Lindsey J. Heagy

email lheagy@eos.ubc.ca
phone 604-836-2715

Education

University of British Columbia 2012 – present
Doctor of Philosophy in Geophysics
Thesis: Monitoring Hydraulic Fracturing with Electromagnetic Geophysics
Supervisor: Dr. Douglas Oldenburg

University of Alberta 2008 – 2012
Bachelor of Science with Honors in Geophysics (First Class Honors)

Professional Experience

Aranz Geo Canada Limited (Calgary, AB) Apr. 2016 – present
Computational Geophysics Consultant (part-time)

- Consulting on software architecture and user interface design for Steno3D, a technical communication and 3D visualization software product
- Technical writing and editing, including internal reports and abstracts for scientific conferences

3point Science Inc (Calgary, AB) Nov. 2015 – Apr. 2016
Computational Geophysicist (part-time)

- Consulting on the development and design of interactive 3D visualization software for the geosciences

Schlumberger Doll Research (Boston, MA) Jun. 2014 – Aug. 2014
Geophysics Intern

- Supervisor: Dr. Dzevat Omeragic
- Examined upscaling techniques and performed numerical simulations to investigate the feasibility of electromagnetic imaging of complex hydraulic fractures

Schlumberger Electromagnetic Imaging (Richmond, CA) Jun. 2013 – Aug. 2013
Geophysics Intern

- Supervisor: Dr. Michael Wilt
- Developed a workflow for mapping hydraulic fractures using cross-well electromagnetic surveys
- Awarded the patent: "Determining proppant and fluid distribution" (US Patent App. 14/494,313) which was developed from this work

ConocoPhillips Canada (Calgary, AB) May 2012 – Aug. 2012
Geophysics Summer Student

- Supervisor: Richard Forest
- Interpreted 3D seismic volumes covering 8 townships in Western Canada by tying synthetic seismograms, mapping seismic horizons, and examining seismic attributes.
- Worked with geologists and reservoir engineers to map a potential natural gas resource and propose a drilling location

Alfred Wegener Institute of Polar and Marine Research (Bremerhaven, Germany) May 2011 – Aug. 2011
Geophysics Summer Student

- Conducted numerical simulations to generate velocity profiles and estimate transport of the Antarctic Circumpolar Current south of Africa
- This project was funded through the Research Internships in Science and Engineering (RISE) program of the German Academic Exchange Service (DAAD)

Teaching Assistantships

EOSC 350: Environmental, Geotechnical, and Exploration Geophysics I 2013 – 2016
University of British Columbia

- Instructor: Dr. Douglas Oldenburg
- Developed labs and assignments, including interactive numerical simulations for labs
- Coordinated content and website upgrades for the web-based resource "Geophysics for Practicing Geoscientists" (http://gpg.geosci.xyz)
- Worked with a Teaching Assistant Team of 5-6 members to instruct labs, mark assignments & exams for 50-60 geology and engineering students

Directed Studies: Inversion in Applied Geophysics 2015
University of British Columbia

- Instructor: Dr. Douglas Oldenburg
- Provided guidance for an undergraduate student in his independent study. He developed Jupyter Notebook Tutorials on the basics of geophysical inversions (https://github.com/jokulhaup/directed_studies)

EOSC 354: Analysis of Time Series and Inverse Theory for Earth Scientists 2012
University of British Columbia

- Instructor: Dr. Michael Bostock
- Instructed labs, marked labs and assignments for a class of 14 geophysics students

Service

Syzygy Data & Computing, a CFI Cyber infrastructure Proposal 2017
Canada Foundation for Innovation (CFI) Grant Application

Proposal Committee Member
Principal Investigator: Dr. Michael Lamoureux, University of Calgary
Syzygy: http://syzygy.ca/, CFI: https://www.innovation.ca/

Society of Exploration Geophysics Distinguished Instructor Short Course 2017 2017
Geophysical Electromagnetics: Fundamentals and Applications by Dr. Douglas Oldenburg
Support Instructor
http://disc2017.geosci.xyz

JupyterCon 2017
August 22-25, New York, NY
Program Committee Member
https://conferences.oreilly.com/jupyter/jup-ny

Banff International Research Station: Geophysical Simulation and Inversion 2017
August 22-25, Banff, AB
Supporting Organizer with Dr. Douglas Oldenburg, Dr. Adam Pidlisecky and Rowan Cockett
http://www.birs.ca/events/2016/2-day-workshops/16w2695

Outreach

GeoSci.xyz 2014 – present
Online interactive textbooks for geophysics
Editor and contributor
http://geosci.xyz

SimPEG 2013 – present
Open source software for Simulation and Parameter Estimation in Geophysics
Lead developer and contributor
http://simpeg.xyz

Publications

Peer Reviewed Publications

1. Caudillo-Mata, L. A., E. Haber, **L. J. Heagy**, and C. Schwarzbach, 2017, A framework for the upscaling of the electrical conductivity in the quasi-static maxwells equations: Journal of Computational and Applied Mathematics, **317**, 388 – 402

2. Cockett, R., S. Kang, **L. J. Heagy**, A. Pidlisecky, and D. W. Oldenburg, 2015a, Simpeg: An open source framework for simulation and gradient based parameter estimation in geophysical applications: Computers & Geosciences, **85**, 142–154

Peer Reviewed Publications (submitted or in review)

1. **Heagy, L. J.**, R. Cockett, S. Kang, G. K. Rosenkjaer, and D. W. Oldenburg, 2016a, A framework for simulation and inversion in electromagnetics (submitted to computers and geosciences): arXiv preprint arXiv:1610.00804

Non Peer Reviewed Publications

1. Cockett, R., **L. J. Heagy**, and D. W. Oldenburg, 2016, Pixels and their neighbors: Finite volume: The Leading Edge, **35**, 703–706

Patents

1. Wilt, M., N. Cuevas, and **L. J. Heagy**, 2014a, Determining proppant and fluid distribution. (US Patent App. 14/494,313)

Conference Proceedings

(∗ : invited, † : award)

1. **Heagy, L. J.**, R. Cockett, and D. W. Oldenburg, 2017, Modular electromagnetic simulations with applications to steel cased wells, *in* Proceedings of the 6th International Symposium on Three-Dimensional Electromagnetics: 125–129

2. * Kang, S., R. Cockett, **L. J. Heagy**, and D. W. Oldenburg, 2016, Practices to enable the geophysical research spectrum: from fundamentals to applications: Presented at the 2016 AGU Fall Meeting

3. * **Heagy, L. J.**, and D. W. Oldenburg, 2016b, Examining the impact of steel cased wells on electromagnetic signals: Presented at the 2016 AGU Fall Meeting

4. * **Heagy, L. J.**, R. Cockett, and D. W. Oldenburg, 2016c, Geosci: Practices to collaboratively build online resources for geophysics education: Presented at the 2016 AGU Fall Meeting

5. Yang, D., D. W. Oldenburg, and **L. J. Heagy**, 2016, 3d dc resistivity modeling of steel casing for reservoir monitoring using equivalent resistor network, *in* SEG Technical Program Expanded Abstracts 2016: Society of Exploration Geophysicists, 932–936

6. **Heagy, L. J.**, R. Cockett, S. Kang, G. K. Rosenkjaer, and D. W. Oldenburg, 2015b, simpegem: An open-source resource for simulation and parameter estimation problems in electromagnetic geophysics: Presented at the 2015 AGU Fall Meeting

7. **Heagy, L. J.**, R. Cockett, S. Kang, and D. W. Oldenburg, 2015a, Real simulation tools in introductory courses: packaging and repurposing our research code.: Presented at the 2015 AGU Fall Meeting

8. Cockett, R., **L. J. Heagy**, S. Kang, and G. K. Rosenkjaer, 2015b, Development practices and lessons learned in developing simpeg: Presented at the 2015 AGU Fall Meeting

9. **Heagy, L. J.**, R. Cockett, D. W. Oldenburg, and M. Wilt, 2015c, Modelling electromagnetic problems in the presence of cased wells, *in* SEG Technical Program Expanded Abstracts 2015: 699–703

10. Kang, S., R. Cockett, **L. J. Heagy**, and D. W. Oldenburg, 2015, Moving between dimensions in electromagnetic inversions, *in* SEG Technical Program Expanded Abstracts 2015: 5000–5004

11. Cockett, R., S. Kang, and **L. J. Heagy**, 2014, Simpeg: An open-source framework for geophysical simulations and inverse problems: AGU Fall Meeting Abstracts, 07

12. **Heagy, L. J.**, A. R. Cockett, and D. W. Oldenburg, 2014a, Parametrized inversion framework for proppant volume in a hydraulically fractured reservoir, *in* SEG Technical Program Expanded Abstracts 2014: 865–869

13. Caudillo-Mata, L., E. Haber, **L. J. Heagy**, and D. W. Oldenburg, 2014, Numerical upscaling of electrical conductivity: A problem specific approach to generate coarse-scale models, *in* SEG Technical Program Expanded Abstracts 2014: 680–684

14. Fournier, D., **L. J. Heagy**, N. Corcoran, D. Cowan, S. G. R. Devriese, D. Bild-Enkin, K. Davis, S. Kang, D. Marchant, M. S. McMillan, M. Mitchell, G. K. Rosenkjar, D. Yang, and D. W. Oldenburg, 2014, Multi-em systems inversion - towards a common conductivity model for the tli kwi cho complex, *in* SEG Technical Program Expanded Abstracts 2014: 1795–1799

15. Devriese, S. G. R., N. Corcoran, D. Cowan, K. Davis, D. Bild-Enkin, D. Fournier, **L. J. Heagy**, S. Kang, D. Marchant, M. S. McMillan, M. Mitchell, G. K. Rosenkjar, D. Yang, and D. W. Oldenburg, 2014, Magnetic inversion of three airborne data sets over the tli kwi cho kimberlite complex, *in* SEG Technical Program Expanded Abstracts 2014: 1790–1794

16. Wilt, M., **L. J. Heagy**, and J. Chen, 2014b, Hydrofracture mapping and monitoring with borehole electromagnetic (em) methods: Presented at the 76th EAGE Conference and Exhibition 2014

17. † **Heagy, L. J.**, D. W. Oldenburg, and J. Chen, 2014b, Where does the proppant go? examining the application of electromagnetic methods for hydraulic fracture characterization: Presented at the GeoConvention 2014, CSEG
    † Student Honourable Mention Integrated Poster

18. † **Heagy, L. J.**, and D. W. Oldenburg, 2013, Investigating the potential of using conductive or permeable proppant particles for hydraulic fracture characterization, *in* SEG Technical Program Expanded Abstracts 2013: 576–580
    † Awards of Merit (Best Student Paper, Annual Meeting)

Other Conference Presentations

1. **Heagy, L. J.**, 2016, Using open source tools to refactor geoscience education: Presented at the SciPy 2016, Austin, TX, https://youtu.be/IW2LDsevvDk

2. **Heagy, L. J.**, 2015, Using python to span the gap between education, research, and industry applications in geophysics: Presented at the SciPy 2015 Conference in Austin, TX, https://youtu.be/4msHJMBvzaI

3. Rosenkjaer, G. K., **L. J. Heagy**, R. Cockett, S. Kang, and D. W. Oldenburg, 2015, Practical integration of processing, inversion and visualization of magnetotelluric geophysical data: Presented at the SciPy 2015 Conference in Austin, TX

4. * **Heagy, L. J.**, D. W. Oldenburg, M. Wilt, and J. Chen, 2014c, Using electromagnetics to delineate proppant distribution in a hydraulically fractured reservoir: Presented at the SEG Development and Production Forum, Santa Rosa CA
    * Invited to "Best of the Development and Production Forum" at the SEG 2014 Annual Meeting

Awards and Scholarships

UBC Library: Innovative Dissemination of Research Award 2016
Awarded for the SimPEG framework and community development ($1,000)

NSERC Vanier Scholarship 2014–2017
Vanier Scholars demonstrate leadership skills and a high standard of scholarly achievement in graduate studies in the social sciences and/or humanities, natural sciences and/or engineering and health. The Vanier Scholarship is the top graduate scholarship in Canada. ($50,000 × 3)

Alexander Graham Bell Canada Graduate Scholarship 2014–2017
Awarded to high caliber scholars who are engaged in a doctoral program in the natural sciences or engineering (Declined) ($35,000 × 3)

Four Year Fellowship (FYF) for PhD Students 2014–2018

Selection based on academic excellence, upon the recommendation of the graduate program at UBC

Special UBC Graduate Scholarship - W.H. Mathews Scholarship 2013

Awarded for academic achievement in Earth, Ocean and Atmospheric Sciences at UBC ($\$5,000$)

Governor Generals Silver Medal 2012

Awarded annually to the three undergraduate students (institution-wide) who achieve the highest academic standing overall upon graduation from his/her Bachelor degree program (University of Alberta)

Lieutenant-Governors Gold Medal 2012

Awarded to the convocating student from an Honours program in the Faculty of Science who has shown the highest distinction in scholarship (University of Alberta)

APEGGA Past Presidents Medal in Geophysics 2012

Awarded to the convocating student who is a Canadian Citizen or Permanent Resident with the highest academic standing in a specialization or honours program in Geophysics on the basis of the final year

The APEGGA Scholarship in Geophysics 2011

Awarded on the basis of superior academic achievement in Honors Geophysics or Specialization in Geophysics ($\$3,000 \times 2$)

The David K Robertson Award in Geophysics and Geology 2010–2012

Awarded to a student entering the third year of a BSc Specializing in Geology or Geophysics on the basis of passion and talent in their field of study, demonstrated leadership, participation in extracurricular activities, and academic standing. ($\$5,000 \times 2$)

The Encana Geology and Geophysics Scholarship 2010–2012

Awarded to student(s) with superior academic achievement entering the third or fourth year of study for a Bachelor of Science with a major in Geology or Geophysical Sciences. ($\$3,500 \times 2$)

Louise McKinney Post Secondary Scholarship, Government of Alberta 2009 – 2011

Recognizes students for their academic achievements at a provincial level and encourages them to continue in their undergraduate program of study ($\$2,500 \times 3$)

Pearl Cuthbertson Memorial Award 2009

Awarded to a student entering the second year of study for a Bachelor of Science degree who has completed Science 100. Selection based on academic standing and demonstrated determination, curiosity and enthusiasm for science. ($\$2,000 \times 2$)

Pearson Book Prize 2009

Awarded for academic achievement in Writing Studies in Science 100

Dean's Honor Roll, University of Alberta 2008 – 2012

Awarded for academic achievement ($\times 4$)

Grants

Science Center for Learning and Teaching - Development Grant 2014

Development of online interactive resources for undergraduate geophysics at UBC ($2,500)

Principal Investigator: Dr. Douglas Oldenburg

Media

Apr. 24, 2017	Guest on Episode 41, *Undersampled Radio* by Graham Ganssle and Matt Hall (https://undersampledrad.io)
Jan. 24, 2017	Guest on Episode 11, *Seismic Soundoff* by the Society of Exploration Geophysicists (http://seg.org/podcast)
Jun. 7, 2012	Article: *Science 100 pioneer grounded in geophysics - University of Alberta Spring Convocation 2012: Celebrating Talented People* (https://www.ualberta.ca/news-and-events/newsarticles)

Professional Development

Conferences Attended

2017	EM-6: The 6th International Symposium in Three-Dimensional Electromagnetics
2016	FORCE11: The Future of Research Communications and e-Scholarship Meeting
2015 – 2016	(2) SciPy Conference
2014 – 2015	(2) British Columbia Geophysical Society EM Workshop
2014	SEG Development and Production Forum
2014	GeoConvention
2014 – 2016	(3) AGU Annual General Meeting
2011 – 2016	(6) Society of Exploration Geophysics Annual Meeting

Courses Attended

2015	Presenting Data and Information presented by Edward Tufte
2014	SEG Distinguished Instructor Short Course: Microseismic Imaging of Hydraulic Fracturing: Improved Engineering of Unconventional Shale Reservoirs presented by Shawn Maxwell