

Mark D. Hofstadter

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Education:

Ph.D., Planetary Science (Electrical Engineering minor) 1992
California Institute of Technology
Thesis: Microwave Observations of Uranus

M.S., Planetary Science 1987
California Institute of Technology

B.S., Physics 1984
Stanford University

Research Experience:

Research Scientist September 2005 to Present
Scientist January 1994 to October 2003

Jet Propulsion Laboratory

Current work is focused in these areas:

Giant planet atmospheres.

- Ground and space-based microwave sounding.
- Seasonal variations in the deep atmosphere of Uranus.
- Retrieval of meteorological parameters (circulation, cloud structure, relative humidity) on Jupiter, Uranus, and Neptune.
- Principal Investigator in NASA's Planetary Astronomy and Education/Public Outreach programs.
- Co-Investigator in NASA's Planetary Atmospheres program.

Comets.

- Ground and space-based microwave spectroscopy.
- Simultaneous retrievals of gas abundance, temperature, and velocity.
- Co-Investigator on the MIRO instrument (a microwave spectrometer flying on the European Space Agency's Rosetta spacecraft).

Terrestrial-planet atmospheres

- Retrieval of atmospheric profiles from orbit using submillimeter spectroscopy.

Previous work includes: retrieval of Earth-cloud properties using orbiting sensors at visible, infrared, and microwave wavelengths; temperature retrievals in the martian atmosphere using infrared wavelengths; studies of ice rheology in martian polar regions.

Resident Research Associate

December 1991 to January 1994

National Research Council/Jet Propulsion Laboratory

Proposed, carried out, and analyzed radio observations of Neptune's atmosphere using the Very Large Array radio interferometer. Created atmospheric, radiative transfer, and dynamical models to support these activities.

Teaching Experience:

Trainer June 2002 to Present

Lewis Center for Educational Research

Co-Leader of four-day training sessions for middle and high-school teachers. Topics include Astronomy, Planetary Science, and classroom activities related to radio science. This activity is done in association with the GAVRT program (see item under “Management Experience”).

Summer Research Advisor Various times, June 1996 to October 2003

Jet Propulsion Laboratory

Supervise summer research students (graduate and undergraduate), with responsibility for choosing and guiding projects that fit within the time and capability limits of the students.

Teaching Assistant January 1987 to December 1988

California Institute of Technology

Graduate courses in planetary radio astronomy and atmospheric dynamics.

Laboratory Instructor April 1983 to June 1984

Stanford University

Undergraduate observational astronomy class.

Management Experience:

Member, Board of Directors May 2006 to Present

Lewis Center for Educational Research

Oversee a private, non-profit foundation that includes two K-12 Charter Schools in California, and various educational programs independent of the schools.

GAVRT Lead Scientist October 2005 to Present

Deep Space Network, Jet Propulsion Laboratory

Provide technical and administrative leadership for the Goldstone-Apple Valley Radio Telescope (GAVRT) Program. GAVRT is an educational activity that allows K-12 students around the world to participate in the research of scientists and engineers. Responsibilities include selection of participating scientists and observing programs, providing scientific content for educational materials, and acting as director of the Michael J. Klein Radio Observatory (consisting of two, 34-meter telescopes).

Deputy Section Manager November 2003 to October 2005

Planetary Science and Life Detection Section, Jet Propulsion Laboratory

Line manager for ~80 research scientists. Responsible for day-to-day operations of the Section, including technical, safety, facility, and personnel issues. Assist in aligning and integrating the Section’s activities with those of JPL and NASA. Assist in the development of various JPL internal policies, operating plans, and strategic initiatives.

Flight Project Experience:

Calibration Working Group

December 2004 to Present

Herschel Space Telescope

Member of the Calibration Working Group for Herschel, an ESA mission with extensive U.S. contributions.

Instrument Scientist

January 1996 to November 2003

Jet Propulsion Laboratory

Instrument Scientist for the AIRS Visible/Near-IR System, currently in Earth orbit on the Aqua spacecraft. Oversee instrument and ground-software design, development, test, calibration, and on-orbit use. Coordinate activities among industrial instrument builder, university-based science team members, and various JPL elements.

Science Team/Co-I

August 1995 to Present

Jet Propulsion Laboratory

Co-I on the MIRO instrument (currently flying on ESA's Rosetta spacecraft).

Science Team Member on the successful Step-I proposal for the Juno mission.

Co-I on Vesper (a 2007 Venus Discovery Mission that advanced to Step-II).

Other Experience:

Educational Outreach

January 1994 to Present

Jet Propulsion Laboratory

Active in public outreach activities for various JPL projects (public talks, providing content for web-pages). Participated in reviews of the California State K-12 Science Education Standards.

Senior Field Engineer

September 1984 to June 1985

Allied-Bendix Aerospace

Performance analysis and operator training for the Deep Space Network's Radio Science System at the Jet Propulsion Laboratory.

Professional Activities and Affiliations:

Co-Convener of NASA's "Uranus System at Equinox" Workshops, held in May and October of 2006 (sponsored by the Outer Planets Research Program).

Member of the scientific support staff to NASA's Solar System Roadmap Development Team, a 1995 strategic planning activity for the 2000-2015 timeframe.

Member of proposal review panels for NASA's Planetary Astronomy program and various JPL-internal programs.

Peer-reviewer for journals such as *Icarus* and *Astronomy and Astrophysics*, and for the *Neptune and Triton* book in the University of Arizona series.

Outer Planet Atmospheres Session Chair at various DPS meetings.

Member of the American Astronomical Society, Division for Planetary Science.

Successful Research Proposals:

Principal Investigator in NASA's Planetary Astronomy Program

FY2008-2010: Multi-Wavelength Imaging of Uranus and Neptune. The proposal includes 4 Co-I's and 4 Collaborators.

FY2006-2008: Imaging Uranus at Millimeter and Submillimeter Wavelengths. The proposal includes 2 Co-I's and 2 Collaborators.

FY2004-2007: Microwave Observations of the Uranian Atmosphere. The proposal includes one Co-I and 4 Collaborators.

Principal Investigator in NASA's Education and Public Outreach Program

FY2005-2007: Uranus, a Dynamic Planet Creates a Dynamic Science-Education Partnership.

NASA Co-Investigator

Co-I in successful proposals to NASA's Planetary Atmospheres and Planetary Astronomy Programs.

NOAA Co-Investigator

Co-I in a successful proposal to the NPOESS Preparatory Project, a joint NASA/NOAA program for the next generation of polar-orbiting satellites for weather forecasting.

Principal Investigator in JPL's internal R&D Program

Summer 2008: To Uranus on Solar Power and Batteries. A study to determine the feasibility of non-nuclear missions to Uranus.

Spring 2003: Deep Sounding of Jupiter's Atmosphere. An exploration of new microwave retrieval techniques to be used on the Juno New Frontiers mission.

Awards:

NASA Group Achievement Award, for work on the Microwave Instrument for the Rosetta Orbiter (MIRO) Team (2005).

NASA Group Achievement Award, for work on the Aqua Mission Team (2003).

NASA Group Achievement Award, for work on the Atmospheric Infrared Sounder Project (2003).

NASA Group Achievement Award, for work on the Venus Balloon Experiment (1985).

Peer-Reviewed Publications:

- Gulkis, S., M. Allen, C. Backus, G. Beaudin, N. Biver, D. Bockelée-Morvan, J. Crovisier, D. Despois, P. Encrenaz, M. Frerking, **M. Hofstadter**, P. Hartogh, W. Ip, M. Janssen, L. Kamp, T. Koch, E. Lellouch, I. Mann, D. Muhleman, H. Rauer, P. Schloerb, and T. Spilker 2007. Remote Sensing of a Comet at Millimeter and Submillimeter Wavelengths from an Orbiting Spacecraft. *Planetary and Space Science* **55**, 1050–1057.
- Gulkis, S., M. Frerking, J. Crovisier, G. Beaudin, P. Hartogh, P. Encrenaz, T. Koch, C. Kahn, Y. Salinas, R. Nowicki, R. Irigoyen, M. Janssen, P. Stek, **M. Hofstadter**, M. Allen, C. Backus, L. Kamp, C. Jarchow, E. Steinmetz, A. Deschamps, J. Krieg, M. Gheudin, D. Bockelée-Morvan, N. Biver, T. Encrenaz, D. Despois, W. Ip, E. Lellouch, I. Mann, D. Muhleman, H. Rauer, P. Schloerb, and T. Spilker 2007. MIRO: Microwave Instrument for Rosetta Orbiter. *Space Sci. Rev.* **128**, 561–597.
- Klein, M.J. and **M.D. Hofstadter** 2006. Long-term Variations in the Microwave Brightness Temperature of the Uranus Atmosphere. *Icarus* **184**, 170–180.
- Janssen, M.A., **M.D. Hofstadter**, S. Gulkis, A.P. Ingersoll, M. Allison, S.J. Bolton, S.M. Levin, and L.W. Kamp 2005. Microwave Remote Sensing of Jupiter’s Atmosphere from an Orbiting Spacecraft. *Icarus* **173**, 447–453.
- Hofstadter, M.D.** and B.J. Butler 2003. Seasonal Change in the Deep Atmosphere of Uranus. *Icarus*, **165**, 168–180.
- Gautier, C., S. Yang, and **M. Hofstadter** 2002. AIRS/Vis Near IR Instrument. *IEEE Transactions on Geoscience and Remote Sensing* **41**, 330–342.
- Fetzer, E., L. McMillin, D. Tobin, H. Aumann, M. Gunson, W. McMillan, D. Hagan, **M. Hofstadter**, J. Yoe, D. Whiteman, et al. 2002. AIRS/AMSU/HSB Validation. *IEEE Transactions on Geoscience and Remote Sensing* **41**, 418–431.
- Fishbein, E.F., C.B. Farmer, S.L. Granger, D.T. Gregorich, M.R. Gunson, S.E. Hannon, **M. Hofstadter**, S.Y. Lee, S.S. Leroy, and L.L. Strow 2002. Formulation and Validation of Simulated Data for the Atmospheric Infrared Sounder (AIRS). *IEEE Transactions on Geoscience and Remote Sensing* **41**, 314–329.
- Safaenili, A., S. Gulkis, **M.D. Hofstadter**, and R.L. Jordan 2002. Probing the Interior of Asteroids and Comets Using Radio Reflection Tomography. *Meteoritics & Planetary Science* **37**, 1953–1963.
- Bolton, S.J., M. Janssen, R. Thorne, S. Levin, M. Klein, S. Gulkis, T. Bastian, R. Sault, C. Elachi, **M. Hofstadter**, A. Bunker, et al. 2002. Ultra-Relativistic Electrons in Jupiter’s Radiation Belts. *Nature* **415**, 987–991.
- Hofstadter, M.D.**, P. Hartogh, J.P. McMullin, R.N. Martin, C. Jarchow, and W. Peters 1999. A Search for Variability in the HCN to H₂CO Ratio in Comet Hale-Bopp. *Earth, Moon, and Planets*, **78**, 53–61.

Peer-Reviewed Publications (Continued):

Hofstadter, M.D., G.L. Berge, and D.O. Muhleman 1990. Vertical Motions in the Uranian Atmosphere: An Analysis of Radio Observations. *Icarus* **84**, 261–267.

Hofstadter, M.D. and B.C. Murray 1990. Ice Sublimation and Rheology: Implications for the Martian Polar Layered Deposits. *Icarus* **84**, 352–361.

Hofstadter, M.D. and D.O. Muhleman 1989. Latitudinal Variations of Ammonia in the Atmosphere of Uranus: An Analysis of Microwave Observations. *Icarus* **81**, 396–412.

Miscellaneous Publications:

First author or major contributor on over twenty NASA, JPL, or Project numbered documents. Topics include simulation, validation and geolocation of spacecraft data, algorithm descriptions of science-data processing software, instrument test plans and reports.

First author on more than twenty scientific papers presented at international conferences. Topics include microwave sounding of giant planet atmospheres and cloud detection from Earth orbit.