

# Ross Ronan Maguire

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<b>Education</b>	2018	PhD, University of Michigan, Department of Earth and Environmental Sciences
	2011	BS, Michigan State University, Department of Geological Sciences
<b>Professional Positions</b>	2022 – present	Assistant Professor, University of Illinois Urbana-Champaign
	2021 – 2022	Postdoctoral Research Scientist, University of New Mexico
	2019 – 2021	NSF Postdoctoral Fellow, University of New Mexico / Michigan State University
	2018 – 2019	Postdoctoral Research Associate, University of Maryland
	2012 – 2018	Graduate Student Researcher / Instructor, University of Michigan
	2011 – 2012	Petrology Lab Manager, Michigan State University
<b>Awards and Resources</b>	2023	Co-recipient of the AAAS Newcomb Cleveland prize
	2019	XSEDE Resource Allocation (\$7,068 worth of computing resources)
	2019	University of Michigan, John Dorr Graduate Academic Achievement Award
	2018	American Geophysical Union, Study of the Earth's Deep Interior Graduate Research Award
	2017	Michigan Geophysical Union Best Student Presentation Award
	2016	XSEDE Resource Allocation (\$26,718 worth of computing resources)
	2016	Scott Turner Research Award (\$1,700)
	2015	XSEDE Resource Allocation (\$26,718 worth of computing resources)
	2014	Scott Turner Research Award (\$1,700)
<b>Grants and Fellowships</b>	2020-2023	<b>co-Investigator</b> NASA DALI, Development of the SUBLIME seismometer for future Lunar missions (PI : Terry Hurford, Goddard Spaceflight Center)
	2019-2021	<b>Principal Investigator</b> NSF Postdoctoral Fellowship, Imaging the Yellowstone magmatic system with ambient noise and local earthquake waveforms
<b>Teaching</b>	2021	Natural Hazards and the Environment, Michigan State University (Guest Lecturer)
	2020	Introduction to Geology, University of New Mexico (Guest Lecturer)
	2019	Computational Data Analysis for Geoscientists, University of New Mexico (Guest Lecturer)
	2019	Structural Geology, University of Maryland (Guest Lecturer)
	2019	Seismology / Seismic Wave Propagation, University of Maryland (Guest Lecturer)
	2018	Field Geophysics, University of Maryland (Guest Lecturer / Field Assistant)
	2018	Observational Geophysics, University of Maryland (Guest Lecturer)
	2018	Active Tectonics, University of Maryland (Guest Lecturer)
	2012 – 2017	Introduction to Geology, University of Michigan (Graduate Student Instructor)
	2013 – 2014	Geology Field Camp, University of Michigan (Graduate Student Instructor)
<b>Peer Reviewed Publications</b>	[27] Zhang, H., Schmandt, B., Zhou, W. Y., Zhang, J. S., & <b>Maguire, R.</b> (2022). A single 520 km discontinuity beneath the contiguous United States with pyrolytic seismic properties. Geophysical Research Letters, 49(24), e2022GL101300.	
	[26] Kim, D., Stahler, S.C., Ceylan, S., Lekic, V., <b>Maguire, R.</b> , Zenhausern, G., Clinton, J., Giardini, D., Khan, A., Panning, M.P. and Davis, P., 2022. Structure Along the Martian Dichotomy Constrained by Rayleigh and Love Waves and their Overtones. Geophysical Research Letters, p.e2022GL101666.	

- [25] Beghein, C., Li, J., Weidner, E., **Maguire, R.**, Wookey, J., Lekic, V., Lognonne, P. and Banerdt, W., 2022. Crustal Anisotropy in the Martian lowlands from surface waves. *Geophysical Research Letters*, 49(24), p.e2022GL101508.
- [24] **Maguire, R.**, Schmandt, B., Li, J., Jiang, C., Li, G., Wilgus, J., & Chen, M. (2022). Magma accumulation at depths of prior rhyolite storage beneath Yellowstone Caldera. *Science*, 378(6623), 1001-1004.
- [23] Kim, D., Banerdt, W. B., Ceylan, S., Giardini, D., Lekić, V., Lognonne, P., **Maguire, R.**... & Panning, M. P. (2022). Surface waves and crustal structure on Mars. *Science*, 378(6618), 417-421.
- [22] Huang, Q., Schmerr, N., King, S., Rivoldini A., Plesa, A., Samuel, H., Kim, D., **Maguire, R.**, Karakostas, F., Lekic, V., Collinet, M., Myhill, R., Antonangeli, D., Drilleau, Bystricky, M., Bollinger, C., Michaut, C., Gudkova, T., Irving, J., Fernando, B., Leng, K., Nissen-Meyer, T., Bejina, F., Beghein, C., Waszek, L., Siersch, N., Scholz, J.-R., Davis, P., Lognonne, P., Pinot, B., Widmer-Schmidrig, R., Panning, M., Smrekar, S., Spohn, T., Giardini, D., Banerdt, B., Seismic detection of the martian mantle transition zone by InSight. *Accepted in Proceedings of the National Academy of Science*
- [21] **Maguire, R.**, Schmandt, B., Chen, M., Jiang, C., Li, J., Wilgus, J., Resolving continental magma reservoirs with 3D surface wave tomography. 2022 *Geochemistry, Geophysics, Geosystems*
- [20] Huang, Q., Schmerr, N., Beghein, C., Waszek, L., **Maguire, R.**, 3-D Synthetic Modeling of Anisotropy Effects on SS Precursors : Implications for Mantle Flow in the Transition Zone. 2022 *Geophysical Journal International*
- [19] Li, G., Chen, M., Li, J., **Maguire, R.** Ma, X., A Code Package for Meshing the Earth's Spherical Geometry using SPECFEM3D\_Cartesian. 2022 *Seismological Research Letters*
- [18] Kim, D, Lekic, V., Irving, J., Schmerr, N., Knapmeyer-Endrun, B., Rakshit, J., Panning, M., Tauzin, B., Karakostas, F., **Maguire, R.**, Huang, Q., Khan, A., Giardini, D., Wieczorek, M., Lognonne, P., Banerdt, B. Improving constraints on planetary interiors with PPs receiver functions *Journal of Geophysical Research : Planets*
- [17] Karakostas, F., Schmerr, N., **Maguire, R.**, Huang, Q., Kim, D., Lekic, V., Nunn, C., Kawamura, T., Menina, S., Lognonne, P., Giardini, D., Banerdt B. Scattering Attenuation of the Martian Interior through Coda Wave Analysis. *Seismological Research Letters*
- [16] Li, J., Chen, M., Ning, J., Bao, T., **Maguire, R.**, Zhou, T., Constraining the 410-km discontinuity with triplication waveform data : Concept, exploration, and application. *Geophysical Journal International*
- [15] Fernando, B., Wojcicka, N., **Maguire, R.**, Stahler, S., Stott, A., Ceylan, S., Charlambous C., Clinton, J., Collins, G., Dahmen, N., Froment, M., Golombek, M., Horelston, A., Karatekin, O., Kawamura, T., Larmat, C., Nissen-Meyer, T., Patel, M., Plasman, M., Posiolova, L., Rolland, L., Spiga, A., Teanby, N., Zenhausern, G., Lognonne, P., Banerdt, B., Daubar, I. All quiet on the landing front : InSight's attempt to detect Perseverance landing on Mars. *Nature Astronomy*
- [14] **Maguire, R.**, Schmerr, N., Lekic, V., Hurford, T., Dai, L., Rhoden, A., (2021) Constraining Europa's ice shell thickness with fundamental mode surface wave dispersion, *Icarus*, <https://doi.org/10.1016/j.icarus.2021.114617>

- [13] Kim, D., Davis, P., Lekic, V., **Maguire, R.**, Compaire, N., Schimmel, Stutzmann, E., Scholz, J.-R., Panning, M., Clinton, J., Zenhausern, G., Dahmen, N., Irving, J.C.E, Lognonne, P., Banerdt, W.B., Garcia, R., Giardini, D., Hurst, K., Knapmeyer-Endrun, B., Nimmo, F., Pike, T., Pou L., Schmerr, N., Stahler, S., Tauzin, B., Widmer-Schmidrig, R. Considerations in Structural Interpretations of InSight Seismic Data. *Accepted in Seismological Research Letters*
- [12] Stahler, S., Khan, A., Banerdt, B.W., Lognonne, P., Giardini D., Ceylan, S., Drilleau M., Duran A.C., Garcia, R., Huang Q., Kim, D., Lekic V., Samuel H., Schimmel M., Schmerr N., Sollberger, D., Stutzmann E., Xu, Z., Antonangeli D., Davis P., Irving J., Kawamura, T., Knapmeyer, M., **Maguire, R.**, Marusiak, A., Panning M.P., Perrin, C., Plesa, A., Rivoldini, A., Schmelzbach C., Zenhausern, G., Beucler, E., Charalambous, C., Clinton, J., Dahmen, N., van Driel, M., Horleston, A., Plasman, M., Smrekar, S.E. (2021) Seismic Detection of the Martian Core, *Science*, 373(6553). <https://doi.org/10.1126/science.abi7730>
- [11] **Maguire, R.**, Schmerr, N., Pettit, E., Riverman, K., Gardner, C., Della-Giustina, D., Avenson, B., Wagner, N., Marusiak, A.G., Habib, N., Broadbeck, J., Bray, V.J., Bailey, H. (2021) Geophysical constraints on the properties of a subglacial lake in northwest Greenland. *The Cryosphere*, <https://doi.org/10.5194/tc-15-3279-2021>
- [10] Khan, A., Ceylan, S., van Driel, M., Giardini, D., Lognonne, P., Samuel, H., Schmerr, N., Stahler, S., Duran, A., Huang, Q., Kim, D., Charalambous, C., Clinton, J., Davis, P., Drilleau, M., Karakostas, F., Lekic, V., **Maguire, R.**, Michaut, C., Panning, M., Pike, W., Pinot, B., Plasman, M., Scholz, J.R., Widmer-Schmidrig, R., Spohn, T., Smrekar, S.E., Banerdt, W. (2021) Upper mantle structure of Mars from InSight seismic data, *Science*, <https://doi.org/10.1126/science.abf2966>
- [9] Fernando, B., Wojcicka, N., Froment, M., **Maguire, R.**, Stahler, S., Rolland, L., Collins, G. S., Karatekin, O., Larmat, C., Sansom, E., Teanby, N. A., Spiga, A., Karakostas, F., Leng, K., Nissen-Meyer, T., Kawamura, T., Giardini, D., Lognonne, P., Banerdt, W., Daubar, I. (2021), Listening for the Landing : Detecting Perseverance's Landing With InSight. *Earth and Space Science*. <https://doi.org/10.1029/2020EA001585>
- [8] Ritsema, J., **Maguire, R.**, Cobden, L., Goes, S. (2021), Seismic Analyses of Plume Conduits in the Deep Mantle. In *AGU Monograph Series "Mantle Convection and Surface Expressions"*
- [7] Daubar, I., Lognonne, P., Teanby, N., Collins, G.S., Clinton, J., Stahler, S., Spiga, A., Kawamura, T., Karakostas, F., Ceylan, S., Malin, M., McEwen, A.S., **Maguire, R.**, Charalambous, C., Onodera, K., Lucas, A., Rolland, L., Vaubaillon, J., Bose, M., Horleston, A., van Buren, M., Pike, T., Stevanovic, J., Huang, Q., Miljkovic, K., Fernando, B., Leng, K., Rajsic, A., Schmerr, N., Wojcicka, N., Wookey, J., Rodriguez, S., Garcia, R., Larmat, C.S., Banks, M.E., Margerin, L., Posiolova, L., Banerdt, B., (2020) A New Crater Near InSight : Implications for Seismic Detectability on Mars. *Journal of Geophysical Research - Planets*, <https://doi.org/10.1029/2020JE006382>
- [6] Jones, T., **Maguire, R.**, van Keken, P.E., Ritsema, J., (2020) Subducted oceanic crust as the origin of seismically slow lower-mantle structures. *Progress in Earth and Planetary Science*, <https://doi.org/10.1186/s40645-020-00327-1>
- [5] Hurford, T. A., Henning, W. G., **Maguire, R.**, Lekic, V., Schmerr, N., Panning, M., Bray, V. J., Manga, M., Rhoden, A. R. (2019). Seismicity on Tidally Active Solid-Surface Worlds. *Icarus*, 338. <https://doi.org/10.1016/j.icarus.2019.113466>
- [4] **Maguire, R.**, Ritsema, J., Goes, S. (2018). Evidence of Subduction-Related Thermal and Compositional Heterogeneity Below the United States From Transition Zone Receiver Functions. *Geophysical Research Letters*, 45(17), 8913–8922. <https://doi.org/10.1029/2018GL078378>

[3] **Maguire, R.**, Ritsema, J., Bonnín, M., van Keken, P. E., Goes, S. (2018). Evaluating the Resolution of Deep Mantle Plumes in Teleseismic Traveltime Tomography. *Journal of Geophysical Research : Solid Earth*, 123(1), 384–400. <https://doi.org/10.1002/2017JB014730>

[2] **Maguire, R.**, Ritsema, J., Goes, S. (2017). Signatures of 660-km topography and compositional heterogeneity in seismic images of upwellings. *Geophysical Research Letters*, 1–19. <https://doi.org/10.1002/2017GL073120>

[1] **Maguire, R.**, Ritsema, J., van Keken, P. E., Fichtner, A., & Goes, S. (2016). P- and S-wave delays caused by thermal plumes. *Geophysical Journal International*, 206(2), 1169–1178. <https://doi.org/10.1093/gji/ggw187>

## Datasets

Larmat, C., Onodera, K., **Maguire, R.**, Lognonné, P., Data from Modelling to resolve whether SEIS has detected the formation of a 1.5m diameter crater ([https://doi.org/10.18715/jgr\\_newcratermod\\_2020](https://doi.org/10.18715/jgr_newcratermod_2020))

## Selected Conference Presentations

**Maguire, R.**, Schmandt, B., Chen, M., Li, J., Jiang, C., Wilgus, J., Ambient noise waveform imaging of Yellowstone’s magmatic system, EGU General Assembly 2021 (Solicited Talk / Convener Highlight)

Stahler, S., Khan, A., Ceylan, S., Duran, A.C., Garcia, R., Giardini, D., Huang, Q., Kim, D., Lognonne, P., **Maguire, R.**, Marusiak, A., Samuel, H., Schmerr, N., Schimmel, M., Sollberger, D., Stutzmann, E., Banerdt, W., Seismic detection of the Martian core by InSight, EGU General Assembly 2021

**Maguire, R.**, Chen, M., Schmandt, B., Li, J., Jiang, C., Wilgus, H., Imaging Yellowstone’s melt distribution with full waveform inversion of ambient noise, SSA Annual Meeting, 2021

**Maguire, R.**, Schmandt, B., Chen, M. Insights into Yellowstone’s magmatic system from 3D seismic waveform modeling and inversion, AGU Fall Meeting 2020

Wilgus, J., Schmandt, B., **Maguire, R.**, Jiang, C., Chaput, J., Shear velocity tomography of the crust below Valles Caldera using a densely spaced nodal transect. AGU Fall Meeting 2020

Karakostas, F., Schmerr, N., **Maguire, R.**, Kim, D., Huang, Q., Kawamura, T., Onodera, K., Lognonne, P., Giardini, D., Banerdt, B., S-coda wave analysis of InSight seismic data to determine the scattering and intrinsic attenuation in the crust of Mars, AGU Fall Meeting 2020

Huang, Q., Schmerr, N., **Maguire, R.**, Antonangeli, D., Fernando, B., Leng, K., Nissen-Meyer, T., King, S., Rivoldini, A., Plesa, A., Lithgow-Bertelloni, C., Gudkova, C., Samuel, H., Giardini, D., Lognonne, P., Banerdt, B., Detecting the Mantle Transition Zone of Mars From Seismic Triplicated and Reflected Waves, AGU Fall Meeting 2020

Huang, Q., Schmerr, N., Beghein, C., Waszek, L., **Maguire, R.**, Synthetic Modeling of Anisotropy Effects on SS Precursors : Implications for Mantle Flow in the Transition Zone, AGU Fall Meeting 2020

Fernando, B., Daubar, I., Wojcicka, N., Froment, M., **Maguire, R.**, Larmat, C., Karakostas, F., Rolland, L., Teanby, N., Collins G., Karatekin, O., Spiga, A., Leng K., Lognonne, P., Banerdt, B., Listening for a Landing : the seismic detectability of Mars 2020’s arrival by the InSight lander, AGU Fall Meeting 2020

Goes, S., Yu, C., **Maguire, R.**, Day, E., van der Hilst, R., Ritsema, J., and Jian, J., Thermal and chemical properties of the mantle transition zone from seismic observations, EGU General Assembly 2020

<sup>†</sup> Gardner, C., **Maguire, R.**, Schmerr, N., Bailey, H., DellaGiustina, D., Avenson, B., Pettit, E., Wagner, N., Marusiak, A., Broadbeck, J., Habib, N., Bray, V., Dahl, P., Carr, C., Weber, R., Constraining the Properties of a Subglacial Lake in Northwest Greenland with Active Source Seismology, AGU Fall Meeting 2019

Moulik, P., **Maguire, R.**, Havlin, C., Gao, C., Lekic, V., Rapid prototyping, interactive visualization and data validation methods for models of planetary interiors, AGU Fall Meeting 2019

van Keken, P.E., Jones, T., Jones, R., Sime, N., Tucker, J., **Maguire, R.**, Ritsema, J., Ballentine, C., Geophysical and geochemical models help constrain the relative importance of oceanic and continental crust recycling, AGU Fall Meeting 2019

Jones, T., Sime, N., **Maguire, R.**, van Keken, P.E., Ritsema, J., The role of crustal recycling : Coevolution of deep-mantle structure and geochemical heterogeneity, AGU Fall Meeting 2019

Huang, Q., Schmerr, N., **Maguire, R.**, Lithgow-Bertelloni, C., Antonangeli, D., King, S., Detecting the Mantle Transition Zone of Mars From Seismic Reflected Waves, AGU Fall Meeting 2019

Karakostas, F., Schmerr, N., **Maguire, R.**, Huang, Q., Larmat, C., Lognoné, P., Daubar, I., Malin, M., Posiolova, L., Constraints for the Martian meteoroid impact seismic signals through modeling based on comparison of Terrestrial, Lunar and Martian data, AGU Fall Meeting 2019

**Maguire, R.**, Schmerr, N., Lekic, V., Hurford, T., Constraining the thickness of Europa's ice shell with observations of Rayleigh and flexural wave dispersion : Insights from synthetic waveform modeling. SAGE/GAGE workshop 2019.

Jones, T., **Maguire, R.**, Sime, N., van Keken, P.E., Ritsema, J. The geodynamical origin of lowermost mantle structure, Goldschmidt 2019

van Keken, P. E, **Maguire, R.**, Ritsema, J., Jones, T., Sime, N., Nakajima, M. Predictions of the morphology and origin of plumes and LLSVPs from combined geodynamical and seismological modeling, EGU General Assembly 2019

**Maguire, R.**, Schmerr, N., Lekic, V. Constraining the thickness of Europa's ice shell with observations of fundamental mode Rayleigh wave dispersion, Lunar and Planetary Science Conference 2019

**Maguire. R.**, Schmerr, N., Lekic, V., Hurford, T.A. Performance of a broadband seismometer on Europa and implications for the detection of liquid water below its icy surface, AGU Fall Meeting 2018

Moulik, P., Havlin, C., **Maguire, R.**, Lekic, V. Real-time interactive analyses and visualization of massive and diverse seismological observations, AGU Fall Meeting 2018

**Maguire, R.**, Ritsema, J. Seismic observation of a sharp post-garnet phase transition within the Farallon crust, AGU Fall Meeting 2017

**Maguire, R.**, Ritsema, J., Goes, S. Tomographic evidence for basalt segregation in the uppermost lower mantle, Gordon Research Conference 2017

**Maguire, R.**, Ritsema, J., Goes, S. Seismic evidence for a subducted oceanic plateau beneath the southeastern USA, Gordon Research Conference 2017

**Maguire, R.**, Ritsema, J. Imaging the mantle transition zone with the USArray, Michigan Geophysical Union 2017

**Maguire, R.**, Ritsema, J., Bonnin, M., van Keken, P.E., Fichtner, A., Goes, S. Resolving plume tails in the lower mantle with finite frequency tomography : Insight from synthetic experiments, AGU Fall Meeting 2016

**Maguire, R.**, Ritsema, J. Modelling the basalt fraction in the transition zone using P-to-S conversions, Study of Earth's Deep Interior Symposium 2016

**Maguire, R.**, Ritsema, J., van Keken, P.E., Fichtner, A., Goes, S. Investigating the effects of mantle plumes on 3D seismic waveforms, AGU Fall Meeting 2014

**Maguire, R.**, van Keken, P.E., Dibble, M., Davaille, A. Modelling laboratory plumes with numerical techniques : validation, verification, and determination of fluid properties, Computational Infrastructure for Geodynamics Mantle Convection and Lithosphere Dynamics Workshop 2014

<sup>†</sup> indicates undergraduate supervised

<b>Invited Talks</b>	2022	Sandia National Laboratory Seminar
	2022	GYPSUM (Geodesy and Geophysics Seminar of the Upper Midwest) Seminar Series
	2022	NASA Jet Propulsion Laboratory, ICE Seminar
	2021	University of Illinois at Urbana–Champaign, Department of Geological Sciences Department Colloquium
	2021	Michigan State University, Department of Earth and Environmental Sciences Distinguished Lecture Series
	2020	Seismological Society of America Virtual Tomography Series, "Cutting Edge Methods in Seismic Tomography"
	2020	Michigan State University, Department of Computational Mathematics, Science and Engineering Seminar
	2020	University of New Mexico, Department of Earth and Planetary Sciences Seminar
	2019	Carnegie Institution for Science DTM Weekly Seminar Series
	2019	Smithsonian National Museum of Natural History Seminar
	2019	University of Maryland, Department of Geology, Lunchtime Seminar Series

<b>Service</b>	NSF Proposal Reviewer (Geophysics Program)
	NASA InSight Seers Program 2022( ?)
	Session Convener, AGU Fall Meeting 2022
	Session Convener, Seismological Society of America 2021 Annual Meeting
	Reviewer, Nature Communications
	Reviewer, Geochemistry, Geophysics, Geosystems
	Reviewer, Journal of Geophysical Research : Solid Earth
	Reviewer, Geology
	Reviewer, Gondwana Research
	Reviewer, Earth and Planetary Science Letters
	Reviewer, Geophysical Journal International
	Reviewer, Geophysical Research Letters
	Reviewer, Icarus

## **Advising**

### **Graduate Students**

Christyna Moore, PhD Student 2022 -

### **Undergraduate Students**

Pedro Sanchez, 2022 - 2023

Hayley Woodrich, 2022 - 2023