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**HONORS AND AWARDS**

- Fellow of the American Geophysical Union
- Group Achievement Award, NASA, 2016, presented “for contributions to the MAVEN Mission”
- Group Achievement Award, NASA, 2009, presented “for contributions to the Cassini/Huygens Mission”
- Group Achievement Award, NASA, 2002, presented “for contributions to the DS1 flyby of comet 19P/Borrelly.”
- Group Achievement Award, NASA, 1999, presented **"in recognition of the successful completion of MICAS, the highly innovative, multipurpose miniature integrated camera-spectrometer that spans the wavelength range from the ultraviolet to infrared"**
- Group Achievement Award, NASA, 1999, presented **"for outstanding contributions to science on the Deep Space One mission"**
- Group Achievement Award, NASA, 1998, presented **"in recognition of the innovative design, development, integration, and test of the Cassini Ion and Neutral Mass Spectrometer instrument"**
- Harold C. Urey Prize, Division of Planetary Science of the American Astronomical Society, 1993, presented for **"outstanding contributions to Planetary Science by a young scientist"**
- Group Achievement Award, NASA, 1990, presented **"in recognition of the outstanding achievements of the Voyager science investigations."**
- Editor's Citation, American Geophysical Union, 1989, for **"Excellence in Refereeing."**

**SPACECRAFT EXPERIENCE**

- Voyager, Ultraviolet Spectrometer, Team Member, 1985-1989
- Cassini, Ion Neutral Mass Spectrometer, Team Member, 1992-2017
- Champollion, CIRCLE Experiment, **Principle Investigator**, 1995-1999
- Deep Space 1, MICAS, Team Member, 1997-2000
- Venus Express, VEX Accelerometer Experiment, Team Member

- MAVEN, Co-Investigator, 2008-2017

### EDUCATION

Department of Physics University of Wisconsin	Ph.D., 1984, M.S. 1980
Department of Physics Worcester Polytechnic Institute	B.S., 1978

### ACADEMIC APPOINTMENTS

Department of Planetary Sciences University of Arizona	Full Professor January 2001 to Present
Visiting Professor, University Joseph Fourier, Grenoble, France	September – December, 2008
Department of Physics and Astronomy Northern Arizona University	Associate Professor September 1999 to December 2000
Astronomy Department Boston University	Associate Professor September 1995 to September 1999
NASA Ames Research Center	Senior NRC Fellow September 1994 to September 1995
Space Telescope Science Institute	Visiting Scientist May 1994 to August 1994
Lunar and Planetary Laboratory University of Arizona	Assistant Research Scientist July 1989 to September 1995
	Senior Research Associate July 1988 to July 1989
	Research Associate November 1984 to July 1988
Physics Department University of Wisconsin-Madison	Research Assistant September 1982 to November 1984
	June 1979 to June 1980
	Teaching Assistant September 1978 to June 1979
Plasma Physics Laboratory Princeton University	Professional Staff June 1980 to September 1982

### PROFESSIONAL SOCIETIES

American Geophysical Union, American Astronomical Society, European Geophysical Society

## **PROFESSIONAL ACTIVITIES**

Neptune Atmospheric Science Working Group, Voyager Project, 1987 - 1989.  
Neptune - Triton International Conference, Organizing Committee Member, 1990 - 1992.  
Cassini/Huygens Titan Atmosphere Modelling Group, 1992.  
Atmospheric Science Working Group, Cassini Project, 1992 -  
NASA Outer Planets Science Working Group (OPSWG), 1991 - 1996  
Icarus Editorial Board, 1993 - 1995.  
National Research Council Committee on Planetary and Lunar Exploration (COMPLEX),  
1994-1996.  
Visiting Member, Dissertation Committee for L. Young, M.I.T., 1994  
NASA Planetary Atmosphere Review Panel, 1994.  
HST Telescope Allocation Committee, 1994.  
NASA Solar System Building Blocks Campaign Working Group, 1996  
Pluto Express Science Definition Team, 1995  
Member, NASA Delegation to Russian Space Agency on behalf of Pluto Express  
Mission, 1996  
NASA Solar System Roadmap Committee, 1996  
International Commission on Planetary Atmospheres and their Evolution, 1996-1999  
NASA Astrophysical Analogs Campaign Working Group, 1996-1998  
Clementine II Science Definition Team, 1997  
Deep Space 4 Science Definition Team, 1997-1999  
NASA Planetary Atmospheres Review Panel, 1997  
NASA Chemical Building Blocks Campaign Working Group, 1997-1999  
NASA Planetary Atmospheres Review Panel 1998  
NASA Task Force on the Availability and Usefulness of Space Data, 2001  
Titan Aeronomy Worksop, Observatoire de Paris, Jan 7-9, 2004, Principle Organizer  
Titan Workshop, Heraklion, Crete (2005) (one of 3 principle organizers)  
DPS Committee Member 2005-2008.  
NASA Planetary Atmospheres review panel, 2006  
Royal Society Discussion: Titan Atmosphere and Space Environment, December 2007,  
(one of 3 principle organizers)  
Guest Editor for Transactions of the Royal Society, 2008.  
NASA Planetary Atmospheres review panel, 2008.  
NASA Planetary Atmospheres review panel, 2009.  
Titan Atmosphere Model Working Group, Chairperson, (Cassini/Huygrns Project) 2000-  
2018  
NASA Committee on Astrobiology and Planetary Science (2013-1026)  
NASA Mars International Collaboration Science Advisory Group (2016-2017)

## **RESEARCH GRANTS**

"Exospheric Line Shape Measurements with a Fabry-Perot ICCD Interferometer," NSF  
Grant No. ATM-8521515, Co-Principal Investigator, 1985-1987.  
"Scientific Program in Planetary Atmosphere Studies," A. L. Broadfoot, P.I., NASA  
Grant No. NAGW-610, Co-Investigator, 1986-1991.

- "An Investigation of the EUV Albedo and Hydrocarbon Photochemistry on Uranus," NASA Grant No. NAGW-1181, Principal Investigator, 1987-1990.
- "A Study of Lyman Alpha Emissions from Uranus," NASA Grant No. NAGW-1207, Principal Investigator, 1987-1990.
- "Theory of Auroras on the Outer Planets," Bill R. Sandel, P. I., NASA Grant No. NAG8-110, Co-Investigator, 1988-1989.
- "Non-LTE Models of the Mesospheres of the Outer planets and their Satellites," NASA Grant No. NAGW 2017, Principal Investigator, 1989-1995.
- "Interpretation of Voyager UVS Observation of Occultations by the Atmosphere of Neptune," Bill R. Sandel, P.I., NASA Grant, No. NAGW- 2441, Co-Investigator, 1990-1993.
- "Interpretation of Voyager UVS Observation of Occultations by the Atmosphere of Neptune," Bill R. Sandel, P.I., NASA Grant, No. NAGW-2441, Co-Investigator, 1990-1993.
- "Analysis of the EUV Dayglow Spectra of Triton, Titan, and Earth," NASA Grant, No. NAGW-2360, Principal Investigator, 1990-1993.
- "Analysis of the EUV Dayglow Spectra of Triton, Titan, and Earth," NASA Grant, No. NAGW-2360, Principal Investigator, 1990-1993.
- "Determination of Stratospheric Thermal Structure and Methane Abundance from Voyager and Ground-Based Data," NASA Grant, No. NAGW-2537, Principal Investigator, 1990-1993.
- "Hubble Space Telescope Observations of Neptune and Uranus," Melissa McGrath (Johns Hopkins University), P.I., Space Telescope Science Institute Grant GO3616.03-91A, Co-Investigator, 1992-1993.
- Ion-Neutral Mass Spectrometer Experiment for Cassini Mission to Saturn, Team Member, 1992-2006.
- "Analysis of Voyager Occultation Measurements of the Atmospheres of Titan and Triton," NASA Grant, No. NAGW-0000, Principal Investigator, 1993.
- "Development and Testing of a Pluto Integrated Camera Spectrometer Ultraviolet Spectrometer Channel," JPL Project No. 959765, Principal Investigator, 1993-1994.
- "UV Observations of the Impact of Comet SL9 with Jupiter," Keith Noll (STScI), P.I., Space Telescope Science Institute, 1994-1995.
- "Consequences of the Shoemaker-Levy Impact with Jupiter," Melissa McGrath (STScI), P.I., Space Telescope Science Institute, Co-Investigator, 1995-1996.
- "Continued Studies of Atmospheric Thermal Structure in the Outer Solar System," NASA's Planetary Atmospheres Program, NAGW-4693, Principal Investigator, 1995-2004.
- "Chemical Consequences of Comet Shoemaker-Levy 9," Space Telescope Science Institute, Director's Discretionary Program, Principal Investigator, 1995.

- "Chemical Consequences of Comet Shoemaker-Levy 9, NASA Planetary Atmospheres Program, NAGW-, Principal Investigator, 1995.
- "Champlion Infrared Spectrometer and Camera Lander Experiment (CIRCLE)", Deep Space 4 Mission, Principal Investigator, 1995-1999.
- "Miniature Integrated Camera and Spectrometer (MICAS) UV Channel, for the Deep Space 1 Mission, Principal Investigator, 1996-1997.
- New Millenium Program Deep Space One Science Team, JPL Subcontract, Team Member, 1997-2000.
- "Analysis of FOS Spectra of Jupiter," Space Telescope Science Institute, Principal Investigator, 1998.
- "Comparison of the Atmospheres of Titan and Earth," NSF grant, Principal Investigator, 1999-2000.
- "STIS Spectra of Outer Planet Atmospheres" Space Telescope Science Institute, Principal Investigator, 2000
- "Structure and Composition of Planetary Atmospheres" NASA Planetary Atmospheres Program, Principle Investigator 2000-2002
- "Structure and Dynamics of the Inner Coma of Comet 19P/Borrelly," NASA Discovery Program, Principle Investigator 2003-2005.
- "Labortatory Simulations of Titan's Ionosphere," NASA Cassini Data Analysis Program, Principle Investigator, 2007-2009
- "Investigations of Titan's Agnostosphere, : NASA Cassini Data Analysis Program, Principle Investigator, 2009-2011
- "Analysis and Interpretation of SPICAM Measrements of O<sub>2</sub> in the Martian Atmosphere," NASA Mars Data Analysis Program, Principle Investigator, 2009-2012.
- "Titan as a Pre-biotic Laboratory," NASA Astrobiology Institute, Co-Investigator, 2009-2013.
- "Chemistry, Dynamics, and Thermal Structure of Titan's Upper Atmosphere," NASA Planetary Atmospheres Program, Principle Investigator 2001-2012
- "MAVEN Interdisciplinary Scientist", Sub-contract, University of Colorado, 2002-2018.
- "Structure and Escape of Exoplanet Atmospheres," NSF Planetary Program, Principle Investigator 2013-2016
- "Analysis and Interpretation of Cassini/UVIS Airglow Observations" NASA CDAP Program, Principle Investigator, 2015-2018.

### **INVITED LECTURES AND REVIEW TALKS**

- "Fluorescence of Sunlight in Upper Atmospheres of Jupiter, Saturn, and Uranus," lecture presented to the Department of Physics and Astronomy, May 1987, University of Iowa, Iowa City, Iowa.

- "Aeronomy of Outer Planet Atmospheres," invited lecture presented to Geophysical Institute, November 1987, University of Alaska, Fairbanks, Alaska.
- "Ultraviolet Spectra and Related Aeronomy of the Outer Planets," invited review presented at AGU Fall Meeting, November 1987, San Francisco, California.
- "Triton Ultraviolet Spectroscopy: Lower Atmospheric Structure and Constituents," invited review presented at AGU Fall Meeting, November 1989, San Francisco, California.
- "Cryogenic Atmospheres of Pluto and Triton," invited lecture presented to the Department of Astrophysics, Planetary and Atmospheric Sciences, March 1990, University of Colorado, Boulder, Colorado.
- "Cryogenic Atmospheres of Pluto and Triton," invited lecture presented to Institute for Terrestrial and Planetary Atmospheres, March 1990, State University of New York, Stonybrook, New York.
- "Structure and Compositions of Triton's Atmosphere," invited review presented at Symposium on Neptune after Voyager, COSPAR, July 4, 1990, The Hague, The Netherlands.
- "Thermal Balance, Photochemistry, and Evolution of Titan's Atmosphere," invited lecture to Department of Space Physics and Astronomy, Rice University, March 24, 1991, Houston, Texas.
- "Thermal Balance, Photochemistry, and Evolution of Titan's Atmosphere," invited lecture at Harvard-Smithsonian Center for Astrophysics, March 29, 1991, Cambridge, Massachusetts.
- "Thermal Balance, Photochemistry, and Evolution of Titan's Atmosphere," invited lecture in Theoretical Astrophysics Seminar Series, April 10, 1991, University of Arizona, Tucson, Arizona.
- "Atomic and Molecular Data Needed for Upper Atmospheric Research," invited review presented at IAU Colloquia 65, July 25, 1991, Buenos Aires, Argentina.
- "Volatile Transport and Lower Atmospheric Structure on Triton," invited review presented at Neptune and Triton Conference, January 10, 1992, Tucson, Arizona.
- "What Triton Can Tell Us About Pluto's Atmosphere," invited lecture presented at AGU Spring Meeting, May 1992, Montreal, Quebec.
- "Thermal Structure and Chemistry of Titan's Upper Atmosphere," presented November 10, 1992, at NASA Goddard Space Flight Center, Greenbelt, Maryland.
- "Pluto's Atmosphere: Structure and Composition," invited review presented at International Pluto Conference, July 1993, Flagstaff, AZ.
- "Pluto's Atmosphere: Where It Comes From and Where It's Going," Urey Prize lecture presented at DPS Meeting, October 20, 1993, Boulder, Colorado.
- "Pluto's Atmosphere: Where It Comes From and Where It's Going," invited lecture to Department of Astronomy, University of California at Berkeley, March 9, 1994, Berkeley, CA.

- "Surface-Atmosphere Interactions on Pluto," invited lecture presented at International Conference on Laboratory Measurements for Planetary Atmospheres, AAS/DPS, November 1994, Bethesda MD
- "Chemical Consequences of the Impact of Comet Shoemaker-Levy with Jupiter," invited lecture to NASA/Ames Research Center Space Science Division, December 1994, Moffett Field, CA.
- "Chemical Consequences of the Impact of Comet Shoemaker-Levy with Jupiter," invited lecture to Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, April 1995, Cambridge MA.
- "Chemical Consequences of the Impact of Comet Shoemaker-Levy with Jupiter," invited lecture to Department of Astronomy, Boston University, April 1995, Cambridge MA.
- "Shoemaker-Levy Chemistry: Theory", presented at IAU Colloquium 156, Space Telescope Science Institute, May 1995, Baltimore MD
- "The New Pluto," presented to The Institute for Astronomy, University of Hawaii, May 1995, Honolulu, Hawaii.
- "Chemical Consequences of Shoemaker-Levy 9: Results from HST," invited lecture to Lunar and Planetary Institute, September 1995, Houston, Texas.
- "Titan's Thermal Structure - What Do We Want Cassini to Tell Us?," invited paper at European Geophysical Society meeting, April 1997, Vienna, Austria.
- "Jupiter's Upper Atmosphere," presented to Lowell Observatory, May 1997, Flagstaff, Arizona.
- "Energetics of Jupiter's Upper Atmosphere," presented to Dept. of Astronomy, New Mexico State University, April 1998, Las Cruces, New Mexico.
- "Thermal Structure and Composition of Giant Planet Upper Atmospheres," invited review presented at Yosemite2000, "Comparative Aeronomy in the Solar System," 9 February 2000, Yosemite National Park, CA.
- "Titan's Upper Atmosphere," invited review at COSPAR conference, Warsaw Poland, July 2000.
- "Gravity Waves and Energy Balance in Jupiter's Upper Atmosphere," presented to Earth and Planetary Science Department, University College London, August 2000.
- "Energetics, Chemistry, and Dynamics of Titan's Upper Atmosphere," presented to Planetary Sciences Department, University of Arizona, Tucson, AZ, May 2001.
- "Jupiter's Upper Atmosphere," invited review at the Jupiter Conference, Boulder, CO, June 2001
- "The Scientific Promise of Pluto," presentation of NAS Primitive Bodies Solar System Exploration Decadal Study Panel, Woods Hole, MA, August 2001
- "Chemistry of Titan's Upper Atmosphere," invited review at the IAGA conference, Hanoi Vietnam, August 2001

- “Disequilibrium Processes in Extra-Solar Planet Atmospheres,” presented to Dept of Engineering Physics, University of Virginia, April 2002.
- “Overview of Cassini Ion Neutral Mass Spectrometer Results” Invited paper presented to IAMAS conference, Beijing, China, July 2005.
- “Aeronomy of Extra-solar Giant Planets” invited review presented to the 3<sup>rd</sup> International TPF/Darwin Workshop, Pasadena, CA, November 2006.
- “A Brief and Partial Summary of New Knowledge of Titan’s Upper Atmosphere Obtained from the Very Small Number of Atmosphere Oriented Cassini Encounters with Titan to Date” invited paper presented at the 18<sup>th</sup> Rencontres de Blois on Planetary Science, Blois France, June 2006.
- Aeronomy of Titan: Preliminary Cassini Results” presented to the Center for Space Physics, Boston University, April 2007.
- “Aeronomy of Titan: Preliminary Cassini Results” presented to Laboratoire de Planetologie, University Joseph Fourier, Grenoble, France July 2007.
- “The Dynamics of Titan’s Thermosphere” Invited Review at Royal Society Discussion Meeting: Titan Atmosphere and Space Environment, December 2007.
- “Escape of Titan’s Atmosphere”, presented to Laboratory of Atmospheric, Space, and Planetary Science, University of Colorado, Boulder, Feb 2008.
- “Results from the Cassini Mission,” Public Lecture, University Joseph Fourier, Grenoble, France, Nov, 2008.
- “Benzene Formation in Titan’s Upper Atmosphere,” invited talk at 3<sup>rd</sup> Titan Chemistry Symposium, San Juan Puerto Rico, March 2009.
- “What Cassini has Taught us about Titan Chemistry,” invited colloquium, Dept. of Planetary Sciences, University of Arizona, Tucson, AZ, March 2009.
- “Titan Ion Chemistry” Invited Lecture, Faraday Discussion on Titan Chemistry, Abbaye de St. Jacut, June, 2011.
- “Chemistry of Titan’s Atmosphere” Invited Talk at a meeting of the IAPS (International Association of the Planetary Sciences, Shanghai, China, July 2014.
- “Escape of the Atmospheres of Pluto and Exoplanets,” invited colloquium to the National Astronomical Observatories, Chinese Academy of Sciences, Beijing, August 2015.
- “MAVEN and Siding Spring” Public Talk, American Geophysical Union, San Francisco, December, 2014.
- “Some Early Results from the MAVEN Mission” invited seminar, Swedish Institute of Space Physics, Kiruna, Sweden, January 2016.
- “How Well do we Understand the Upper Atmosphere of Mars” invited talk, Frontiers of Theoretical Physics, Sharjah, UAE, February, 2016.

## Peer-Reviewed Publications

1. Chadney, J. M., Galand, M., Koskinen, T. T., Miller, S., Sanz-Forcada, J., Unruh, Y. C., Yelle, R. V. 2016. EUV-driven ionospheres and electron transport on extrasolar giant planets orbiting active stars. *Astronomy and Astrophysics* 587, A87.
2. Capalbo, F. J., Bénilan, Y., Fray, N., Schwell, M., Champion, N., Es-sebbar, E.-t., Koskinen, T. T., Lehoccki, I., Yelle, R. V. 2016. New benzene absorption cross sections in the VUV, relevance for Titan's upper atmosphere. *Icarus* 265, 95-109.
3. Lillis, R. J., and 26 colleagues 2015. Characterizing Atmospheric Escape from Mars Today and Through Time, with MAVEN. *Space Science Reviews* 195, 357-422.
4. McClintock, W. E., Schneider, N. M., Holsclaw, G. M., Clarke, J. T., Hoskins, A. C., Stewart, I., Montmessin, F., Yelle, R. V., Deighan, J. 2015. The Imaging Ultraviolet Spectrograph (IUVS) for the MAVEN Mission. *Space Science Reviews* 195, 75-124.
5. Jakosky, B. M., and 70 colleagues 2015. The Mars Atmosphere and Volatile Evolution ( MAVEN) Mission. *Space Science Reviews* 195, 3-48.
6. Tinetti, G., and 354 colleagues 2015. The EChO science case. *Experimental Astronomy* 40, 329-391.
7. Capalbo, F. J., Bénilan, Y., Yelle, R. V., Koskinen, T. T. 2015. Titan's Upper Atmosphere from Cassini/UVIS Solar Occultations. *The Astrophysical Journal* 814, 86.
8. Bougher, S., and 93 colleagues 2015. Early MAVEN Deep Dip campaign reveals thermosphere and ionosphere variability. *Science* 350, 0459.
9. Andersson, L., and 14 colleagues 2015. Dust observations at orbital altitudes surrounding Mars. *Science* 350, 0398.
10. Jakosky, B. M., and 93 colleagues 2015. MAVEN observations of the response of Mars to an interplanetary coronal mass ejection. *Science* 350, 0210.
11. Koskinen, T. T., Sandel, B. R., Yelle, R. V., Strobel, D. F., Müller-Wodarg, I. C. F., Erwin, J. T. 2015. Saturn's variable thermosphere from Cassini/UVIS occultations. *Icarus* 260, 174-189.
12. Lavvas, P., Yelle, R. V., Heays, A. N., Campbell, L., Brunger, M. J., Galand, M., Vuitton, V. 2015. N<sub>2</sub> state population in Titan's atmosphere. *Icarus* 260, 29-59.

13. Gröller, H., and 18 colleagues 2015. Probing the Martian atmosphere with MAVEN/IUVS stellar occultations. *Geophysical Research Letters* 42, 9064-9070.
14. Lo, D. Y., and 16 colleagues 2015. Nonmigrating tides in the Martian atmosphere as observed by MAVEN IUVS. *Geophysical Research Letters* 42, 9057-9063.
15. Benna, M., Mahaffy, P. R., Grebowsky, J. M., Fox, J. L., Yelle, R. V., Jakosky, B. M. 2015. First measurements of composition and dynamics of the Martian ionosphere by MAVEN's Neutral Gas and Ion Mass Spectrometer. *Geophysical Research Letters* 42, 8958-8965.
16. Mahaffy, P. R., Benna, M., Elrod, M., Yelle, R. V., Bougher, S. W., Stone, S. W., Jakosky, B. M. 2015. Structure and composition of the neutral upper atmosphere of Mars from the MAVEN NGIMS investigation. *Geophysical Research Letters* 42, 8951-8957.
17. Crismani, M. M. J., and 14 colleagues 2015. Ultraviolet observations of the hydrogen coma of comet C/2013 A1 (Siding Spring) by MAVEN/IUVS. *Geophysical Research Letters* 42, 8803-8809.
18. Koskinen, T. T., Erwin, J. T., Yelle, R. V. 2015. On the escape of CH<sub>4</sub> from Pluto's atmosphere. *Geophysical Research Letters* 42, 7200-7205.
19. Teolis, B. D., and 17 colleagues 2015. A Revised Sensitivity Model for Cassini INMS: Results at Titan. *Space Science Reviews* 190, 47-84.
20. Sagnières, L. B. M., Galand, M., Cui, J., Lavvas, P. P., Vigren, E., Vuitton, V., Yelle, R. V., Wellbrock, A., Coates, A. J. 2015. Influence of local ionization on ionospheric densities in Titan's upper atmosphere. *Journal of Geophysical Research (Space Physics)* 120, 5899-5921.
21. Schneider, N. M., and 16 colleagues 2015. MAVEN IUVS observations of the aftermath of the Comet Siding Spring meteor shower on Mars. *Geophysical Research Letters* 42, 4755-4761.
22. Benna, M., Mahaffy, P. R., Grebowsky, J. M., Plane, J. M. C., Yelle, R. V., Jakosky, B. M. 2015. Metallic ions in the upper atmosphere of Mars from the passage of comet C/2013 A1 (Siding Spring). *Geophysical Research Letters* 42, 4670-4675.
23. Sandel, B. R., Gröller, H., Yelle, R. V., Koskinen, T., Lewis, N. K., Bertaux, J.-L., Montmessin, F., Quémerais, E. 2015. Altitude profiles of O<sub>2</sub> on Mars from SPICAM stellar occultations. *Icarus* 252, 154-160.