Dr. Hannah F. Mark

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Education

2019 **PhD in Marine Geophysics**, MIT-WHOI Joint Program

2014 **BA Physics, BS Geophysical Sciences**, University of Chicago

Professional Appointments

2021 – on **Postdoctoral Investigator**, Woods Hole Oceanographic Institution

2019 – 2021 **Fossett Postdoctoral Fellow**, Washington University in St Louis

Publications

2024 Gourdeau, A, Prush, VB, Rowe, C, Nackers, C, **Mark, HF**, Morris, I, Rosset, P, Lamothe, M, Chouinard, L, Tarling, MS. Investigation of suspected Holocene fault scarp near Montrèal, Quèbec: The first paleoseismic trench in eastern Canada. *Seismica.* doi:10.26443/seismica.v3i2.1179

2023 **Mark, HF**, Lizarralde, D, Wiens, DA. Constraints on bend-faulting and mantle hydration at the Marianas Trench from seismic anisotropy. *Geophysical Research Letters.* doi:10.1029/2023GL103331
Open data: scripts for anisotropy calculations

2022 Russell, JB, Gaherty, JB, **Mark, HF**, Hirth, G, Hansen, LN, Lizarralde, D, Collins, JA, Evans, RL. Seismological evidence for girdled olivine lattice-preferred orientation in oceanic lithosphere and implcations for mantle deformation processes during seafloor spreading. *Geochemistry, Geophysics, Geosystems.* doi:10.1029/2022GC010542

2022 Ben Mansour, W, Wiens, DA, **Mark, HF**, Russo, RM, Richter, A, Marderwald, E, Barrientos, S. Mantle flow pattern associated with the Patagonian slab window determined from azimuthal anisotropy. *Geophysical Research Letters.* doi:10.1029/2022GL099871

2022 **Mark, HF**, Wiens, DA, Ivins, ER, Richter, A, Ben Mansour, W, Magnani, MB, Marderwald, E, Adaros, R, Barrientos, S. Lithospheric erosion in the Patagonian slab window, and implications for glacial isostasy. *Geophysical Research Letters.* doi:10.1029/2021GL096863
Open data: velocity and viscosity models, and some cross-correlations

2021 **Mark, HF**, Collins, JA, Lizarralde, D, Hirth, G, Gaherty, JB, Evans, RL, Behn, MD. Constraints on the depth, thickness, and strength of the G discontinuity in the central Pacific from S receiver functions. *Journal of Geophysical Research: Solid Earth.* doi:10.1029/2019JB019256

2019 Shinevar, WJ, **Mark, HF**, Clerc, F, Codillo, EA, Gong, J, Olive, JA, Brown, SM, Smalls, PT, Liao, Y, Le Roux, V, Behn, MD. Causes of oceanic crustal thickness oscillations along a 74-Myr Mid-Atlantic Ridge flow line. *Geochemistry, Geophysics, Geosystems.* doi:10.1029/2019GC008711

2019 **Mark, HF**, Lizarralde, D, Collins, JA, Miller, NC, Hirth, G, Gaherty, JB, Evans, RL. Azimuthal seismic anisotropy of 70 Ma Pacific-plate upper mantle. *Journal of Geophysical Research: Solid Earth.* doi:10.1029/2018JB016451

2018 **Mark, HF**, Behn, MD, Olive, JA, Liu, Y. Controls on Mid-ocean Ridge Normal Fault Seismicity Across Spreading Rates From Rate-and-State Friction Models *Journal of Geophysical Research: Solid Earth.* doi:10.1029/2018JB015545

Manuscripts in progress

In review **Mark, HF**. Refining the extent and depth of the shear zone surrounding the Alpine Fault using receiver function harmonics. *Preprint available on ESSOAR:* 10.22541/essoar.172434288.86649219/v1

In review **Mark, HF**, Zhu, J, Tominaga, M, Aliod, D, Tivey, M. shipgrav: A Python package for marine gravimetry. *Submitted to JOSS; copies available upon request. Code available at* `https://github.com/PFPE/shipgrav`.

In prep **Mark, HF**, Wiens, DA, Ben Mansour, W, Zhou, Z. Depth-varying azimuthal anisotropy and mantle flow in the Patagonian slab window. *Copies available on request*.

Reviewed editorials

2023 **Mark, HF**, Ragon, T, Funning, G, Hicks, S, Rowe, C, Teplitzky, S, Convers, J, Karasözen, E, Corona-Fernandez, RD. Editorial workflow of a community-led, all-volunteer scientific journal: lessons from the launch of Seismica. *Seismica.* doi:10.26443/seismica.v2i2.1091

2022 Rowe, C, Agius, M, Convers, J, Funning, G, Galasso, C, Hicks, S, Huynh, T, Lange, J, Lecocq, T, **Mark, HF**, Okuwaki, R, Ragon, T, Rychert, C, Teplitzky, S, van den Ende, M. The launch of Seismica: a seismic shift in publishing. *Seismica.* doi:10.26443/seismica.v1i1.255

Funding

2023 – 2024 NSF-OCE: "An assessment of low-temperature, ductile lithospheric deformation using existing broadband seismic data from around South Island, New Zealand".
Award ID: 2316757. PI: **Mark, HF**.
$84k to HF Mark

2023 – 2025 NSF-OCE: "Collaborative Research: Resolving the Origin of the Jurassic Quiet Zone".
Award ID: 2221814. PI: Tominaga, M, co-PIs: **Mark, HF**; Sager, W.
$827k to WHOI including $192k to HF Mark

Awards

2023 **Seismica Moment Award**, Seismica journal

2019 **Fossett Postdoctoral Fellowship**, Washington University in St Louis

2019 **AGU Outstanding Student Paper Award (OSPA)**, Tectonophysics

2016 **AGU OSPA**, Tectonophysics

2016 **GeoPrisms OSPA**, honorable mention

2015 **National Science Foundation Graduate Research Fellowship**

2014 **Rosenblith Presidential Fellowship**, Massachusetts Institute of Technology

2014 **Phi Beta Kappa**, Beta of Illinois

2013 **John Crerar Science Writing Prize**, University of Chicago

Teaching Experience

2024 **Buzzards Bay Term**, Gull Island Institute, Natural science faculty

2023 **WHOI Software Carpentries Python workshop**, Course assistant

2020 **EPS 564: Multidisciplinary Study of Subduction Zones**, Washington University in St Louis, Guest lecturer

2018 **Kaufman Teaching Certificate**, MIT Teaching and Learning Lab

2018 **WHOI Software Carpentries git workshop**, Course assistant

2017 **MS-3221: Oceanography**, Massachusetts Maritime Academy, Co-Instructor

2016 **12.710: Elements of Modern Oceanography**, MIT-WHOI Joint Program, TA

2016–2017 **WHOI Summer Math Review**, Lecturer

Academic Service

2022 – on **Seismica** journal management committee, Co-chair of Standards and Copy Editing

2022 – 2024 **WHOI Postdoc Association**, Department representative

2022 – 2024 **WHOI Workplace Climate Committee**, Postdoc representative

2022 – 2023 **WHOI G&G Proposal Club**, Co-organizer

2021 **WUSTL EPS Department URGE pod**, Pod leader

2018 – 2019 **500 Women Scientists of Cape Cod**, Steering Committee member

2015 – 2019 **MIT-WHOI Joint Program Farrington Collection**, Librarian

2014 – 2016 **WHOI Summer Math Review**, Coordinator

Peer reviewer for: JGR Solid Earth, Nature Geoscience, Geophysical Research Letters, Science Advances, Nature Communications, Journal of Open Source Software, Geoscience Letters, Earth and Planetary Science Letters, Seismological Research Letters, Geological Society of London Special Publications, Seismica, Tectonics, The Seismic Record

Conference sessions convened: SSA Annual Meeting 2022, *Marine Seismology*; AGU Fall Meeting 2021, *EP15 – Coupling of the Cryosphere, Solid Earth, Surface, and Climate in Shaping Late Cenozoic Topography*

Workshops and short courses

2022 IRIS Magnetotelluric Instrumentation and Data Processing Short Course

2017 WHOI Communications Course – How NOT to write for peer-reviewed journals: Talking to everyone else

2017 MBL Writing about Science for the Public workshop

2015 WHOI Ocean Law and Policy Seminar

Invited Seminars

2024 **Texas A&M University**, Oceanography Department seminar

2023 **McGill University**, EPS Department seminar

University of Arizona, Geosciences Colloquium

2022 **University of Washington School of Oceanography**

University of Wisconsin Madison, Weeks Seminar

Syracuse University, EES Department Colloquium

2021 **University of Hawai'i Manoa**, Earth Sciences Department seminar

2019 **University of Illinois Urbana-Champaign**, Brown bag seminar

2018 **Lamont-Doherty Earth Observatory**, MGG/SGT seminar

WHOI, Interdisciplinary Biology Seminar Series on Acoustics

Field Experience

2020 R/V *Marcus G. Langseth*, MGL2003.
Active-source reflection and refraction survey in the Central Aleutians

2017 R/V *Neil Armstrong*, AR23-02.
Collecting underway data along a ridge flowline in the Atlantic

2016 R/V *Neil Armstrong*, AR05.
Scientific validation cruise

2015 ENAM land seismic experiment, North Carolina.
RT-125 deployment and recovery for active-source seismic lines on the Eastern North American Margin

2014 PRIDE SeisORZ seismic experiment, Botswana.
RT-125 deployment and recovery for an active-source seismic line across the Okavango Delta

Selected Communication and Outreach

2023 – on	Essay reviewer for Syrian Youth Empowerment Initiative.
2021	Panel speaker for virtual AGU event on ”Submitting your first paper”
2020 – 2022	Contributing writer and peer editor at geobites.org Blogging, general audience summaries of new research
2018	How is the seafloor made? Magazine article, *Oceanus* Vol 53. No. 2
2017	(Way) under the sea: Imaging the rocks beneath the deep ocean Public talk, Science Made Public lecture series, Woods Hole, MA
	The lithosphere-asthenosphere boundary: What it is, where it is, and why you should care Public talk, Woods Hole Public Library, Woods Hole, MA
2016	Under-under the sea: Imaging the rocks beneath the deep ocean Public talk, Woods Hole Public Library, Woods Hole, MA

Conference Abstracts (*=invited)

2024 **Mark, HF**. *Estimating the Extent of Low-temperature Ductile Deformation in the Lithosphere Using Seismic Anisotropy Measurements Around the Alpine Fault.* SSA Annual Meeting, Anchorage, AK.

Mark, HF, Lizarralde, D, Shillington, D, Cortes Rivas, V. *Seismic Structure of Arc Crust in the Andreanof Segment of the Aleutian Arc from Wide-angle Refraction Data.* SSA Annual Meeting, Anchorage, AK.

*__Mark, HF__. *Open Science for geoscience workshop.* ACCESS, Tempe, AZ.

2023 Gourdeau, A, Prush, V, Rowe, C, Wang, K, Rosset, P, Chouinard, L, Lamothe, M, **Mark, HF**, Morris, I, Laly, M, Nackers, C. *An Ongoing Search for Active Faults in the Western Quebec Seismic Zone, Eastern Canada.* AGU Fall Meeting, San Francisco, CA.

2022 *__Mark, HF__, Collins, JA, Lizarralde, D, Gaherty, JB, Hirth, G, Evans, RL, Behn, MD. *Where is the G discontinuity, what does it represent, and how can we tell? A case study from the NoMelt experiment.* AGU Fall Meeting, Chicago, IL.

Cortes Rivas, V, Shillington, D, Lizarralde, D, **Mark, HF**, Estep, JD, Boston, B. *Seismic reflection imaging of along-strike changes in forearc structure in the Andreanof segment of the Aleutian subduction zone.* AGU Fall Meeting, Chicago, IL.

Russell, JB, Gaherty, JB, **Mark, HF**, Hirth, G, Hansen, LN, Lizarralde, D, Collins, JA, Evans, RL. *Seismological Evidence for Girdled Olivine Fabric in Oceanic Lithosphere and Implications for Mantle Deformation Processes During Seafloor Spreading.* AGU Fall Meeting, Chicago, IL.

Wiens, DA, Ben Mansour, W, **Mark, HF**. *Seismic Anisotropy and Mantle Dynamics Associated with Slab Windows.* AGU Fall Meeting, Chicago, IL.

Mark, HF, Wiens, DA, Lizarralde, D. *Insights into bend-faulting and mantle hydration at the Marianas trench from seismic anisotropy.* SSA Annual Meeting, Belleview, WA (poster).

2021 **Mark, HF**, Wiens, DA, Ben Mansour, W, Ivins, ER, Richter, A, Magnani, MB, Marderwald, E, Adaros, R, Barrientos, S. *Thermal erosion of the lithosphere in the Patagonian slab window and implications for glacial isostatic adjustment.* AGU Fall Meeting, New Orleans, LA.

Mark, HF, Lizarralde, D, Shillington, D, Cortes Rivas, V, Estep, JD. *Crustal structure along-strike in the Andreanof segment of the Aleutian Arc from wide-angle seismic refraction data.* AGU Fall Meeting, virtual (poster).

Wiens, DA, Ben Mansour, W, **Mark, HF**, Shore, P, Richter, A, Barrientos, S. *Geodynamics of the Patagonian Slab Window Constrained by Shear Wave Splitting and Seismic Imaging.* AGU Fall Meeting, New Orleans, LA.

Mark, HF, Wiens, DA, Lizarralde, D. *Estimating bend-faulting and mantle hydration at the Marianas trench from seismic anisotropy.* EGU General Assembly, virtual.

*__Mark, HF__. *Anisotropy in slightly more than one dimension.* Marine Seismology Symposium, virtual.

Mark, HF, Wiens, DA, Lizarralde, D. *Estimating bend-faulting and mantle hydration at the Marianas trench from seismic anisotropy.* Marine Seismology Symposium, virtual (poster).

2020 **Mark, HF**, Wiens, DA, Pourpoint, M, Magnani, MB, Ivins, ER, Richter, A, Barrientos, S. *Seismic structure and the extent of the slab window beneath the Northern and Southern Patagonian Icefields.* AGU Fall Meeting, virtual (poster).

2019 **Mark, HF**, Collins, JA, Lizarralde, D, Hirth, G, Gaherty, JB, Evans, RL. *The depth, sharpness, and strength of the G discontinuity from S-to-p receiver functions at the NoMelt site in the central Pacific.* AGU Fall Meeting, San Francisco, CA.

2018 **Mark, HF**, Collins, JA, Lizarralde, D, Hirth, G, Gaherty, JB, Evans, RL. *S-to-p receiver functions for the central Pacific from NoMelt.* AGU Fall Meeting, Washington, D. C.

Shinevar, WJ, **Mark, HF**, Clerc, F, Codillo, EA, Olive, JA, Gong, J, Brown, SM, Smalls, PT, Liao, Y, Le Roux, V, Behn, MD. *Temporal variability of seafloor spreading processes documented along an 80-Myr geophysical transect across the Mid-Atlantic Ridge.* AGU Fall Meeting, Washington, D.C.

Gaherty, JB, Russell, JB, **Mark, HF**, Lin, PP, Sarafian, EK, Ma, Z, Lizarralde, D, Collins, JA, Hirth, G, Evans, RL, Dalton, CA. *A comprehensive portrait of the central Pacific lithosphere-asthenosphere system from NoMelt seafloor geophysical observations.* AGU Fall Meeting, Washington, D.C.

2017 *__Mark, HF__, Behn, MD, Liu, Y, Olive, JA. *Geometric and thermal controls on normal fault seismicity.* AGU Fall Meeting, New Orleans, LA.

Mark, HF, Lizarralde, D, Collins, JA, Miller, NC, Hirth, G, Gaherty, JB, Evans, RL. *Seismic anisotropy of 70 Ma Pacific-plate upper mantle.* AGU Fall Meeting, New Orleans, LA.

*__Mark, HF__, Behn, MD, Liu, Y, Olive, JA. *Seismic coupling at divergent plate boundaries from rate-and-state friction.* GeoPrisms TEI on Rift Initiation and Evolution, Albuquerque, NM.

2016 **Mark, HF**, Behn, MD, Liu, Y, Olive, JA. *Seismic coupling at divergent plate boundaries from rate-and-state friction.* AGU Fall Meeting, San Francisco, CA.

Mark, HF, Behn, MD, Liu, Y, Olive, JA. *Rate-and-state friction models of seismic cycles on oceanic normal faults.* GRC on Rock Deformation, Andover, NH (poster).

Mark, HF, Lizarralde, D, Gaherty, JB, Collins, JA, Hirth, G, Evans, RL, Lin, PP. *Seismic anisotropy in the Pacific upper mantle.* Seismology Student Workshop, Lamont Doherty Earth Observatory.

2014 **Mark, HF**, Lizarralde, D, Gaherty, JB, Collins, JA, Hirth, G, Evans, RL. *Pacific upper mantle seismic anisotropy from the active-source component of the NoMelt experiment.* AGU Fall Meeting, San Francisco, CA (poster).

2012 Heinz, DL, **Mark, HF**. *The Effect of Wavelength-Dependent Emissivity on the Melting Temperature of Iron from Shock Wave Measurements.* AGU Fall Meeting, San Francisco, CA (poster).