

# Stanford

---



## Ryan Schultz

Ph.D. Student in Geophysics

 Curriculum Vitae available Online

### Bio

---

#### HONORS AND AWARDS

- AER Awards of Excellence, Alberta Energy Regulator (2018)
- AER Awards of Excellence, Alberta Energy Regulator (2015)
- AER Awards of Excellence, Alberta Energy Regulator (2014)
- Graduate Student Teaching Award, University of Alberta (2012)
- Roy Hibbs Memorial Graduate Scholarship, University of Alberta (2011)
- Alberta Advanced Education and Technology Graduate Student Scholarship, Government of Alberta (2011)
- Canadian Association of Petroleum Producers Scholarship, CAPP (2011)
- Canadian Society of Explorational Geophysicists Scholarship, CSEG (2011)
- Golden Key International Honour Society Member, Golden Key (2011)
- Queen Elizabeth II Graduate Scholarship, University of Alberta (2011)
- Jason Lang Scholarship, University of Alberta (2008)
- Rutherford Scholarship, Government of Alberta (2003)

#### EDUCATION AND CERTIFICATIONS

- M.Sc., University of Alberta , Geophysics (2012)
- B.Sc., University of Alberta , Honours Physics (2009)
- B.Sc., University of Alberta , Specialization in Chemistry (2007)

#### LINKS

- Google Scholar: [https://scholar.google.com/citations?hl=en&user=VB2wsJAAAAAJ&view\\_op=list\\_works](https://scholar.google.com/citations?hl=en&user=VB2wsJAAAAAJ&view_op=list_works)
- ResearchGate: [https://www.researchgate.net/profile/Ryan\\_Schultz3](https://www.researchgate.net/profile/Ryan_Schultz3)
- LinkedIn: <https://www.linkedin.com/in/ryan-schultz-544013ba>
- GitHub: <https://github.com/RyanJamesSchultz>

## Research & Scholarship

---

### CURRENT RESEARCH AND SCHOLARLY INTERESTS

I am interested in better understanding the geological, tectonic, and hydrological controls on induced earthquakes. Specifically, in using observational seismology techniques to infer these characteristics. In addition to this, I am also interested in describing practical regulatory frameworks to manage induced seismicity. My prior focus has emphasized earthquakes related to hydraulic fracturing, but will include other anthropogenic causes such as wastewater disposal.

### LAB AFFILIATIONS

- Greg Beroza (9/6/2019)

## Professional

---

### WORK EXPERIENCE

- Seismologist - Alberta Geological Survey (May 1, 2012)

## Publications

---

### PUBLICATIONS

- **Risk-Informed Recommendations for Managing Hydraulic Fracturing-Induced Seismicity via Traffic Light Protocols** *BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA*  
Schultz, R., Beroza, G., Ellsworth, W., Baker, J.  
2020; 110 (5): 2411–22
- **Hydraulic Fracturing-Induced Seismicity** *REVIEWS OF GEOPHYSICS*  
Schultz, R., Skoumal, R. J., Brudzinski, M. R., Eaton, D., Baptie, B., Ellsworth, W.  
2020; 58 (3)
- **Newly emerging cases of hydraulic fracturing induced seismicity in the Duvernay East Shale Basin** *TECTONOPHYSICS*  
Schultz, R., Wang, R.  
2020; 779
- **Short-Term Hindcasts of Seismic Hazard in the Western Canada Sedimentary Basin Caused by Induced and Natural Earthquakes** *SEISMOLOGICAL RESEARCH LETTERS*  
Ghofrani, H., Atkinson, G. M., Schultz, R., Assatourians, K.  
2019; 90 (3): 1420–35
- **A New Year's Day icebreaker: icequakes on lakes in Alberta Canada** *CANADIAN JOURNAL OF EARTH SCIENCES*  
Kavanaugh, J., Schultz, R., Andriashek, L. D., van der Baan, M., Ghofrani, H., Atkinson, G., Utting, D. J.  
2019; 56 (2): 183–200
- **Faults and associated karst collapse suggest conduits for fluid flow that influence hydraulic fracturing-induced seismicity** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*  
Galloway, E., Hauck, T., Corlett, H., Pena, D., Schultz, R.  
2018; 115 (43): E10003–E10012
- **The Cross-Correlation and Reshuffling Tests in Discerning Induced Seismicity** *PURE AND APPLIED GEOPHYSICS*  
Schultz, R., Telesca, L.  
2018; 175 (10): 3395–3401
- **Faults and Non-Double-Couple Components for Induced Earthquakes** *GEOPHYSICAL RESEARCH LETTERS*  
Wang, R., Gu, Y., Schultz, R., Chen, Y.  
2018; 45 (17): 8966–75
- **Increased likelihood of induced seismicity in highly overpressured shale formations** *GEOPHYSICAL JOURNAL INTERNATIONAL*  
Eaton, D. W., Schultz, R.

2018; 214 (1): 751–57

- **Subsurface faults inferred from reflection seismic, earthquakes, and sedimentological relationships: Implications for induced seismicity in Alberta, Canada** *MARINE AND PETROLEUM GEOLOGY*  
Corlett, H., Schultz, R., Branscombe, P., Hauck, T., Haug, K., MacCormack, K., Shipman, T.  
2018; 93: 135–44
- **The Geological Susceptibility of Induced Earthquakes in the Duvernay Play** *GEOPHYSICAL RESEARCH LETTERS*  
Pawley, S., Schultz, R., Playter, T., Corlett, H., Shipman, T., Lyster, S., Hauck, T.  
2018; 45 (4): 1786–93
- **Hydraulic fracturing volume is associated with induced earthquake productivity in the Duvernay play** *SCIENCE*  
Schultz, R., Atkinson, G., Eaton, D. W., Gu, Y. J., Kao, H.  
2018; 359 (6373): 304–8
- **Source characteristics and geological implications of the January 2016 induced earthquake swarm near Crooked Lake, Alberta** *GEOPHYSICAL JOURNAL INTERNATIONAL*  
Wang, R., Gu, Y., Schultz, R., Zhang, M., Kim, A.  
2017; 210 (2): 979–88
- **Fluid Injection and Seismic Activity in the Northern Montney Play, British Columbia, Canada, with Special Reference to the 17 August 2015 M-w 4.6 Induced Earthquake** *BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA*  
Mahani, A., Schultz, R., Kao, H., Walker, D., Johnson, J., Salas, C.  
2017; 107 (2): 542–52
- **A seismological overview of the induced earthquakes in the Duvernay play near Fox Creek, Alberta** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*  
Schultz, R., Wang, R., Gu, Y., Haug, K., Atkinson, G.  
2017; 122 (1): 492–505
- **Hydraulic Fracturing and Seismicity in the Western Canada Sedimentary Basin** *SEISMOLOGICAL RESEARCH LETTERS*  
Atkinson, G. M., Eaton, D. W., Ghofrani, H., Walker, D., Cheadle, B., Schultz, R., Shcherbakov, R., Tiampo, K., Gu, J., Harrington, R. M., Liu, Y., van der Baan, M., Kao, et al  
2016; 87 (3): 631–47
- **Linking fossil reefs with earthquakes: Geologic insight to where induced seismicity occurs in Alberta** *GEOPHYSICAL RESEARCH LETTERS*  
Schultz, R., Corlett, H., Haug, K., Kocon, K., MacCormack, K., Stern, V., Shipman, T.  
2016; 43 (6): 2534–42
- **Source analysis of a potential hydraulic-fracturing-induced earthquake near Fox Creek, Alberta** *GEOPHYSICAL RESEARCH LETTERS*  
Wang, R., Gu, Y., Schultz, R., Kim, A., Atkinson, G.  
2016; 43 (2): 564–73
- **The Cardston Earthquake Swarm and Hydraulic Fracturing of the Exshaw Formation (Alberta Bakken Play)** *BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA*  
Schultz, R., Mei, S., Pana, D., Stern, V., Gu, Y., Kim, A., Eaton, D.  
2015; 105 (6): 2871–84
- **Hydraulic fracturing and the Crooked Lake Sequences: Insights gleaned from regional seismic networks** *GEOPHYSICAL RESEARCH LETTERS*  
Schultz, R., Stern, V., Novakovic, M., Atkinson, G., Gu, Y.  
2015; 42 (8): 2750–58
- **Detection Threshold and Location Resolution of the Alberta Geological Survey Earthquake Catalogue** *SEISMOLOGICAL RESEARCH LETTERS*  
Schultz, R., Stern, V., Gu, Y., Eaton, D.  
2015; 86 (2): 385–97
- **An investigation of seismicity clustered near the Cordel Field, west central Alberta, and its relation to a nearby disposal well** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*  
Schultz, R., Stern, V., Gu, Y.  
2014; 119 (4): 3410–23

- **Multiresolution imaging of mantle reflectivity structure using SS and (PP')-P-' precursors** *GEOPHYSICAL JOURNAL INTERNATIONAL*  
Schultz, R., Gu, Y. J.  
2013; 195 (1): 668–83
- **Flexible, inversion-based Matlab implementation of the Radon transform** *COMPUTERS & GEOSCIENCES*  
Schultz, R., Gu, Y.  
2013; 52: 437–42
- **Tracking slabs beneath northwestern Pacific subduction zones** *EARTH AND PLANETARY SCIENCE LETTERS*  
Gu, Y., Okeler, A., Schultz, R.  
2012; 331: 269–80
- **Mantle reflectivity structure beneath oceanic hotspots** *GEOPHYSICAL JOURNAL INTERNATIONAL*  
Gu, Y., An, Y., Sacchi, M., Schultz, R., Ritsema, J.  
2009; 178 (3): 1456–72