JOHN A. TARDUNO

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William R. Kenan, Jr., Professor; Professor of Geophysics
Department of Earth & Environmental Sciences
Dean for Research
Arts, Science & Engineering
University of Rochester, Rochester, NY 14627

Academic Career:

2019-present Dean for Research, Arts, Science & Engineering, University of Rochester
2005-present Professor of Physics and Astronomy, University of Rochester, Rochester, NY.
2000-present Professor of Geophysics, University of Rochester, Rochester, NY.
1998-2006, 2016-2019 Chair, Department of Earth and Environmental Sciences
1996 Associate Professor of Geophysics, University of Rochester, Rochester, NY.
1993 Assistant Professor of Geophysics, University of Rochester, Rochester, NY.
1990 Assistant Research Geophysicist, Scripps Institution of Oceanography, La Jolla, Ca.
1989 National Science Foundation Postdoctoral Fellow, ETH, Zürich, Switzerland
1988 JOI/USSAC Ocean Drilling Fellow, Stanford University, Stanford, Ca.
1987 Ph.D. (Geophysics), Stanford University, Stanford, Ca.
1987 M.S. (Geophysics) Stanford University, Stanford Ca.
1983 B.S. (Geophysics) Lehigh University, Bethlehem Pa.

Honors and Awards: Phi Beta Kappa (1983); Fellow, Geological Society of America (1998); JOI/USSAC Distinguished Lecturer (2000-2001); Goergen Award for Distinguished Achievement and Artistry in Undergraduate Teaching (2001); Fellow, American Association for the Advancement of Science (2003); American Geophysical Union/Geomagnetism, Paleomagnetism and Electromagnetism Section Bullard Lecturer (2004); Fellow, John Simon Guggenheim Foundation (2006-2007); Edward Peck Curtis Award for Excellence in Undergraduate Teaching (2007); Fellow, American Geophysical Union (2007); GSA Structure and Tectonics Outstanding Publication Award (2014); Honorary Professor, University of KwaZulu-Natal, South Africa (2014); Price Medal, Royal Astronomical Society (2016); Petrus Peregrinus Medal, European Geosciences Union (2017); Japan Society for the Promotion of Science Invitational Fellow (2017); William R. Kenan, Jr., Professor (2018)

Memberships: AGU, EGU, GSA, FRAS, AAAS, GS, MetSoc

Research Narrative: I use paleomanetism to better understand the nature of the mantle and core, as well as the history of the geodynamo and its relationship to planetary habitability. My work has included paleomagnetic measurements documenting rapid southward motion of the Hawaiian hotspot in Earth's mantle forming the Emperor Seamounts (*2, 8, 11, 14*), and paleomagnetism applied to the timing, location and impact of mantle plume volcanism, specifically Ontong Java Plateau and the High Arctic large igneous province (*13*). My group contributed the first archeomagnetic measurements from southern African, providing evidence for recurrence of the South Atlantic Anomaly (*5*). My research group developed the single silicate crystal paleointensity

technique (*10*) and have applied it to *i.* paleointensity history versus reversal frequency and mantle control of the geodynamo (*12*); *ii.* evidence for late formation of the inner core and near collapse of the dynamo (*3*) and *iii.* studies of the most ancient geodynamo, magnetopause and magnetic shielding bearing on planetary habitability (*1, 4, 6-7, 9*).

Select Publications

1. Tarduno, J.A., R.D. Cottrell, R.K. Bono, H. Oda, W.J. Davis, M. Fayek, O. van 't Erve, F. Nimmo, W. Huang, E. Thern, S. Fearn, G. Mitra, A.V. Smirnov, E.G. Blackman, Paleomagnetism indicates that primary magnetite in zircon records a strong Hadean geodynamo *Proceedings National Academy of Sciences, 117,* 2309-2319*,* 2020.

2. Bono, R.K., J.A. Tarduno, H.-P. Bunge, Hotspot motion caused the Hawaiian-Emperor Bend and LLSVPs are not fixed, *Nature Communications*, *10*:3370, 2019.

3. Bono, R.K., J.A. Tarduno, F. Nimmo, R.D. Cottrell, Young inner core inferred from Ediacaran ultra-low geomagnetic field intensity, *Nature Geoscience*, *12*, 143-147, 2019.

4. Tarduno, J.A., R.D. Cottrell, W.J. Davis, F. Nimmo, R.K. Bono, A Hadean to Paleoarchean geodynamo recorded by single zircon crystals, *Science*, *349*, 521-524, 2015.

5. Tarduno, J.A., M. Watkeys, T. Huffman, R.D. Cottrell, E.G. Blackman, A. Wendt, C.A. Scribner, C.L. Wagner, Antiquity of the South Atlantic Anomaly: Evidence for top-down control on the geodynamo, *Nature Communications*, *6*:7865, 2015.

6. Tarduno, J.A., E. Blackman, E. Mamajek, Detecting the oldest geodynamo and attendant shielding from the solar wind: Implications for habitability, *Physics of Earth and Planetary Interiors*, *233*, 68-87, 2014.

7. Tarduno, J.A., R.D. Cottrell, M.K. Watkeys, A. Hofmann, P.V. Doubrovine, E.E. Mamajek, D. Liu, D.G. Sibeck, L.P. Neukirch, Y. Usui, Geodynamo, Solar wind, and magnetopause 3.4 to 3.45 billion years ago, *Science*, *327*, 1238-1240, 2010.

8. Tarduno, J.A., H.-P. Bunge, N. Sleep, U. Hansen, The bent Hawaiian-Emperor hotspot track: Inheriting the mantle wind, *Science*, *324*, 50-53, 2009.

9. Tarduno, J.A., R.D. Cottrell, M.K. Watkeys, D. Bauch, Geomagnetic field strength 3.2 billion years ago recorded by single silicate crystals, *Nature, 446*, 657-660, 2007.

10. Tarduno, J.A, R.D Cottrell, A.V. Smirnov, The paleomagnetism of single silicate crystals: Recording the geomagnetic field during mixed polarity intervals, superchrons and inner core growth, *Reviews of Geophysics*, *44*, Art. No. RG1002, 2006.

11. Tarduno, J.A., R.A. Duncan, D.W. Scholl, R.D. Cottrell, B. Steinberger, T. Thordarson, B.C. Kerr, C.R. Neal, F.A. Frey, M. Torii, C. Carvallo, The Emperor Seamounts: Southward motion of the Hawaiian Hotspot plume in Earth's mantle, *Science, 301*, 1064-1069, 2003.

12. Tarduno, J.A., R.D. Cottrell, A.V. Smirnov, High geomagnetic field intensity during the mid--Cretaceous from Thellier analyses of single plagioclase crystals, *Science, 291*, 1779-1783, 2001.

13. Tarduno, J.A., D.B. Brinkman, P.R. Renne, R.D. Cottrell, H. Scher, P. Castillo, Evidence for extreme climatic warmth from Late Cretaceous Arctic vertebrates, *Science, 282*, 2241-2244, 1998.

14. Tarduno, J.A., and J. Gee, Large-scale motion between Pacific and Atlantic hotspots, *Nature, 378*, 477-480, 1995.