, San Francisco, CA, 11–15 December.
- 62 Eaton, D., and the HuBLE Working Group, 2006, The Hudson Bay Lithospheric Experiment, American Geophysical Union, Fall Meeting, San Francisco, CA, 11–15 December.
- 61 IJ Ferguson, AW Frederiksen, DW Eaton, S Miong, E Gowan, 2005, Mantle Fabric at Multiple Scales Across an Archean-Proterozoic Boundary, Eastern Ontario, Canada, AGUFM 2005, T13A-0433.
- 60 C Bank, DW Eaton, K Aktas, 2005, Moho topography and lower crustal density in Southern Ontario from linearized gravity inversion, AGUSM 2005, T43D-04.
- 59 DW Eaton, 2005, POLARIS: Challenges for real-time Geoscience in (really) remote places, European Geophysical Union, Vienna, Austria, April, 2005.
- 58 Eaton, D., Mereu, R., Jones, A. and Hyndman, R., 2005, The Moho Beneath the Canadian Shield, European Geophysical Union, General Assembly, Vienna, Austria, 25 April.
- 57 Eaton, D., Atkinson, G., Asudeh, I. and the POLARIS team, 2005, POLARIS: Challenges for real-time Geoscience in (really) remote places, European Geophysical Union, General Assembly, Vienna, Austria, 27 April (invited).
- 56 Eaton, D., Ma, S. and Dineva, S., 2005, Crustal structure and seismicity characteristics of the Maniwaki cluster, western Quebec, 77th Annual Meeting, Eastern Section, Seismological Society of America, Memphis, Tennessee.
- 55 Ma, S., Eaton, D. and Dineva, S., 2005, Discriminating small earthquakes from quarry blasts using peak amplitude ratio  $V_{max}/H_{max}$ , 77th Annual Meeting, Eastern Section, Seismological Society of America, Memphis, Tennessee.
- 54 AW Frederiksen, S Miong, DW Eaton, 2004, Mantle Fabric Beneath Ontario: Results From the CNSN, FEDNOR and POLARIS Arrays, AGUFM 2004, T33A-1326.
- 53 S Dineva, D Mihaylov, DW Eaton, 2004, Discriminating small local earthquakes from quarry blasts in southern Ontario, Seismological Research Letters 75 (3), 448.
- 52 DW Eaton, T Li, 2004, Delineating the Tuwu porphyry copper deposit at Xinjiang, China with seismic-reflection profiling, AGUSM 2004, NS43A-09.
- 51 DW Eaton, A Frederiksen, S Miong, 2004, Shear-wave splitting observations in the lower Great Lakes region, AGUSM 2004, S23B-04.
- 50 C Bank, DW Eaton, K Aktas, 2004, Crustal thickness in Southern Ontario from constrained linearized gravity inversion, AGUSM 2004, S33A-04.
- 49 S Dineva, DW Eaton, 2004, Crustal Seismic Velocity Model of Southern Ontario, AGUSM 2004, S33A-01.

- 48 AW Frederiksen, S Miong, DW Eaton, 2004, Possible Subcrustal Anisotropic Fabric Beneath the Grenville Orogen, AGUSM 2004, S33A-03.
- 47 Bank, C, Eaton, D W, and Aktas, K., 2004, Crustal thickness in Southern Ontario from constrained linearized gravity inversion, AGU/CGU/SEG Joint Assembly, Montreal, 17-21 May.
- 46 Eaton, D. and Li, Tonglin, 2004, Delineating the Tuwu porphyry copper deposit at Xinjiang, China with seismic-reflection profiling., AGU/CGU/SEG Joint Assembly, Montreal, 17-21 May.
- 45 Eaton, D., Frederiksen, A., and Miong, S-K., 2004, Shear-wave splitting observations in the lower Great Lakes region, AGU/CGU/SEG Joint Assembly, Montreal, 17-21 May.
- 44 Frederiksen, A W., Miong, S., and Eaton, D W., 2004, Possible Subcrustal Anisotropic Fabric Beneath the Grenville Orogen, AGU/CGU/SEG Joint Assembly, Montreal, 17-21 May.
- 43 Eaton, D., Dineva, S. and Aktas, K., 2004, Teleseismic studies of the western Grenville orogen, Ontario, 11th International Symposium on Deep Seismic Profiling of the Continents and their margins, Mont-Tremblant, Quebec, Sept. 28-Oct. 1.
- 42 Aktas, K. And Eaton, D., 2004, Upper-mantle P-wave velocity structure, western Grenville orogen, Canada: Evidence for a 1.5 Ga frozen slab, 11th International Symposium on Deep Seismic Profiling of the Continents and their margins, Mont-Tremblant, Quebec, Sept. 28-Oct. 1.
- 41 Eaton, D., Milkereit, B. and Salisbury, M., 2004, Enhancing base metal exploration through seismic-reflection studies adapted for the crystalline rock environment, The LITHOPROBE Celebratory Conference, Toronto Oct. 13-15 (invited).
- 40 Eaton, D., Mereu, R. and Dineva, S., 2004, Crustal Structure of Western Lake Ontario: Implications for Precambrian Basement Controls on Local Seismicity, SSA Eastern Section, 76th Annual Meeting, Nov. 2.
- 39 B Milkereit, DW Eaton, M Salisbury, E Adam, T Bohlen, 2003, 3D Seismic Imaging for Mineral Exploration, Proceeding of 12th International Workshop of Commission on Controlled-Source.
- 38 JF Cassidy, J Adams, I Asudeh, G Atkinson, MG Bostock, DW Eaton, .., 2003, POLARIS: Portable Observatories for Lithospheric Analysis and Research Investigating Seismicity-New Opportunities in Canada, EAEJA, 13206.
- 37 Eaton, D., Aktas, K., Dunn, B. and Asudeh, I., 2003, Preliminary analysis of teleseismic recordings from the Ontario POLARIS seismograph array., CGU Annual Scientific Meeting, 10-14 May.
- 36 Murphy, C., Eaton, D. and Dineva, S., 2003, Empirically estimated site response for POLARIS seismograph stations in Ontario, CGU Annual Scientific Meeting, 10-14 May.
- 35 Mihaylov, D., Dineva, S. and Eaton, D, 2003, Seismic noise characteristics and recording capabilities of the Ontario POLARIS seismic stations, CGU Annual Scientific Meeting, 10-14 May.
- 34 Dineva, S., Eaton, D., Mereu, R., Dunn, B. and Yapp, A., 2003, Ontario POLARIS seismic array local and regional recordings in 2002-2003, CGU Annual Scientific Meeting, 10-14 May.
- 33 Dineva, S. and Eaton, D., 2003, Crustal seismic velocity model for southern Ontario: Preliminary results, CGU Annual Scientific Meeting, 10-14 May.
- 32 Eaton, D. and Frederiksen, A., 2003, Mantle anisotropy beneath the Grenville Province, Ontario, Seismological Society of America, 75th Eastern Section Annual Meeting, 19-21 October.
- 31 O'Dowd, C. and Eaton, D., 2003, An integrated geophysical study of the crustal structure of the CMBbtz beneath the greater Toronto area, Ontario Exploration and Geoscience Symposium, 8-10 December.
- 30 Li, T. and Eaton, D., 2003, Seismic reflection surveys to delineate the Tuwu prophyry Cu-Au deposit, Xinjiang, China, Ontario Exploration and Geoscience Symposium, 8-10 December.
- 29 Eaton, D., 2003, UWO geophysics field school, Sudbury, Ontario, Ontario Exploration and Geoscience Symposium, 8-10 December.
- 28 C Murphy, DW Eaton, 2002, Near Surface Characterization and Estimated Site-Response at POLARIS Seismograph Stations in Southern Ontario, AGUFM 2002, S12B-1204.

- 27 DW Eaton, C O'Dowd, S Dineva, R Mereu, H Asmis, 2002, Crustal Structure and Seismicity in the Greater Toronto Area, AGUFM 2002, S21B-0990.
- 26 S Dineva, R Mereu, DW Eaton, 2002, Fluid-moderated seismicity in Great Lakes?, Seismological Research Letters 73 (2), 254.
- 25 Dineva, S., Mereu, R., and Eaton, D, 2002, Fluid Moderated Seismicity in the Great Lakes? , Seismological Society of America Meeting, Victoria, B.C., April 17-19.
- 24 Eaton, D., Asudeh, I., Dunn, B. and Dineva, S., 2002, Preliminary results from the POLARIS network, Symposium on Deep Seismic Profiling of the Continents and their margins, Taupo, N.Z., January 6-10.
- 23 H Perry, A Forte, DW Eaton, 2001, Constraints on Mantle Dynamics below North America from Tomography-Based Flow Models: Implications of Dynamic Topography and Free Air Gravity Anomalies, AGUFM 2001, T31E-07.
- 22 AG Jones, D Snyder, I Asudeh, D White, DW Eaton, G Clarke, 2000, Lithospheric architecture at the Rae-Hearne boundary revealed through magnetotelluric and seismic experiments, Geol. Ass. Canada Yearly Meeting 2000, Abstr.[CD-ROM].
- 21 Perry, C., Pinnegar, C. and Eaton, D., , 1999, Application of the S-Transform to Analysis of Inner Core Seismic Attenuation and Anisotropy., CGU Annual Scientific Meeting, Banff, May 9-13.
- 20 Eaton, D. and Clarke, G., 1999, Elastic-Wave Scattering from Massive Sulphide Ore Deposits: Insights from Born and Kirchhoff Modelling, CGU Annual Scientific Meeting, Banff, May 9-13.
- 19 Froelich, N. and Eaton, D., 1999, An Assessment of Noise Characteristics and Determination of Event Magnsmograms: Application to modelling the receiver-function response of an irregular Moho surface. , Seismological Society of America Meeting, Victoria, B.C., April 17-19.
- 18 Eaton, D., Ross, G. and Clowes, R., 1998, The Vulcan Structure, southern Alberta: New insights on an enduring enigma, Quebec 98, GAC/MAC/CGU Joint Annual Meeting, May 18-20, Quebec.
- 17 Eaton, D., Ross, G., Cook, F. and VanderVelden, A, 1998, Lithoprobe's VAuLT survey: Pushing the depth limit of Vibroseis profiling, Quebec 98, GAC/MAC/CGU Joint Annual Meeting, May 18-20, Quebec.
- 16 Eaton, D., Ross, G., Clowes, R. and Cook, F, 1998, Lithospheric Structure of the Southern Hearne Province, Canadian Shield: a Paleoproterozoic Pyrenees? 8th International Symposium on Deep Seismic Profiling of the Continents and their Margins, Barcelona, 20-25 September.
- 15 Eaton, D. and Hynes, A., 1998, Extrusion Tectonics In The Grenville Province: Seismic, Gravity And Structural Constraints On Exhumation Of The Orogenic Root, 8th International Symposium on Deep Seismic Profiling of the Continents and their Margins, Barcelona, 20-25 September.
- 14 Hope, J., Eaton, D., Ross, G. and Dietrich, J., 1998, Epeirogeny, Flexure and Formation of Cratonic Arches: Results of Lithoprobe Regional Seismic Profiles in the Western Canada Sedimentary Basin, 8th International Symposium on Deep Seismic Seismic Profiling of the Continents and their Margins, Barcelona, 20-25 September.
- 13 Ross, G., Eaton, D. and Boerner, D., 1998, Reflections on the Assembly of western Laurentia, Geological Society of America, 1998 Annual Meeting, Toronto, October 26-29.
- 12 Eaton, D. and Hynes, A., 1998, Extrusion of eclogites in the eastern Grenville Province: Seismic and potential-field test of a lateral ramp model, Geological Society of America, 1998 Annual Meeting, Toronto, October 26-29.
- 11 Eaton, D.W, 1997, Modelling 3-D elastic scattering in the crystalline crust: Application to the interpretation of crustal reflection profiles, CGU Annual Scientific Meeting.
- 10 Eaton, D., Cook, F., Ross, G. and VanderVelden, A., 1997, Vibroseis profiling of the upper mantle across a Precambrian suture in western Canada, American Geophysical Union, 1997 Fall Meeting, San Francisco, Dec. 8-12.
- 9 Eaton, D.W. and Cassidy, J, 1996, Crustal Structure from Combined Analysis of Teleseismic Receiver

- Function and Seismic-Reflection Data, CGU Annual Mtg., Banff.
- 8 Eaton, D.W., Ross, G.M., Cook, F.A. and Van der Velden, A, 1996, The Lithoprobe VAULT Experiment: Multiresolution profiling of the continental lithosphere, CGU Annual Conference, Banff.
  - 7 Eaton, D.W., Ross, G.M., Milkereit, B. and Kanasewich, E.R., 1996, The PRAISE Survey: A new look at crustal structure of the Peace River Arch region, CGU Annual Conference, Banff.
  - 6 Eaton, D.W. and Cook, F.A, 1995, Eastern Grenville province and southeastern Canadian Cordillera: A geophysical comparison., GAC/MAC Annual Meeting, Program with Abstracts (INVITED PRESENTATION).
  - 5 Eaton, D.W., Boerner, D., Milkereit, B., Ross, G., and Kanasewich, E, 1995, Lithoprobe Alberta Basement Transect: New Perspectives on the Evolution of Precambrian Lithosphere Beneath Western Canada, IUGG, XXI General Assembly.
  - 4 Eaton, D.W., and Wu, J., 1995, True Relative-Amplitude Processing Strategies for Crustal Seismic Reflection Data: An Example From Western Canada, IUGG, XXI General Assembly.
  - 3 Eaton, D., Milkereit, B., Ross, G.M. and Kanasewich, E.R, 1994, Seismic evidence for basement controls on sedimentation in the Western Canada Sedimentary Basin, 6th Internat. Symposium on Seismic Reflection Probing of the Continents and their Margins, Budapest, Hungary.
  - 2 Eaton, D. and Milkereit, B, 1994, Lower crustal reflection-strength estimates in central Alberta, CGU Annual Scientific Meeting.
  - 1 Eaton, D., Milkereit, B. and the Alberta Basement Transect Working Group, 1993, Influence of Paleoproterozoic crustal structure on the sedimentary cover in the Alberta Basin: New insights from LITHOPROBE seismic reflection data, AGU Fall Meeting, San Francisco.

#### Patents

- 1 St-Onge, A., Eaton, D.W. and Pidlisecky, A., 2012. Assessing stress, strain and fluid pressure in strata surrounding a borehole based on borehole casing resonance, U.S.A., Canada, U.K., United States Patent Application 20130188452, Pending.

#### Invited Seminars, Webinars and Lectures

##### *Outreach-oriented talks shown in magenta*

- 105 Using DAS to monitor fluid injection: Application to the proposed KIQ-START initiative. Japan Oil, Gas and Metals National Corporation, Technology Research Centre, online, November 17, 2020.
- 104 Seismicity Induced by the Development of Unconventional Oil and Gas Resources, Bureau of Economic Geology and University of Texas Austin, October 23, 2020.
- 103 **Aseismic fault creep leading to hydraulic-fracturing induced seismicity: Understanding the physical mechanisms of HFIS fault activation. Invited webinar, American Rock Mechanics Association, Induced Seismicity Working Group, 2020.**
- 82 **Crustal fluids, friction and faults: What can we learn from injection-induced earthquakes? CSEG Foundation distinguished lecture tour (21 venues across Canada), 2019-2020**
- 81 Imaging & Control of Hydraulic Fracturing: Background and Motivation for a new Research Consortium. Kyoto University, Japan, October 31, 2019.
- 80 Hydraulic fracturing, microseismic monitoring and induced seismicity: Research perspectives in a changing global industry. Japan Oil, Gas and Metals National Corporation, Technology Research Centre, Chiba, Japan, October 29, 2019.
- 79 The Value of Microseismic Observations for Monitoring Hydraulic-Fracturing Well Completions. Saskatchewan Research Council, invited seminar, 7 February 2019
- 78 Unconventional Resource Development and Induced Seismicity in Western Canada: An Update. SPE

- Edmonton Chapter, 22 January 2018.
- 77 Fault activation by hydraulic fracturing in western Canada. Schatzalp Workshop on Induced Seismicity, Davos, Switzerland, 2017
- 76 Potential ICDP drilling sites in western Canada. SEISMS ICDP workshop, New York, April 1, 2017
- 75 Unconventional Resource Development and Induced Seismicity in Western Canada. Canadian Association of Drilling Engineers, Luncheon, January 12, 2017, Calgary, Canada, 2017
- 74 Unconventional Resource Development and Induced Seismicity in Western Canada. SPE Geomechanics Division, Luncheon, January 26, 2017, Calgary, Canada, 2017
- 73 Dynamics of fault activation by hydraulic fracturing in overpressured shale formations. DOE/NSF SedHeat workshop, Salt Lake City, United States 2017
- 72 Fault activation by hydraulic fracturing. Youngstown State University, Webinar, September 13, 2017, Youngstown, Ohio, 2017
- 71 Hydraulic Fracturing and Induced Seismicity. Penn State University, International webinar, April 13, 2017. 2017
- 70 What Controls the Maximum Magnitude (Mmax) of Injection-Induced Earthquakes? Denver Microseismic Study Group, International Webinar, October 17, 2017 2017
- 69 CCArray: A Proposed Integrated Earth Observation Network Spanning the Canadian Cordillera. Seminar, University of Victoria, October 27, 2017
- 68 **What Controls the Maximum Magnitude (Mmax) of Injection-Induced Earthquakes? SEG-SPE Workshop on Injection-Induced Seismicity, Dallas, November 7, 2017**
- 67 Passive seismic methods for hydraulic-fracture monitoring: Resolving fracture networks, slow slip and earthquake nucleation processes. IRIS annual scientific workshop, Vancouver, WA, United States (invited) 2016
- 66 Passive seismic methods for hydraulic-fracture monitoring: Resolving fracture networks, slow slip and earthquake nucleation processes. Workshop on Seismic and micro-seismic signature of fluids in rocks: Bridging the scale gap, Cergy, France, 2016
- 65 2b... or not 2b? A new view of operationally induced microseismicity from hydraulic fracturing. Department Seminar, Stanford University, Palo Alto, United States, 2015
- 64 2b... or not 2b? A new view of operationally induced microseismicity from hydraulic fracturing. CSEG Technical Luncheon, Calgary, Canada (keynote), 2015
- 63 **Hydraulic fracturing and induced seismicity. AGU Joint Assembly, Montreal (CGU President's Plenary prentation, invited), 2015**
- 62 In search of the elusive LAB beneath – and beside – Precambrian cratons. Seminar, Department of Geological Sciences, Oregon, United States 2015
- 61 Microseismic Monitoring and Reservoir Characterization. CSPG Gussow Conference on life cycle of fine-grained reservoirs, Banff, Canada 2015
- 60 [The Calgary frost quake of March 4, 2014. Earth Sciences for Society, Calgary, Canada, 2015.](#)
- 59 Enhanced Downhole Microseismic Processing Using Matched Filtering Analysis (MFA). CSEG Microseismic User Group (MUG) talk, Calgary, Canada, 2015
- 58 Hydraulic Fracturing Innovation Initiative: Design Optimization, Environmental Implications & Regulatory Framework. Chief Geophysicists Forum, Calgary, Canada 2015
- 57 [Cryoseism! The inferred Calgary frost quake of March 4, 2014: An analog for hydraulic fracturing? CSEG Microseismic User Group \(MUG\) talk, Calgary, Canada 2014](#)
- 56 In search of the elusive LAB beneath cratons. EGU LABPAX workshop, Vienna, Austria, 2014
- 55 Estimating stress parameters using earthquake focal mechanisms: A tutorial.

- 54 Magnitude, scaling, and spectral signature of tensile microseisms. Schlumberger SIG seminar, Calgary, Canada 2014
- 53 Anomalous induced seismicity in the WCSB Historical review of examples including Eagle and Rocky Mountain House. CGF/CSEG/MUG Workshop in Induced Seismicity. Calgary, November 22, 2013
- 52 Microseismic Monitoring Myths, Modelling, Magnitudes and Melodies. FATS seminar, Department of Geoscience, Calgary, Canada October 4, 2013
- 51 Hydraulic Fracturing: Design Optimization, Environmental Implications & Regulatory Framework. Energy Leaders Breakfast, Calgary, Canada, 2013.
- 50 Breakdown of the Gutenberg-Richter relation for microearthquakes induced by hydraulic fracturing? Influence of stratabound fractures. BIRS workshop on Statistics and Triggering of Earthquakes, Banff, September 1, 2013.
- 49 Finite-Difference Micro-Synthetics. CGU/MUG Technology Forum, Calgary, September 9, 2013.
- 48 Spectral characteristics and scaling relations for tensile microseismic events. Houston Geological Society: Applied Geoscience Conference, Interdisciplinary Micro to Macroscale Geomechanics. Houston, November 4, 2013.
- 47 The search for long-period long-duration microseismic events: Hydraulic fracture stimulation, NW Canada. Institutes for Geophysics, Czech Academy of Sciences, Prague, 12 June, 2012
- 46 Estimating energy balance for hydraulic fracture stimulations: Is microseismicity just a side show? Geophysics seminar, School of Earth Sciences, University of Bristol, 16 October, 2012.
- 45 Isopycnicity, Thermal State and Secular Evolution of Cratonic Mantle Keels. Leeds University, Department of Earth Sciences, Leeds, U.K., 2012 October
- 44 Isopycnicity, Thermal State and Secular Evolution of Cratonic Mantle Keels. University of Bristol, School of Earth Sciences, Bristol, U.K., 2012 October
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- 34 Solid angles and resolution of microseismic moment tensors. Schlumberger Canada, Ltd, Calgary, AB, October, 2009
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## Articles with editorial review

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## RESEARCH FUNDING

Career research funding to date (Eaton as lead PI): **\$16,821,019**

Project Title	Funding Agency / Program Name (if appl.)	Role	Project Years	Total Award Amount (All/Eaton)
Enhanced seismograph network coverage for Eavor-Loop demonstration project in central Alberta	Eavor Technology	Principal Investigator	2020-2021 (1 year)	\$35,000/ \$35,000
Dynamics of fault activation by hydraulic fracturing: Insights from new technologies	NSERC/Alliance	Principal Investigator	2020-2023 (3 years)	\$1.05M / \$667,000
Water quality and unconventional resource development: Partnering with remote indigenous communities to build a mentorship pipeline	NSERC/Promoscience	Principal Investigator	3 years (2020-2023)	\$180,000
Microseismic Industry Consortium (phase III)	Industry/ Research Consortium	Principal Investigator	2020-2023 (3 years)	\$1.05M / \$900K (expected)
Understanding and mitigating induced seismicity risk in the Kiskatinaw Area, BC	Geoscience BC	Principal Investigator	2019-2021 (2 years)	\$144,438/ \$144,438
Advanced Simulation Environment for Induced Seismicity Mitigation and Integrated Control (ASEISMIC)	CFREF-GRI/Greenstem	Principal Investigator	2019-2021 (2 years)	\$250,000 / \$250,000
Responsible Development of Low Permeability Hydrocarbon Resources	NSERC/CREATE	Principal Investigator	2017-2023 (6 years)	\$1.65M / \$0.8M
Natural and injection-induced seismicity in stable continental regions: Fingerprinting critically stressed fault systems	NSERC/Discovery	Principal Investigator	2017-2022 (5 years)	\$270,000 / \$270,000
Mitigating and managing risks of induced seismicity	CFREF-GRI	Principal Investigator	2017-2020 (3 years)	\$280,000 / \$100,000
Multi-scale monitoring of hydraulic fracturing and wastewater injection, Duvernay region, Alberta	NSERC/CRD	Principal Investigator	2015-2020 (5 years)	\$1.4M / \$0.8M
NSERC/Chevron Senior Industrial Research Chair in Microseismic System Dynamics	NSERC/IRC	Principal Investigator	2015-2020 (5 years)	\$1.8M / \$1.8M
Microseismic Industry Consortium (phase II)	Industry/ Research Consortium	Co-Investigator	2015-2020 (5 years)	\$3.0M / \$200K

Hydraulic Fracturing Innovation Initiative	UCalgary / Energy Grand Challenge	Principal Investigator	2014-2016 (3 years)	\$400K / \$100K
Induced Seismicity Processes	NSERC / CRD	Co-Investigator	2014-2018 (3 years)	\$680,010 / \$310,000
Towards Improved Microseismic Monitoring Technology	NSERC / CRD	Principal Investigator	2012-2015 (3 years)	\$930,000 / \$465,000
Innovative Approaches to Microseismic Monitoring of underground CO <sub>2</sub> injection: Seismic Interferometry and Ultralow frequency deformation events	Carbon Management Canada	Co-Investigator	2011-2013 (3 years)	\$378,900 / \$189,450
Portable broadband seismographs for continuous microseismic monitoring and aftershock studies	NSERC / RTI	Principal Investigator	2011 (1 year)	\$41,603 / \$41,603
The subcontinental lithosphere-asthenosphere boundary	NSERC / Discovery Accel. Supplement	Principal Investigator	2011-2013 (3 years)	\$120,000 / \$120,000
The subcontinental lithosphere-asthenosphere boundary	NSERC / Discovery	Principal Investigator	2011-2015 (5 years)	\$265,000 / \$265,000
Adapting Probabilistic Seismic Hazard Assessment Methods to Site Evaluation for Carbon Capture and Storage	Carbon Management Canada	Principal Investigator	2011 (2 year)	\$106,000 / \$106,000
Microseismic Industry Consortium (phase I)	Industry/ Research Consortium	Principal Investigator	2010-2015 (5 years)	\$3.0M / \$1.5M
Laboratory for Passive Seismic Imaging of Earth Processes	CFI/ Institutional Operating Fund	Principal Investigator	2009-2013 (5 years)	\$72,000 / \$72,000
Laboratory for Passive Seismic Imaging of Earth Processes	CFI/ Leaders Opportunity Fund	Principal Investigator	2009 (1 year)	\$808,090 / \$808,090
Preliminary assessment of regional seismic hazards in the Redwater area, north-central Alberta	Alberta Research Council	Principal Investigator	2010 (1 year)	\$34,300 / \$34,300
Optimization of microseismic borehole receiver geometry: A synthetic modelling study	Shell Canada	Principal Investigator	2009 (1 year)	\$15,000 / \$15,000
Improved seismic hazard estimation through joint analysis of high-resolution aeromagnetic and deep seismic data from western Lake Ontario and environs	Ontario Power Generation	Principal Investigator	2008 (1 year)	\$28,000 / \$28,000
New Faculty Startup	University of Calgary	Principal Investigator	2007-2011 (4 years)	\$240,000 / \$240,000
Development of a Borehole Seismograph Network for	Ontario Power Generation	Principal Investigator	2007 (1 year)	\$323,000 / \$323,000

Microearthquake Monitoring Near a Proposed Deep Geologic Repository at the Bruce Nuclear Site				
From Crust to Core: Seismological Studies of the Deep Earth using the POLARIS network	NSERC / Discovery	Principal Investigator	2005-2009 (5 years)	\$193,600 / \$193,600
POLARISNet: Interactive online educational resources for our dynamic planet	NSERC / Promoscience	Principal Investigator	2004-2006 (3 years)	\$100,200 / \$100,200
Finite-difference simulation of high-frequency wave propagation in a 3-D viscoelastic medium	Compute Canada / SHARCNET	Principal Investigator	2002 (1 year)	\$7,088 / \$7,088
3-D Tectonic Architecture and Seismicity of Southern Ontario	NSERC / Discovery	Principal Investigator	2001-2004 (5 years)	\$198,000 / \$198,000
Ontario Centres of Excellence in Earthquake Hazards and Continental Dynamics	Ontario R&D Challenge Fund	Principal Investigator	2002-2007 (6 years)	\$2.05 M / \$250K
Portable Observatories for Lithospheric Analysis and Research Investigating Seismicity (POLARIS)	CFI / Innovation Fund	Co-investigator	2001-2004 (4 years)	\$9.8 M / \$2.3M
Seismic risk to Canada's economic core: Imaging the bedrock architecture of southern Ontario	Institute for Catastrophic Loss Reduction	Principal Investigator	2000-2001 (2 years)	\$21,000 / \$21,000
Ontario Earthquake Research Initiative	Province of Ontario / Premier's Research Excellence Award	Principal Investigator	2000-2001 (2 years)	\$86,000 / \$86,000
Integrating Lithoprobe seismic refraction results with surface-wave inversion to constrain crustal thickness and structure in Canada	Lithoprobe/ Supporting Geoscience	Co-investigator	2000 (1 year)	\$35,000 / \$17,500
Ontario Earthquake Research Initiative	University of Western Ontario / Academic Development Fund	Principal Investigator	2000 (1 year)	\$50,000 / \$50,000
University of Western Ontario Lithoprobe Remote Site Equipment Upgrade	Lithoprobe / Remote Site Hardware Upgrade	Co-investigator	1999 (1 year)	\$26,500 / \$13,250
Portable broadband seismometer array for lithospheric studies	NSERC / Equipment	Principal Investigator	1998 (1 year)	\$63,000 / \$63,000
Teleseismic investigation of upper mantle anisotropy, Great Slave Lake shear zone	Lithoprobe / Supporting Geoscience	Principal Investigator	1998-1999 (2 years)	\$27,000 / \$27,000
Teleseismic survey of the central	University of Western	Principal	1998 (1	\$5,000 /

Metasedimentary belt	Ontario / VP Research Fund	Investigator	year)	\$5,000
Imaging the crystalline basement of the Peace River Arch	Lithoprobe / Supporting Geoscience	Principal Investigator	1997-1998 (2 years)	\$40,000 / \$40,000
Seismological studies of the continental lithosphere	NSERC / Discovery	Principal Investigator	1997-2001 (4 years)	\$112,640 / \$112,640
Portable broadband seismometer array for lithospheric studies	NSERC / Equipment	Principal Investigator	1997 (1 year)	\$57,000 / \$57,000
New Faculty Start-up Funds	University of Western Ontario	Principal Investigator	1997 (1 year)	\$45,000 / \$45,000
Comparative field tests of hydrophones and clamped triaxial geophones	University of Western Ontario / VP Research Fund	Principal Investigator	1997 (1 year)	\$7,000 / \$7,000
Multicomponent seismic profiling in southern Alberta	Lithoprobe / Supporting Geoscience	Principal Investigator	1995 (1 year)	\$100,000 / \$100,000
Borehole Seismic Imaging of Near-Vertical Structures	Geological Survey of Canada / Industrial Partnership Program	Principal Investigator	1995 (1 year)	\$31,000 / \$31,000

## SUPERVISION OF HIGHLY QUALIFIED PERSONNEL

### Summary

Postdoctoral fellows, research associates and visiting scientists	23
PhD students supervised (completed / in progress)	20/4
MSc students supervised (completed / in progress)	16/3
Undergraduate thesis supervision	33

### Post-Doctoral Fellows, Research Associates and Visiting Scientists

**Dr. German Rodriguez-Pradilla**, PDF – (2020) *Analysis of induced seismicity in the western Canada Sedimentary Basin*

**Dr. Rebecca Salvage**, PDF – (2019-2023) *Seismological studies of induced seismicity*

**Dr. Naimeh Riazi**, PDF – (2018-2020) *Integrated studies of induced seismicity*

**Dr. Sahar Ghannadi**, PDF – (2018-2020) *Ground-motion studies and pipelines, life-cycle analysis*

**Dr. Thomas Eyre**, PDF – (2017-2020) *Mechanisms of fault activation*

**Dr. Behrooz Hosseini**, PDF – (2017-2019) *Geomechanical simulation of hydraulic fracturing*

**Dr. Lydia DiCaprio**, RA – (2017) *Geodynamic numerical simulation*

**Dr. Megan Zecevic**, PDF – (2015-2017) *Induced seismicity processes*

**Dr. Murad Abuaisa**, PDF – (2014-2016) *Geomechanical studies of rupture processes during hydraulic fracturing*

**Dr. Samira Maghsoudi**, PDF – (2014-2015) *Statistical analysis of microseismicity*

**Dr. Enrico Caffagni**, PDF – (2014 – 2015) *Interpretation and processing of long-period long-duration microseismicity and repeating events*



**Dr. Xuewei Bao**, PDF – (2013 – 2015) *Surface-wave inversion for lithospheric studies in western Canada*

**Dr. Alireza Mahani**, PDF – (2013 – 2014) *Probabilistic seismic hazard assessment applied to CCS and hydraulic fracturing*

**Dr. Zuhair El-Isa, Visiting Scientist** (2013) *Seismotectonic studies of the Jordan-Dead Sea Transform*

**Dr. Chang Liu**, PDF – (2013) *Geomechanical studies of rupture processes during hydraulic fracturing*

**Dr. Chad Hogan**, PDF – (2011 –2012), *Spectral element modeling of teleseismic wave propagation*

**Dr. Kris Vasudevan, R.A.** - (2008 – 2011) *Seismic hazard studies for carbon capture and storage*

**Dr. Meghan Miller**, PDF – (2008 –2009) *S-receiver function studies in Canada.*

**Dr. Fiona Darbyshire**, PDF - (2005 –2006) *Surface wave analysis of POLARIS recordings from Ontario.*

**Dr. Tonglin Li, Visiting Scientist** - (2003 –2004) Jilin University, PRC. *Specializing in fractal studies of potential-field data, applications of seismic methods to mineral exploration.*

**Dr. Savka Dineva, R.A.** - (2000 –2007) *Specialization in seismicity and tectonics of continental interior regions.*

**Dr. Thomas Bohlen, R.A.** (2002) Kiel University – *3-D viscoelastic finite-difference modelling studies using the SHARCnet cluster*

**Dr. Jacqueline Hope**, PDF (2001 – 2002) *Teleseismic studies of the Great Slave Lake shear zone and analysis of the lithosphere in North America using surface waves.*

## Doctoral Students

### Principal Supervisor

**Kienan Marion**, *Induced seismicity and thermoelastic processes related to closed-loop geothermal systems.* Expected completion 2024.

**Paulina Wozniakowska**, *Application of machine-learning to decipher induced seismicity processes.* Expected completion 2022. [Received graduate scholarship from Geoscience BC]

**Nadine Igonin**, *Induced seismicity source mechanisms, anisotropy and runaway rupture processes.* Expected completion 2020. [Awarded Alexander Graham Bell Canada Graduate Scholarship. Value of \$105,000; 2017-2020]

**Atila da Silva Paes**, *Towards real-time microseismic processing: Efficient and robust methods for event detection and automated arrival time picking.* Completed 2020.

**Eneanwan Ekpo**, *Geophysical constraints on basement faulting in west-central Alberta: Implications for induced seismicity and post-collisional modification of western Laurentia.* Completed 2020.

**German Rodriguez-Pradilla**, *Microseismic Monitoring of a Duvernay Hydraulic-Fracturing Stimulation, Alberta Canada: Processing and Interpretation assisted by Finite-Difference Synthetic Seismograms.* Completed 2019.

**Hongliang Zhang**, *Moment-Tensor Analysis of Seismicity Related to Hydraulic Fracturing in North America.* Completed 2019.

**Tanistha Maiti**, *Structure of the continental Moho and lithosphere-asthenosphere boundary: Insights from receiver-function analysis and numerical modelling.* Completed 2018.

**Arsalan Sattari**, *Finite-element modelling of induced rupture on faults with non-negligible cohesion.* Completed 2018.

**Neda Boroumand**, *Microseismic interpretation of hydraulic fracture processes in unconventional reservoirs: geomechanics, simulation and data integration.* Completed: 2016

**Jubran Akram**, *Downhold microseismic monitoring: processing, algorithms and error analysis.* Completed: 2014

**Andre St-Onge**, *Four Phenomena Observed on Microseismic Data.* Completed: 2012

**Agnieszka Pawlak**, *Crustal structure beneath Hudson Bay from ambient-noise tomograph*. Completed: 2012  
**Catherine Alexandrakis**, *Seismological studies of Earth's outermost core*. Completed: 2011  
**Kadircan Aktas**, *Some Methods and Applications of Teleseismic Tomography*. Completed: 2009  
**Shutian Ma**, *Intraplate seismicity of eastern North America*. Completed: 2008  
**Jacqueline Hope**, *Structure of the crust and upper mantle beneath the western Canada sedimentary basin: An integrated geophysical approach*. Completed: 2001

#### Co-Supervisor

**Marco Venieri**, *On the relationship between lithofacies and geomechanical properties in the Duvernay unconventional resource play, western Canada*. Co-supervised with P. Pedersen. Expected completion 2021.  
**Yukuan Chen**, *Real-time earthquake location based on the Kalman filter formulation*. Co-supervised with Haijiang Zhang, USTC. Completed 2020.  
**Ron Weir**, *New technologies for unconventional reservoir characterization: Seismic inversion, focal-time estimation, and signal processing to improve reservoir imaging*. Co-supervised with L. Lines and D. Lawton. Completed 2020.  
**Suzie Jia**, *Stress inversion and damage quantification in tight gas shale with application to hydraulic fracturing*. Co-supervised with R. Wong. Completed 2019.  
**Mason MacKay**, *Rock mass characterization and the hydro-mechanical behaviour within interbedded low-permeability reservoirs during hydraulic fracturing*. Co-supervised with C. Clarkson. Completed 2018.  
**Rebekka Steffen**, *On the role of postglacial rebound in intraplate seismicity of the Hudson Bay region*. Co-supervised with P. Wu. Completed 2013.  
**Wayne Edwards**, *Seismic monitoring of bolide air blasts*. Co-supervised with P. Brown. Completed 2008.

#### Supervisory Committee (with substantial involvement)

**Zahra Bagheriashena**, (Geomatics Engineering, University of Calgary)

#### Master's Students (Thesis Based)

##### Principal Supervisor

**Zahra Esmailzadeh**, *Impact of lateral pore-pressure gradient on fault activation: A reservoir simulation approach*. Expected completion 2021. [awarded Alberta Graduate Excellence Scholarship (AGES) and Winston Karel Memorial Scholarship from the CWLS]  
**Volodymyr Vragov**, *Comparison of convolutional neural networks with matched-filtering for detection of induced Seismicity*. Completed 2018.  
**Alana Kent**, *Towards improved hydraulic fracturing effectiveness through modelling and data integration: A case study from the Horn River basin, BC*. Completed 2018.  
**Hoda Rashedi**, *Finite-difference simulation of synthetic microseismograms in the presence of anisotropy and attenuation*. Completed 2015.  
**Aamir Rafiq**, *Integrated interpretation of microseismic data with surface seismic data in a tight gas reservoir, central Alberta, Canada*. Completed 2015.  
**Kim Pike**, *Microseismic data processing, modelling and interpretation in the presence of coals: A Falher member case study*. Completed 2014.

**Farshid Forouhideh**, *Moment-tensor inversion of microseismic data*. Completed 2011  
**Clare O'Dowd**, *Crustal structure of the Grenville Province near Toronto, Ontario*. Completed 2004.  
**Charley Murphy**, *Site response for POLARIS stations in Ontario*. Completed 2003.  
**Gregory Clarke**, *Simulating elastic-wave scattering using the Kirchhoff method*. Completed 2000.

#### Co-Supervisor

**Eziz Atdayev**, *Equivalent Continuum Approach in Modelling the Hydraulic Fracturing*. Co-supervised with R. Wong. Expected completion 2020.  
**Kim Read**, *Earthquake soil response at POLARIS stations in Ontario*. Co-supervised with H. El Naggar. Completed 2009.  
**Claire Perry**, *Constraints on mantle dynamics below North America from tomography-based flow models: implications of dynamic topography and free air gravity anomalies*. Co-supervised with A. Forte. Completed 2001.

#### Supervision of course-based MSc (with substantial independent research projects)

**Prince Igweze**, *Analysis of seasonal variations in seismograph site response within the Kiskatinaw Seismic Monitoring and Mitigation Area*. Expected completion 2021.  
**Lona Leavitt**, *Analysis and implications of seismic amplitude variations with azimuth within the Duvernay*. Completed 2017.  
**Rebecca Daniels**, *A test of coda-based methods for precise focal depth determination in sedimentary basins*. Completed 2016.  
**Lindsay Uptier**, *Initial walkaway and azimuthal VSP results from the Brooks VSP experiment*. Completed 2015.  
**Kelsey Alexander**, *Pore-pressure diffusion modeling based on treatment data*. Completed 2015.  
**Ihsee Shwasdichira**, *Analysis of continuous microseismic data from the Cigar Lake uranium mine, northern Saskatchewan*. Completed 2012.

#### External Ph.D. Examinations

**A. Amini**, 2020. *Investigation of induced seismicity mechanisms and magnitude distributions under different stress regimes, geomechanical factors and fluid injection parameters*. (26 October 2020).  
**J. Holmgren**, 2020. *Source Parameters of Induced Seismicity in North America*. University of Western Ontario (26 March 2020).  
**E. Wang**, 2019. *Multidimensional magnetotelluric studies of the Precambrian Alberta basement*. University of Alberta. (2 May 2019).  
**S. Tabari**, 2015. *Time-lapse ultrasonic imaging of elastic anisotropy in saturated sandstone under a polyaxial stress state*. University of Toronto (21 September 2015)  
**N. Norouziyan**, 2006. *Patch Template Correlation (PTC) as a Method for AVO/AVA Analysis* University of Toronto (18 December 2006)  
**Istvan Györfi**, 2006. *Seismic constraints on the geological evolution of the McArthur River region in the view of the tectonics of the Eastern Athabasca Basin, Northern Saskatchewan* University of Saskatchewan (28 March 2006)  
**E. Sonley**, 2004. *Earthquake ground motion in eastern Canada*. Carleton University (28 May 2004)

- K. Laletsan**, 2001. *Seismic exploration for metallic mineral deposits*. Memorial University.
- D. Chen**, 1999. *Control by basement and boundary tectonic events on stratigraphic evolution in the Peace River Arch Region, Western Canada Sedimentary Basin*. University of Regina.
- G. Bellefleur**, 1997. *A link between deformation history and the orientation of reflective structures in the 2.68-2.83 Ga Opatika belt of the Canadian Superior Province*. Ecole Polytechnique de Montréal.
- X. Zeng**, 1996. *Finite difference modeling of viscoelastic wave propagation in a generally heterogeneous medium in the time domain, and a dissection method in the frequency domain*, University of Toronto.
- G. Rumpker**, 1996. *On seismic shear-wave propagation in variable anisotropic Earth models*, Queen's University.

#### Undergraduate (B.Sc.) Thesis Supervision

- Keegan Valerio**, *Creating Synthetic Seismograms for Multicomponent P-Sv Reflection Seismic: Comparing Finite-Difference and Ray-Tracing Methods*. March 2019.
- Scott Pellegrino**, *Estimating a hydraulic fracture network using microseismic events generated by bedding slip*. April 2018.
- Wan Wang**, *Moment tensor inversion of the 2017 M6.0 Resolute earthquake and its relation to post-glacial rebound in Arctic Canada*. April 2017.
- Moriah Rempel**, *Application of the empirical hazard matrix approach to induced seismicity in the northern Montney*. December 2016.
- Nadine Igonin**, *Wavefield separation of microseismic event data based on linear polarization in the presence of noise*. March 2016.
- Zach Anderson**, *Wastewater injection-induced seismicity near Peace River, AB*. December 2015.
- Harris Ali**, *Processing microseismic data using Excel*, March 2013.
- Ivan Mak**, *Microseismic event locations using a distributed receiver network*, April 2012
- Katarina Seckarova**, *Processing and interpretation of surface microseismic data from the Rolla Microseismic Experiment*. March 2012.
- Andrew Iverson**, *Production-induced microseismicity at the Strachan gas field, AB*. March, 2011.
- Mustaffa Al-Ibrahim**, *A teleseismic study of western Canada*, January, 2010.
- Leo Leon**, *The effects of soil moisture on GPR signal penetration*, March, 2009.
- Farshid Forouhideh**, *Shear-wave splitting in the Hudson Bay region*, May, 2008.
- Dima Amine**, *Spatial variations in lower mantle anisotropy from analysis of Sdiff phases observed using the POLARIS array*. May 2007.
- Leila Ertolahti**, *Lithospheric structure from receiver-function analysis of waveform data from northern Ontario*. May 2006.
- Johanna Wagstaffe**, *Seismicity and seismotectonics of southwestern British Columbia from POLARIS observations*. May 2006.
- Harvey Ng**, *Crustal thickness of the Slave craton, NWT*. May 2005.
- Catherine Alexandrakis**, *Neotectonics and seismic reflection studies of the Evia Gulf, Greece*. May 2005.
- Eileen Blackmore**, *A semi-quantitative approach to the interpretation of an airborne electromagnetic survey: A study of the Uranium deposits in the Athabasca Basin*. May 2003.
- Jeannette Walker**, *Regional seismic-refraction investigation of the Oak Ridges Moraine*. May 2003.
- Anya Seward**, *Refraction tomography over an Alpine Rockglacier: Murtel-Crovatsch, Upper Engadine*. May 2003.
- Mark Pelechaty**, *Processing and interpretation of borehole geophysical logging data from an iron exploration prospect, northern Minnesota*. May 2001.

**Emily Duncan**, *Acquisition, processing and interpretation of ground penetrating radar data for groundwater investigations in southern Ontario*. May 2001.

**Charley Murphy**, *Gravity and magnetic modelling and comparison with Lithoprobe seismic data, Niagara Peninsula, Ontario*. May 2001. [won Ontario Petroleum Institute award for best thesis]

**Julie Shavers**, *Processing, interpretation and AVO analysis of a seismic reflection profile across a Paleozoic reef, southwestern Ontario*. May 2001.

**Wayne Edwards**, *A case for non-isostatically supported Mare fill as a cause for lunar gravity anomalies*, co-supervised with L. Mansinha. May, 2000.

**Maiclaire Bolton**, *Mapping the Internal Structure of Quaternary Glaciofluvial Deposits Northern Sudbury Basin, Using Seismic and Ground Penetrating Radar*. May, 2000.

**Kendall Rogers**, *Observations and analysis of the September 25, 1998 magnitude 5.2 Pymatuning earthquake*. May, 1999.

**Claire Perry**, *Preliminary analysis of seismic anisotropy and attenuation in the Earth's inner core using the S-Transform: Possible implications for the structure of the inner core*, co-supervised with R. Secco. May, 1999.

**Tyler Hayes**, *Gravity and magnetic constraints on the origin of the Temagami Anomaly*. May, 1999.

**Norma Froelich**, *An assessment of noise characteristics and determination of an event magnitude-range threshold for short-period seismometers in public buildings*. May, 1999.

**Claire Currie**, *Deep sea gas hydrate: A seismic study over the Cascadia accretionary prism, offshore Vancouver Island*. May, 1999.

**Stephen Beatty**, *Seismic interpretation in northeast B.C.: The secret is locked in the basement*, May 1998.

## INNOVATION

**Innovation is a core element of my research program.** This commitment is reflected in a patent application (St-Onge, A., Eaton, D.W. and Pidlisecky, A., 2012. Assessing stress, strain and fluid pressure in strata surrounding a borehole based on borehole casing resonance, U.S.A., Canada, U.K., United States Patent Application 20130188452) and a number of key inventions. One example is the **focal-time method** (A Poulin, R Weir, DW Eaton, N Igonin, Y Chen, L Lines, D Lawton, 2019, Focal-time analysis: A new method for stratigraphic depth control of microseismicity and induced seismic events: Geophysics 84 (6), KS173-KS182), a novel data-driven method for estimation of the depth of induced events without requiring an explicit velocity model . This new intellectual property has created new business opportunities for members of the Microseismic Industry Consortium and is one of the factors that contributed to the 2020 NSERC Synergy Award for Innovation.

Together with postdoctoral research Dr. Thomas Eyre, in 2019 I co-founded [ASEISMIC Solutions Inc.](#) as a spin-off company from the University of Calgary, with green-stem financial support from the in Sustainable Low Carbon Unconventional Resources. ASEISMIC provides integrative solutions for modelling induced seismicity and mitigating the associated risks. A computational toolbox has been developed to aid in producing quantitative mitigation and response plans, by combining reservoir-simulation methods with advanced geomechanical and seismological computational tools. These tools can significantly reduce the financial, environmental and social risk, as well as potential to cause damage to local populations and infrastructure. Case studies from around the world are being used to apply this approach to unconventional oil and gas development, geothermal projects and gigaton-scale carbon dioxide storage.

Based on a request to the Dean of Science by University of Calgary Geoscience Alumni, I have developed a new capstone course, entitled “**Emerging Technologies, Entrepreneurial Thinking & Disruptive Innovation in**

**Geoscience**". This course uses a project-based course approach to provide students with opportunities to network with industry representatives and to gain experience in the innovation and entrepreneurial ecosystem, with a special focus on applications of data science, interactive modelling, visualization and visual analytics to problems in geology and geophysics.

#### PUBLIC OUTREACH AND SCIENCE COMMUNICATION

**I have demonstrated a sustained commitment to public outreach and science communication**, coupled with innovative educational approaches. My commitment to public outreach has been demonstrated through numerous media interviews, public presentations and outreach projects - two of which have been funded through NSERC's PromoScience program. My first PromoScience project, called "POLARISNet: Interactive online educational resources for our dynamic planet", took place at the University of Western Ontario from 2004-2006 and developed online educational materials (with a Canadian focus) for students in grades 7-12 to enable them to develop a deeper understanding of earthquake processes and how they are researched. The second, called, "NIYAK: Network for Indigenous Youth Academic Knowledge" is currently underway at the University of Calgary (*Niyak* = "for the future" in Cree). This program is linked to a PromoScience grant application entitled "Water Quality and Unconventional Resource Development: Partnering with remote Indigenous communities to create a mentorship pipeline" and builds directly on the CREATE program that Eaton leads ([REDEVELOP](#)).

**NIYAK** aims to encourage Indigenous youth to pursue post-secondary training in Science and Engineering that is relevant to understanding water quality issues in their community. Indigenous communities fall outside provincial water governance and are fully responsible for managing water resources under their own jurisdiction. In northern Alberta, surface water resources are abundant, but Indigenous communities are adversely affected by poor water quality, unfit for regular use. Since there is a strong urge within the communities to be self-reliant, professionals with training in science, technology, engineering and mathematics (STEM), including hydrogeologists and engineers, are urgently needed to address the water quality issues. The goal of this program is to build on existing relationships with key First Nations communities in northern Alberta to develop a 'mentorship pipeline' in order to foster a familiar, consistent educational and scientific partnership.

**REDEVELOP** (Responsible Development of Low Permeability Resources) trains graduate students to work across disciplines, distance and cultures. As Canada struggles to find its "new normal", unconventional resources are key in our transition to a low-carbon energy future, environmental sustainability and socio-economic stability. By integrating technical expertise with training in communication, conflict resolution, project management and Indigenous relations, this training initiative, funded by NSERC's CREATE program, enhances the preparedness of STEM trainees for a changing workforce. Future leaders within industry, government and Indigenous communities will rely on knowledge that crosscuts western disciplines in science and engineering and traditional ways of knowing with a deep understanding of pertinent socio-economic and environmental factors.

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## TEACHING

University of Western Ontario

### a) Undergraduate:

Course	Title	Years Taught	Mean Enrolment
Earth Sciences 023A /123A	Planet Earth: Shaken and Stirred Our Dynamic Earth <sup>1</sup>	2005-2006	150
Earth Sciences 220B	Exploration Geophysics I: Seismic Methods	1997-2004	25
Earth Sciences 320A	Exploration Geophysics II: Potential Field and Electromagnetic Methods	1997-2003, 2005-2006	15
Earth Sciences 350Y Earth Sciences 451Y	Geophysical Field School	1997-2003 2005	10
Earth Sciences 390Y	Industry Internship	2003-2004	1
Earth Sciences 459A	Special Topics in Earth Sciences	1997, 2000, 2006	2
Earth Sciences 425B	Global Seismology	2006	5
Earth Sciences 423B	Applied Seismology	2007	12

### b) Graduate:

Course	Title	Years Taught	Mean Enrolment
Geophysics 520	Exploration Geophysics II: Potential Field and Electromagnetic Methods	1998	1
Geophysics 511	Principles of Seismic Imaging	1997, 2002, 2007	6
Geophysics 512	Introduction to Theoretical Seismology	1998-99 and 2004	7
Geophysics 525B	Global Seismology	2006	6
GEOL 5956 <sup>2</sup>	Geophysical Methods for Mineral Exploration	2001	14

### Notes:

<sup>1</sup> Honorable mention for a 2006 Students Union Teaching Award

<sup>2</sup> Taught by invitation at Laurentian University for their course-based M.Sc. Program in Mineral Deposit Geology.

## University of Calgary

### a) Undergraduate<sup>3</sup>

Course	Title	Years Taught	Mean Enrolment	Average USRI score <sup>4</sup>
GLGY 201	Principles of Geoscience	2013, 2014, 2018x2	400	5.91
GOPH 351	Introduction to Geophysics	2015, 2016	250	6.49
GOPH 375	Natural Disasters and Critical Earth Phenomena	2010, 2011x2	400	6.06
GOPH 453	Mining Geophysics	2008-2010, 2013, 2014	40	6.47
GOPH 457	Physical Properties of Rocks	2012	30	6.31
GOPH 549	Geophysics Field School	2008	40	6.41
SCIE 507	Emerging Technologies, Entrepreneurial Thinking & Disruptive Innovation in Geoscience	2019	5	N/A

### b) Graduate

Course	Title	Years Taught	Mean Enrolment	Average USRI score <sup>2</sup>
GOPH 667	Introduction to Microseismic Methods	2014x2, 2016x2, 2018x2, 2019, 2020	15	6.63
GOPH 699.17	Methods used for teleseismic data analysis	2011	6	N/A
GLGY 699.70	Responsible Development of Low Permeability Resources	2020	2	N/A

#### Notes:

<sup>3</sup> Reduced teaching load whilst Department Head (2007-2012) and Research Chair (2015-2020).

<sup>4</sup> Universal Student Ratings of Instruction (USRI) scores follow a 7-point scale. Values shown are the average for all categories (overall instruction, content well organized, communicated with enthusiasm, etc.) for every available evaluation. USRI scores are not available for small-enrollment courses. Based on the reported mode statistic provided that year, in F2019 a perfect score of 7.0 was achieved for GOPH 667 (15 respondents).

#### **Other teaching-related activities:**

1. Principal Investigator and Program Chair, CREATE-REDEVELOP (Responsible Development of Low Permeability Hydrocarbon Resources) (2017-). This graduate training initiative is a collaboration of 11 researchers from the Universities of Calgary (Faculties of Science, Engineering and the School of



Public Policy), Alberta, Toronto, Waterloo and Western Ontario, industry, government and the Indian Resource Council. The cultural model is *ii'taa'poh'to'p*, which means "together in a good way". To date, REDEVELOP has provided enhanced graduate training for more than 100 highly qualified personnel (HQP) from across Canada, preparing them to work across disciplines to serve as the next generation of science and engineering leaders and policy-makers.

2. Principal Investigator for NSERC Promoscience grants, NIYAK (2020-) and POLARISNet (2004-2006). NIYAK, which means "For the Future" in Cree and stands for "Network for Indigenous Youth Academic Knowledge", is focused on building relationships with key First Nations communities in northern Alberta to develop a 'mentorship pipeline' that encourages youth to pursue postsecondary education in STEM disciplines.
  3. Course and program development. My active engagement in new course development has included SCIE 507, which was proposed in 2018 by the Geoscience Alumni Association and focuses on disruptive innovation and entrepreneurship in Geoscience. In 2014, I developed GOPH 667 to provide a unique, hybrid short-course training program that brings together graduate students and industry professionals within the emerging area of microseismic monitoring. This course has become a regular option taken by students in the Reservoir Characterization MSc program and provided the basis for my recent textbook published by Cambridge University Press. I played a strong catalytic role in the Geoscience Undergraduate and Curriculum Committee (GUCC) by organizing a department retreat in April 2010 as part of NSF's "building strong geoscience departments" program. The engagement of U.S. faculty members through the NSF program at this retreat was pivotal in moving the process forward. The Department of Geoscience was selected as the only Canadian Earth Science department to participate in this program. I redeveloped GOPH 453 (Mining Geophysics) from scratch after joining the University of Calgary as Department Head, due to retirement of the faculty member who had taught this for decades; and Geophysics Field School (ES 350Y), which I developed and taught at the University of Western Ontario. This was the first-ever geophysics field course at Western and it grew into a multi-university course that included students from the University of Toronto, University of Windsor and the University of Leeds. Key outcomes were presented in 2003 at the Ontario Exploration and Geoscience Symposium
  4. Developing geophysics components of geology program. I participated in complete redesign of GOPH 351 (Introduction to Geophysics) following the principles of Teaching by Design.
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## SERVICE

### External service (activities with > 20 hours per month in bold):

- **Reviewer** for numerous journals, including Nature, Science, Nature Geoscience, Geology, Journal of Geophysical Research, Geophysical Research Letters, Bulletin of the Seismological Society of America, Geophysical Journal International, Canadian Journal of Earth Sciences, etc. Average of 50+ reviews per year for the past 25 years.
- Review of grant proposals for NSERC, National Science Foundation, Swiss National Science Foundation, Polish National Science Foundation, Czech National Science Foundation, Dutch National Science Foundation and others (average 3+ reviews per year for the past 15 years, average 2+ per year prior to that)
- Public outreach through media interviews, often focused on controversial topics such as induced seismicity. Average of 5 per year for the past 10 years.
- Session convenor for AGU, CGU and SSA conferences, average once per year for the past 10 years.
- External appraiser of promotion and tenure files at other universities.

### University Service (activities with > 40 hours per month shown in bold):

- Elected member of General Faculties Council (GFC) Research Committee (2020-2022)
- Chair of Awards Committee, Department of Geoscience (2020-)
- Member of Awards Committee, Faculty of Science (2020-)
- Member, Department of Geoscience Strategic Planning Committee (2020-)
- Member of Killam Postdoctoral Award and Johnson & Johnson WiSTEM2D selection committee (2019-)
- **Scientific Lead**, Theme 2 (Tight Oil and Gas), \$75M CFREF program at the University of Calgary (Global Research Initiative in Sustainable Low-Carbon Unconventional Resources) (2017-2023)
- Member, faculty search committee, Complexity Science, Department of Physics and Astronomy (2016-2017)
- Member, faculty search committee, CSEG Chair, Department of Geoscience (2014-2015)
- Chair, GFC Research and Development Policy Committee (2011-2012)
- **Department Head**, University of Calgary Department of Geoscience (2007-2012)
- Member, Deans Advisory Council, Faculty of Science (2007-2012)
- Member of faculty search committee, CRC tier I (geophysics), University of Western Ontario (2007)
- Member of graduate admissions committee, University of Western Ontario (2005-2006)