# Vedran Lekić

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## EMPLOYMENT HISTORY

- 2023-present: Professor, Dept. of Geological, Environmental, and Planetary Sciences, University of Maryland, College Park
- 2018-2023: Associate Professor, Dept. of Geology, University of Maryland, College Park
- 2012-2018: Assistant Professor, Dept. of Geology, University of Maryland, College Park
- 2010-2011: National Science Foundation Postdoctoral Fellow, Brown University
- 2010: Postdoctoral Fellow, Berkeley Seismological Laboratory, UC Berkeley

## DEGREES

- Ph.D., Earth and Planetary Science, University of California, Berkeley, December 2009
- A.B., Astronomy & Astrophysics and Earth & Planetary Science, *magna cum laude*, Harvard University, May 2004

## NARRATIVE OF RESEARCH EXPERIENCE

I am a geophysicist and seismologist who uses seismic waves to investigate the interiors and evolution of Earth and other planetary bodies. My research spans global and regional mantle structure, the lithosphere-asthenosphere system, the core-mantle boundary, the shallow subsurface, planetary seismicity, and the interiors of Mars, Moon, and icy satellites. I combine waveform analysis, receiver functions, surface waves, scattering and coda methods, tomography, potential fields, and Bayesian inversion methods to extract structural information and uncertainties from complex geophysical data. My recent work has helped interpret seismic observations from NASA *InSight*, including constraints on Martian crustal structure, surface waves, mantle discontinuities, and core-transiting phases. I also develop methods for lunar and planetary seismology, including reanalysis of Apollo data, active-source seismic exploration concepts, and integrated geophysical approaches for near-surface imaging relevant to future exploration. Across these efforts, I emphasize uncertainty quantification, and links among seismic observations, mineral physics, geodynamics, and planetary evolution.

## SHORT LIST OF KEY PUBLICATIONS (chronological order)

Lekić, V., J. Matas, M. Panning, and B. Romanowicz (2009), Measurement and implications of frequency dependence of attenuation, *Earth Planet. Sci. Lett.,* 282, 285-293, doi:10.1016/j.epsl.2009.03.030

Lekić, V., French, S. W., & Fischer, K. M. (2011). Lithospheric thinning beneath rifted regions of Southern California. *Science*, 334, 783-787. doi:10.1126/science.1208898.

Lekić, V., Cottaar, S., Dziewonski, A. M., & Romanowicz, B. (2012). Cluster analysis of global lower mantle tomography: A new class of structure and implications for chemical heterogeneity. *Earth Planet. Sci. Lett.*, 357, 68-77. doi:10.1016/j.epsl.2012.09.014.

Lekić, V., & Fischer, K. M. (2014). Contrasting lithospheric signatures across the western United States revealed by Sp receiver functions. *Earth Planet. Sci. Lett.*, 402, 90-98. doi:10.1016/j.epsl.2013.11.026.

Rudolph, M. L., Lekić, V., & Lithgow-Bertelloni, C. (2015). Viscosity jump in Earth's mid-mantle. *Science*, 350, 1349-1352. doi:10.1126/science.aad1929.

Cottaar, S., & Lekić, V. (2016). Morphology of seismically slow lower-mantle structures. *Geophys. J. Int.*, 207, 1122-1136. doi:10.1093/gji/ggw324.

Burdick, S. & Lekić, V. (2017). Velocity Variations and Uncertainty from Transdimensional P-wave Tomography of North America, *Geophys. J. Int.*, 209 (2): 1337-1351, doi:10.1093/gji/ggx091
Gao, C. & Lekić, V. (2018). Consequences of parameterization choices in surface wave inversion: Insights from transdimensional Bayesian methods, *Geophys. J. Int.*, 215(2), 1037–1063, doi:10.1093/gji/ggy310
Kim, D., & Lekić, V. (2019). Groundwater variations from autocorrelation and receiver functions. *Geophys. Res. Lett.*, 46, 13722-13729. doi:10.1029/2019GL084719.
Kim, D., Lekić, V., Ménard, B., Baron, D., & Taghizadeh-Popp, M. (2020). Sequencing seismograms: A panoptic view of scattering in the core-mantle boundary region. *Science*, 368, 1223-1228. doi:10.1126/science.aba8972.
Ritsema, J., & Lekić, V. (2020). Heterogeneity of seismic wave velocity in Earth's mantle. *Ann. Rev. Earth Planet. Sci.*, 48, 377-401. doi:10.1146/annurev-earth-082119-065909.
Samuel, H., Drilleau, M., Rivoldini, A., Xu, Z., Huang, Q., Garcia, R., Lekić, V., Irving, J.C.E., Badro, J., Lognonne, P., Connolly, J., Kawamura, T., Gudkova, T. & Banerdt, W.B. (2023) Geophysical evidence for an enriched molten silicate layer above Mars's core, *Nature*, doi:10.1038/s41586-023-06601-8
Irving, J. C. E., Lekić, V., Duran, A. C., Drilleau, M., Kim, D., Rivoldini, A., Khan, A., et al. (2023). First observations of core-transiting phases on Mars. *Proc. Natl. Acad. Sci.*, 120, e2217090120. doi:10.1073/pnas.2217090120
Maguire, R., Lekić, V., Kim, D., Schmerr, N., Li, J., Beghein, C., Huang, Q., Irving, J.C.E., Karakostas, F., Lognonné, P., Stähler, S.C. & Banerdt, W.B. (2023) Moment Tensor Estimation of Event S1222a and Implications for Tectonics Near the Dichotomy Boundary in Southern Elysium Planitia, Mars, *J. Geophys. Res. Planets*, doi:10.1029/2023JE007793
Wang, J., Lekić, V., Schmerr, N., Gu, Y., Guo, Y. & Rongzhi, L. (2024). Mesozoic intraoceanic subduction shaped the lower mantle beneath the East Pacific Rise. *Science Advances*, 10(39), p.eado1219, doi:10.1126/sciadv.ado1219
Myers, H., Lathrop, D.P. & Lekić, V. (2025) Enabling Small Anomaly Detection using Finite-Difference Magnetic Gradiometry, *Geophysics*, 90(4), 1-63. Doi:10.1190/geo2024-005.1
Kim, D., Lekić, V., Wieczorek, M., Schmerr, N.C., Collins, G. & Panning, M.P. (2025) A New Lunar Crustal Thickness Constrained by Converted Seismic Waves Detected beneath the Apollo Seismic Network, *Geophys. Res. Lett.*, 52(13), doi:10.1029/2024GL114506

## HONORS

- University of Maryland Invention of the Year, Information Sciences (2022)
- University of Maryland Board of Visitors Distinguished Junior Faculty Award (2015)
- Packard Foundation Fellowship for Science and Engineering (2014-2019)
- NSF CAREER Award (2014-2019)
- Charles F. Richter Award, Seismological Society of America (2013)

## PROFESSIONAL SOCIETY MEMBERSHIPS AND LEADERSHIP

- Geological Society of Washington: President (2025), Past President (2026), 1st Vice President (2024), 2nd Vice President (2023), Councilmember at Large and Membership Committee (2014-2015).
- Seismological Society of America: Co-Chair, 2025 Annual Meeting in Baltimore; honors committee service for the Richter and Frank Press awards.
- American Geophysical Union and SEDI: Seismology Section Program Committee co-chair/chair; Study of the Earth's Deep Interior Section Program Committee chair.
- EarthScope/IRIS community: EarthScope Data Products and Services Advisory Committee; IRIS Global Seismic Network and Instrumentation Services committees; Chair, IRIS Quality Assurance Advisory Committee.