

HRVOJE TKALČIĆ

Professor of Seismology | Australian Laureate Fellow

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HISTORY OF EMPLOYMENT

2026–present Professor | Australian Laureate Fellow, RSES, ANU, Canberra, Australia
2023–2026 Professor (E2), RSES, ANU
2021–2026 Head of Geophysics, RSES, ANU
2019–2023 Professor (E1), RSES, ANU
2017–2021 Head of Seismology and Mathematical Geophysics, RSES, ANU
2013–2018 Associate Professor, RSES, ANU
2007–2013 Fellow in Seismology, RSES, ANU
2007–present Director, Warramunga Seismic and Infrasound Facility, NT, Australia
2006–2007 Research Geophysicist, Multimax Inc., Emeryville, CA, USA
2003–2006 Postdoctoral Researcher, Lawrence Livermore National Laboratory, CA, USA
2002–2003 Postdoctoral Research Fellow, SCRIPPS, UCSD, CA, USA
2001–2002 Postdoctoral Research Fellow, UC Berkeley, CA, USA

DEGREES

Ph.D. in Geophysics, University of California at Berkeley, 2001 (Adv: Prof. Barbara Romanowicz)

Diploma of Engineering in Physics (~M.Sc.), specialty in Geophysics with Meteorology, University of Zagreb, Croatia, 1996

RESEARCH EXPERIENCE

My research focuses on understanding the deep interiors of Earth and, recently, other planetary bodies through global observational seismology and mathematical geophysics. My most recognized contributions involve innovative approaches to seismological observations and geophysical inference. My research group developed the coda correlation wavefield paradigm, which uses the late coda of seismograms to extract otherwise undetectable seismic phases, leading to the detection of J waves traversing the solid inner core and increased constraints on the isotropic and anisotropic structure of Earth's core. I have also helped advance Bayesian, trans-dimensional, and hierarchical inversion methods applied to moment tensor estimation, lithospheric, lowermost mantle, and core imaging, ranging from volcanic and nuclear source characterization to planetary seismology. A particular focus has been on transforming moment tensor inversion by explicitly accounting for both data noise and theoretical errors, yielding more reliable source mechanisms. We have documented the oscillating differential rotation of the inner core and contributed to Mars seismology from the crust to core, with lunar seismology ahead through the Australian SPIDER mission (Fleet Space Technologies). I have published ~140 refereed journal articles and three books, secured over A\$15M in competitive funding as chief investigator, and supervised 19 PhD students to completion or near-completion. My work has been covered by the New York Times, BBC, CNN, the Washington Post, ABC, Reuters, The Conversation, Sydney Morning Herald, Scientific American and Nature, among others.

KEY PUBLICATIONS (selected from 139 refereed articles; Google Scholar h-index: 44, citations: 5,899; accessed on 24 May 2026)

Earth structure

- Tkalčić, H. & Phạm, T-S., Shear properties of Earth's inner core revealed by a detection of J waves in global correlation wavefield, *Science*, 362, 329–332, 2018.
- Bodin, T., Sambridge, M., Tkalčić, H. et al., Transdimensional inversion of receiver functions and surface wave dispersion, *J. Geophys. Res.*, 117, B02301, 2012.
- Tkalčić, H., Phạm, T-S. & Wang, S., The Earth's coda correlation wavefield: rise of the new paradigm and recent advances, *Earth-Sci. Rev.*, 208, 103285, 2020.

Seismic sources

- Dreger, D., Tkalčić, H. & Johnston, M., Dilatational processes accompanying earthquakes in the Long Valley Caldera, *Science*, 288, 122–125, 2000.
- Mustač, M. & Tkalčić, H., Point source moment tensor inversion through a Bayesian hierarchical model, *Geophys. J. Int.*, 204, 311–323, 2016.
- Hu, J., Phạm, T-S. & Tkalčić, H., A composite seismic source model for the first major event during the 2022 Hunga (Tonga) volcanic eruption, *Geophys. Res. Lett.*, 51, 18, 2024.

Planetary seismology

- Wang, S. & Tkalčić, H., Scanning for planetary cores with single-receiver intersource correlations, *Nat. Astron.*, 6, 1272–1279, 2022.
- Sun, W. & Tkalčić, H., Constraints on the origin of the Martian dichotomy from Southern Highlands marsquakes, *Geophys. Res. Lett.*, 52, e2024GL110921, 2025.

Books

- Tkalčić, H., *The Earth's Inner Core Revealed by Observational Seismology*, Cambridge University Press, 2017.
- Tkalčić, H., *When Worlds Quake: The Quest to Understand the Interior of Earth and Beyond*, Princeton University Press, 2026.

SELECTED HONOURS AND AWARDS

- 2026 Corresponding Fellow, Croatian Academy of Sciences and Arts (HAZU)
- 2025 Australian Laureate Fellow, Australian Research Council
- 2024 Honorary Doctorate (honoris causa), University of Zagreb, Croatia
- 2024 Fellow, Australian Academy of Science (FAA)
- 2022 Price Medal, Royal Astronomical Society, London, UK
- 2020 Fellow, American Geophysical Union
- 2016 Excellence in Research Achievement Award, AuScope (inaugural)
- 2002 Outstanding Student Paper Award, American Geophysical Union

PROFESSIONAL SOCIETY MEMBERSHIPS

- American Geophysical Union (member since 1997; Fellow since 2020)
- Seismological Society of America (member since 2006)
- European Geosciences Union (member since 2011)
- Royal Astronomical Society (Fellow since 2021)