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University of Texas at Austin Institute for Geophysics 425.381.0531

FOCUS AREAS

Seafloor geodesy, tectonic margins, slow slip events, instrument and technique development, mesoscale ocean circulation

EDUCATION

University of Washington, School of Oceanography, **Ph.D.** 2023
Advisor: William S.D. Wilcock
Dissertation: Circulation-Informed Seafloor Geodetic Techniques for Understanding Plate Boundary Processes

University of Washington, School of Oceanography, **M.S.** 2019

University of Washington, Physics, Earth & Space Sciences, **B.S.** 2012
Double Major, Magna cum laude, Advisor: Caroline A.E. Stromberg

EMPLOYMENT

Postdoctoral Research Scholar, University of Texas at Austin May 2023–present
Distinguished Postdoctoral Fellow , UT-Austin Institute for Geophysics
Advisor: Laura Wallace

PUBLICATIONS

Fredrickson, E.K., Wilcock, W.S.D., Harrington, M.J., Cram, G., Tilley, J., Martin, D., Burnett, J. (2024). The self-calibrating tilt accelerometer: A method for observing tilt and correcting drift with a triaxial accelerometer, *Earth and Space Sciences,* 11. https://doi.org/10.1029/2024EA003909

Cook, M.J., **Fredrickson, E.K.**, Roland, E.C., Sasagawa, G.S., Schmidt, D.A., Wilcock, W.S.D., Zumberge, M.A. (2023). Calibrated absolute seafloor pressure measurements for geodesy in Cascadia, *Journal of Geophysical Research: Solid Earth*, 128 (6). https://doi.org/10.1029/2023jb026413.

Fredrickson, E.K., Gomberg J., Wilcock, W.S.D., Hermann, A.J., Hautala S.L, Johnson, H.P. (2023). Slow slip detectability in seafloor pressure records offshore Alaska. *Journal of Geophysical Research: Solid Earth, 128 (2).* https://doi.org/10.1029/2022JB024767

Wilcock, W.S.D., Manalang, D.A., **Fredrickson, E.K.**, Harrington, M.J., Cram, G., Tilley, J., Burnettt, J., Martin, D., Kobayashi, T., Paros, J.M. (2021). A Thirty-Month Seafloor Test of the A-0-A Method for Calibrating Pressure Gauges, *Frontiers in Earth Science, 8*. https://doi.org/10.3389/feart.2020.600671

Fredrickson, E.K., Wilcock, W.S.D., Schmidt, D.A., MacCready, P., Roland, E.C., Kurapov, A.L., Zumberge, M.A., & Sasagawa, G.S. (2019). Optimizing sensor configurations for the detection of slow slip earthquakes in seafloor pressure records, using the Cascadia Subduction Zone as a case study, *Journal of Geophysical Research: Solid Earth, 124.* https://doi.org/10.1029/2019JB018053

Wilcock, W.S.D., Manalang, D.A., Harrington, M.J., **Fredrickson, E.K.**, Cram, G., Tilley, J., Burnett, J., Martin, D., Kobayashi, T., Paros, J.M. (2018). New Approaches to In Situ Calibration for Seafloor Geodetic Measurements, *2018 OCEANS - MTS/IEEE Kobe Techno-Oceans (OTO)*, Kobe, 2018, pp. 1-8. https://doi.org/10.1109/OCEANSKOBE.2018.8559178

Lee, H., Vilches, O.E., Wang, Z., **Fredrickson, E.K**., Morse, P., Roy, R., Dzyubenko, B., and Cobden, D.H. (2012). Kr and He-4 Adsorption on Individual Suspended Single-Walled Carbon Nanotubes. *Journal of Low Temperature Physics*, v. 169, p. 338-349. https://doi.org/10.1007/s10909-012-0642-3

MANUSCRIPTS IN PREP

Fredrickson, E.K., Wallace, L.M., Webb, S.C. (2024). Observations from a regional scale network of A-0-A drift-calibrated seafloor pressure sensors on the Hikurangi margin. [Manuscript in preparation]

GRANT FUNDING

(*Pending*) Collaborative Research: Data- and model-driven optimization of the SZ4D MultiArray: An on-shore/offshore network for integrated observations of subduction zone geohazards.
Agency: National Science Foundation (GEO/OCE)
Award: $19,183 (*pending*)
Period: 11/01/2024 – 10/31/2025
Collaborators: D. Roman, Carnegie; W. Fan, UC San Diego; J. Byrnes, N. Arizona Univ; B. Yanites, Indiana Univ; N. Finnegan, UC Santa Cruz; M. Wei, Univ Rhode Island; C. Barcheck, Cornell; J Collins, WHOI; A Barclay, WHOI; L Wallace, UT Austin; V Ferrini, Columbia

INVITED TALKS

Drift-Free Pressure Observations from the Hikurangi margin. *SZNet Ocean Floor Observational Technology Workshop,* Santiago, Chile. (2025)

Using tilt meters and pressure sensors to monitor an event. *Endeavour 3.0 Workshop,* Victoria, B.C., Canada. (2024)

Drift-Free Pressure Records from the Hikurangi Subduction Zone. *GEOMAR Geodynamics Seminar,* Kiel, Germany. (2024)

Seafloor Pressure Geodetic Experiments in the Hikurangi Subduction Zone. *Joint International Earthquake Science Symposium,* UT Institute for Geophysics, Austin, TX. (2024)

Pressure Processing Techniques for Detecting Slow Slip Events. *Pressure Seafloor Geodesy Workshop*, University of Rhode Island Bay Campus, Narragansett, RI. (2023)

Seafloor Geodesy for Tectonic Studies. *Coastal College of Georgia Department of Natural Sciences Seminar*, virtual. (2023)

Exploring proxies for correcting oceanographic seafloor pressure signals and improving slow slip detectability. *Seafloor Pressure Workshop*, virtual. (2022)

Seafloor pressure geodesy: challenges and opportunities. *Future Directions in Seafloor Geodesy 2021 Workshop*, virtual. (2021)

Seafloor pressure geodesy in Cascadia and Alaska: network geometry matters for reducing non-tidal oceanographic noise. *University of Texas Institute for Geophysics Seminar*, virtual. (2020)

Optimizing seafloor pressure networks for the detection of slow slip earthquakes in Cascadia and beyond. *SAGE/GAGE Workshop*, Portland, OR. (2019)

The detectability of offshore slow slip earthquakes with seafloor pressure sensors: A sensitivity analysis for the Cascadia Subduction Zone. *AGU Fall Meeting*, Washington D.C. (2018)

WHITEPAPERS

Fredrickson, E.K., Newman, A., Soule, D.C. (2021). Towards a seafloor geodetic instrument pool for the expanded study of spreading ridge, continental rift, and backarc rift systems. *2021 Rift2Ridge Workshop.*

Byrnes, J.S., Janiszewski, H.A., Eilon, Z.C., Rollins, C., Lynner, C., Wei, S.S., **Fredrickson, E.K.**, Naif, S., Shuck, B.D., Bartlow, N.M., Bodmer, M. (2020). An early career investigator vision for shoreline-crossing geophysics at the NSF future geophysical facility. 2020 *Early Career Investigator Virtual Workshop on Community Vision for the Future NSF Geophysical Facility*

AWARDS

McDuff Family Endowment in Honor of Mary Landsteiner 2021
For community building, as voted by the graduate student body

Dean A. McManus Excellence in Teaching Award 2021
For quality in education, as nominated by undergraduates

Paros Scholarship in Geophysical Instrumentation 2021
For research in geophysical instrumentation and field measurements

AWARDS CONT.

AGU Outstanding Student Paper Award 2018
DoD NDSEG, Alternate Selectee 2016
NSF GRFP, Honorable Mention 2016
Mary Gates Research Scholarship 2012

COMMITTEES

CRESCENT Leadership Board 2024–
Special Interest Group on Offshore Observations
AGU Ewing Medal Selection Committee 2024–
Recognizing original contributions to the ocean sciences
International Association of Geodesy Committees
Acoustic Delay Corrections for Submarine Geodesy 2024–
Seafloor Pressure: A Key Data for Monitoring Vertical Deformation 2024–
School of Oceanography (SoO) Faculty Search Committee 2021–2022
Search for Assistant Professor in Active Margins research area
SoO Early Career Scientist Seminar Organizing Committee 2021–2022
Revamped department seminar series to focus on early career researchers
SoO Director's Advisory Committee 2020–2021
Represent student body in regular meetings with department chair
College of the Environment Anti-Discrimination Working Group 2020–2022
Multidisciplinary group working towards shared DEI goals
School of Oceanography Communications Committee 2020–2021
Tasked to increase communication and transparency within the department

REVIEWS

Geophysical Journal International 2024
Journal of Geodesy 2024
Marine Geodesy 2023, 2024
Earth and Space Science 2022
Journal of Geophysical Research: Solid Earth 2022
Progress in Earth and Planetary Science 2021
Geophysical Research Letters 2020
Frontiers in Geodesy 2020

TEACHING EXPERIENCE

Oceanography of the Pacific Northwest (101; TA) 2020
100-student class. With one other TA, I redesigned the laboratory section for remote learning during the pandemic and oversaw those lab sections each week.
Global Oceans Human Culture (480; TA) 2018–2020
30-student class. I led pre- and in-class discussions and helped students formulate and develop term projects.
Marine Geology and Geophysics (340; TA) 2017
30-person class. I led the computer-based laboratory section and graded the assignments and tests.
Seattle Public Library K-12 tutor 2016–2018
Math and science expert for weeknight drop-in homework help.

SERVICE AND ENGAGEMENT

Judge, Jackson School of Geosciences Student Research Symposium 2024
Research showcase for geoscience graduate and undergraduate projects
Workshop Co-Organizer 2024
Merging Oceanographic and Geophysical Interests to Study Shelf and Slope Processes, *Ocean Sciences Meeting Sunday session*
Conference Session Co-Convener/Chair
AGU Fall Meeting, *Recent Developments in Seafloor Geodesy* 2023, 2024
Seismological Society of America Meeting, *Adv. in Geo. Sensing* 2022
Ocean Sciences Meeting, *Seafloor Geodesy* 2022
OCEANS'18 MTS/IEEE, *Ocean Natural Hazards Monitoring* 2018

SERVICE AND ENGAGEMENT CONT.

Allandale Newsletter, design and layout editor 2023–
Bi-monthly neighborhood publication for community news and interests
AGU OSPA Judge 2021–
Graduate Application Mentorship Program, mentor 2021
Support program for interested applicants to increase transparency
Open letters to administration, co-organizer & co-author 2020-2021
Calls to action to address DEI issues at the department and college level
Oceanography Graduate and Postdoc Symposium, founder 2019–2022
Annual opportunity for trainees to present work in low-stakes environment
Academic and Recreational Graduate Oceanographers, founder 2019–2022
Organization for increasing engagement in the graduate program
The Touch Tank (graduate student quarterly publication), editor 2018–2022
Newsletter aimed at community building through shared experiential humor

ADDITIONAL RESEARCH EXPERIENCE

Research Technician, Univ. of WA, Dept. of Oceanography 2015–2016
Advisor: William S.D. Wilcock
Acoustic detection and tracking of whales on ocean-bottom seismometer data
Field Assistant, Univ. of FL & Smithsonian 2013–2014
Advisors: Aaron R. Wood & Jorge Velez-Juarbe
Site stratigraphic description and fossil collection and identification
Undergraduate Research Assistant, Univ. of WA, Dept. of Biology 2011–2013
Advisor: Caroline A.E. Stromberg
Paleoclimatic reconstruction from isotopes and fossil plant cells and soils
Undergraduate Research Assistant, Univ. of WA, Dept. of Physics 2009–2011
Advisor: David H. Cobden
Phase transitions of monatomic gases in quasi one-dimensional systems

FIELD EXPERIENCE

Deployment of seafloor geodetic network in Hikurangi, R/V Tangaroa 2023
Recovery of seafloor geodetic network in Hikurangi, R/V Tangaroa 2023
Deployment of novel tilt instrument on Axial Seamount, R/V Revelle 2018
In-situ data collection from seafloor instruments, R/V Sikuliaq 2017
Deployment of seafloor pressure gauges, R/V Sikuliaq 2016
Cascadia Initiative OBS recovery, R/V Thompson 2015
Paleontology: site stratigraphy and fossil collection in Panama 2013
Paleontology: site stratigraphy and fossil collection in Montana 2012

CONFERENCES

Slow-to-Fast Earthquake Workshop, Santiago, Chile (oral) 2025
Searching for secular vertical strain signal in the Hikurangi margin using calibrated seafloor pressure data
USGS Subduction Zone Science Meeting (poster) 2025
Using calibrated pressure to quantify vertical secular deformation in the offshore Hikurangi Subduction Zone
AGU Fall Meeting, Washington D.C. (poster) 2024
Observations of vertical secular deformation offshore Hikurangi
Ocean Sciences Meeting, New Orleans, LA (poster) 2024
Observations of along-isobath correlation in seafloor pressure records from multiple margins in the Pacific
AGU Fall Meeting, San Francisco, CA (poster) 2023
Seafloor observations of a 2022 shallow slow slip event in the Hikurangi Subduction Zone offshore Gisborne
SSA Annual Meeting, Bellevue, WA (poster) 2022
Results from a novel self-calibrating tiltmeter at Axial Seamount

CONFERENCES CONT.

Ocean Sciences Meeting, virtual (oral) 2022
Methods for predicting and correcting oceanographic seafloor pressure signals and the impact on slow slip detectability

AGU Fall Meeting, New Orleans, LA (oral) 2021
Seafloor pressure geodesy on the Alaska margin – methods for predicting and correcting oceanographic signals and their effects on slow slip detectability

Marine Seismology Symposium, virtual (poster) 2021
Using observations from the AACSE and predictions from a regional oceanographic model to predict and correct non-tectonic signals on ocean bottom pressure recorders

AGU Fall Meeting, virtual (lightning talk) 2020
Tilt and pressure records of short-term deflation events at Axial Seamount

AGU Fall Meeting, San Francisco, CA (poster) 2019
Observing and interpreting seafloor tilt at Axial Seamount

Pacific Northwest Earthquake Science Workshop, Seattle, WA (poster) 2019
Optimizing seafloor pressure sensor networks in Cascadia for the detection of shallow slow slip earthquakes

SSA Annual Meeting, Seattle, WA (poster) 2019
A sensitivity analysis of seafloor pressure sensors for the detection of offshore slow slip earthquakes in the Cascadia Subduction Zone

OCEANS/Techno-Ocean Symposium, Kobe, Japan (oral) 2018
New approaches to in situ calibration for seafloor geodetic instruments

AGU Fall Meeting, New Orleans, LA (poster) 2017
Evaluating the use of seafloor pressure data for the study of slow slip earthquakes; insights from the 2011-2015 Cascadia Initiative deployment

GSA Annual Meeting, Charlotte, NC (oral) 2012
Vegetation response to the Late Oligocene Warming Event in southwestern Montana based on a combined phytolith-carbon isotope record