

George Taylor

(G. JEFFREY TAYLOR)

Hawai'i Institute of Geophysics and
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EDUCATION

A.B.: Colgate University (physics).
M.A.: Rice University (geology and geophysics).
Ph.D.: Rice University (geology and geophysics).

SCIENTIFIC WORK

- Most research has been on the petrology and chemistry of lunar samples and meteorites to understand the origin and evolution of the solar system and the planets in it.
- Studies geared to understanding the processes involved in planetary formation and evolution, including nebular and parent body alteration, impact, accretion, and core formation.
- Recent meteorite research focuses on the nature of Martian volcanism as revealed by SNC meteorites and aqueous alteration in SNC meteorites.
- Evolution of the Martian crust as determined from geochemical mapping using data from Mars Odyssey, and theoretical investigations of igneous and aqueous processes.
- Lunar research has concentrated on the origin of igneous lithologies in the lunar highlands, and the bulk composition of the Moon. Member of GRAIL mission science team.
- Have done considerable work on utilizing space resources and on telerobotic geologic exploration of planetary surfaces.

POSITIONS HELD

1990–present: *Research Professor*, Planetary Geosciences, Hawai'i Institute of Geophysics and Planetology, University of Hawai'i at Manoa
1998–2002: *Director*, Hawai'i Space Grant Consortium
: *Assistant Director*, Institute of Meteoritics
: *Senior Research Scientist*, Institute of Meteoritics and Department of Geology, University of New Mexico, Albuquerque, New Mexico
: *Assistant Professor*, Department of Earth and Planetary Sciences, Washington University, St. Louis, Missouri
: *Postdoctoral Fellow*, Smithsonian Astrophysical Observatory and Harvard College Observatory, Cambridge, Massachusetts

AWARDS

- Ninninger Meteorite Prize,
- Sigma Xi Award for Graduate Research, Rice University,
- *A Close Look at the Moon* selected as one of the outstanding science books for children in by the National Science Teachers Association and the National Book Council.
- *Volcanoes in Our Solar System* selected as one of the outstanding science books for children in by the National Science Teachers Association and the National Book Council.
- Carl Sagan Medal for Excellence in Public Communications in Planetary Science, 2008
- Shoemaker Distinguished Lunar Scientist Award (NASA Lunar Science Inst.), 2011

NATIONAL COMMITTEES (abbreviated)

- Member, NASA Review Panels: 8
- Group Chief, NASA Review Panels: 3
- Chair, NASA Review Panels: 23
- Member (2001–2011), Board of Directors, Space Resources Roundtable, Inc.
- Chair (2003–2004), Goals Revision Committee (Mars Exploration Program Analysis Group, NASA/JPL)
- Co-Chair (2005), Human Exploration Systems and Mobility Capabilities Roadmapping Team (NASA)
- Chair (2005-2007), Member of Executive Committee (2007-2010), Lunar Exploration Analysis Group (NASA).

REFEREED PUBLICATIONS (selected recent, > 200 total)

Melosh, H. J., Kendall, J., Horgan, B., Johnson, B. C., Bowling, T., Lucey, P. G., and Taylor, G. J. (2017) South Pole-Aitken basin ejecta reveal the Moon's upper mantle. *Geology* **45**, doi: 10.1130/G39375.1

Jansen, J. C., J.C. Andrews-Hanna, Y. Li, P.G. Lucey, G.J. Taylor, S. Goossens, F.G. Lemoine, E. Mazarico, J.W. Head, C. Milbury, W.S. Kiefer, J.M. Soderblom, M.T. Zuber (2017) Small-scale density variations in the lunar crust revealed by GRAIL. *Icarus* **291**, 107-123. doi.org/10.1016/j.icarus.2017.03.017

Hallis, L. J., Huss, G. R., Nagashima, K., Taylor, G. J., Stoffler, D., Smith, C. L., and Lee, M. R. (2017) Effects of shock and Martian alteration on Tissint hydrogen isotope ratios and water content. *Geochim. Cosmochim. Acta* **200**, 280-294. doi.org/10.1016/j.gca.2016.12.035

Zuber, M. T. and 27 others (2016) Gravity Field of the Orientale Basin from the Gravity Recovery and Interior Laboratory Mission, *Science*, v. 354(6311), p. 438-441, doi: 10.1126/science.aag0519

Johnson, B. C. and 13 others (2016) Formation of the Orientale Lunar Multiring Basin, *Science*, v. 354(6311), p. 441-444, doi: 10.1126/science.aag0518.

Robinson, K. L., Barnes, J. J., Nagashima, K., Thomen, A., Franchi, I. A., Huss, G. R., Anand, M., and Taylor, G. J. (2016) Water in evolved lunar rocks: Evidence for multiple reservoirs. *Geochim. Cosmochim. Acta* **188**, 244-260. doi.org/10.1016/j.gca.2016.05.030

Carballido Somohano, A., Desch, S., and Taylor, G. J. (2016) Magneto-rotational instability in the protolunar disk. *Icarus* **268**, 89-101.

Hallis, L. J., Huss, G. R., Nagashima, K., Taylor, G. J., Halldorsson, S. A., Hilton, D. R., Mottl, M. J., and Meech, K. J. (2015) Evidence for primordial water in Earth's deep mantle. *Science* **350**, 795-797.

Crites, S. T., Lucey, P. G., and Taylor, G. J. (2015) The mafic component of the lunar crust: Constraints on the crustal abundance of mantle and intrusive rock, and the mineralogy of lunar anorthosites. *Am. Mineral.* **100**, 1708-1716.

Lemelin, M., Lucey, P. G., Song, E., and Taylor, G. J. (2015) Lunar central peak mineralogy and iron content using the Kaguya Multiband Imager: Reassessment of the compositional structure of the lunar crust. *J. Geophys. Res.* **120**, 869-887.

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- Taylor, G.J. and Wieczorek, M. (2014) Lunar bulk chemical composition: a post-Gravity Recovery and Interior Laboratory reassessment. *Phil. Trans. Royal Soc.*, doi:10.1098/rsta.2013.0242.
- Robinson, K. L. and Taylor, G.J. (2014) Heterogeneous distribution of water in the Moon. *Nat. Geosci.* **7**, 401-408. DOI:10.1038/NGEO2173.
- Warren, P. H., and Taylor, G. J. (2014) The Moon. Chapter 2.9 in *Treatise on Geochemistry* (Vol. 2, Andrew Davis, Editor), 213-250. Elsevier-Pergamon, Oxford.
- Taylor, G. J. (2013) The bulk composition of Mars. *Chemie der Erde* **73**, 401-420. doi: 10.1016/j.chemer.2013.09.006

REFEREED ARTICLES ABOUT LUNAR RESOURCES AND OUTPOSTS

- Duke, M. B., Gaddis, L. R., Taylor, G. J., and Schmitt, H.H. (2006) Development of the Moon. In *New Views of the Moon* (B. J. Jolliff, M. A. Wieczorek, C.K. Shearer, and C. R. Neal, eds.), *Rev. Min. & Geochem.* **60**, 597-655.
- Taylor, G. J. and Martel, L. M. V. (2003) Lunar prospecting. *Adv. Space Res.* **31**, 2403-2412.
- Taylor, G. J. (2001) Manufacturing a substrate for solar cells by the *in situ* melting of the lunar surface: analysis of the concept. *AIAA Space 2001--Conference and Exposition*, paper number **2001-4577**, CD-ROM. American Institute of Aeronautics and Astronautics.
- Johnson, S.W., Taylor, G.J., Wetzels, J.P. and Burns, J.O. (1991) Environmental effects on lunar observatories and lunar concrete. In *Lunar Concrete* (R.A. Kaden, ed.), **ACI SP-125**, 191-205. American Concrete Institute, Detroit.
- Fernini, I., Burns, J.O., Taylor, G.J., Sulkanen, M., Duric, N. and Johnson, S.W. (1990) Dispersal of gases generated near a lunar outpost. *J. Spacecraft Rockets* **27**, 527-538.
- Johnson, S.W., Burns, J.O., Chua, K.M., Duric, N., Gerstle, W.H. and Taylor, G.J. (1990) Lunar astronomical observatories: design studies. *J. Aerospace Eng.* **3**, 211-222.
- Morris, R.W., Taylor, G.J., Newsom, H.E., Keil, K. and Garcia, S.R. (1990) Highly evolved and ultramafic lithologies from Apollo 14 soils. *Proc. Lunar Planet. Sci. Conf. 20th*, 61-75.
- Burns, J.O., Duric, N., Johnson, S.W. and Taylor, G.J. (1990) LOUISA: A lunar optical-ultraviolet-infrared synthesis array. *Engineering, Construction, and Operations in Space II* (S.W. Johnson and J.P. Wetzels, eds.), 677-686. ASCE, New York.
- Taylor, G.J. and Spudis, P.D. (1990) A teleoperated, robotic field geologist. *Engineering, Construction, and Operations in Space II* (S.W. Johnson and J. P. Wetzels, eds.), 246-255. ASCE, New York.
- Spudis, P.D. and Taylor, G.J. (1990) Rationale and requirements for lunar exploration. *Engineering, Construction, and Operations in Space II* (S.W. Johnson and J.P. Wetzels, eds.), 236-245. ASCE, New York.
- Taylor, G.J. and Spudis, P.D., eds. (1990) *Geoscience and a Lunar Base: A Comprehensive Plan for Lunar Exploration*. NASA Conference Publication **3070**, 73 p.
- Taylor, G.J. (1990) The lunar environment: challenges and opportunities. *Advanced Materials Symposium*, AIME, 23-27. AIME, Littleton, CO.