

Curriculum Vitae

John Fraser Mustard

Professor of Geological Sciences

Education

- B.Sc. Geological Sciences (Honors), May 1983, University of British Columbia, Vancouver, B.C. CANADA
M.Sc. Geological Sciences, May 1986, Brown University, Providence RI.
Ph.D. Geological Sciences, May 1990, Brown University, Providence RI.

Professional Appointments

- 7/2007-present Professor of Geological Sciences and Professor of Environmental Studies, Brown University
7/2000-6/2007 Associate Professor of Geological Sciences and Associate Professor of Environmental Studies, Brown University
7/1998-6/2000 Steven Robert Assistant Professor, Assistant Professor of Geological Sciences, Brown University
7/1996-6/1998 Assistant Professor, Department of Geological Sciences, Brown University
7/1991-6/1996 Assistant Professor for Research, Department of Geological Sciences, Brown University
1/1990-6/1991 Post-doctoral research associate in the Department of Geological Sciences at Brown University

Completed Research and Scholarship

Edited Book

Gutman G., C. Justice, D. Skole, R. Rindfuss, J. Mustard, W. Turner, T. Janetos, and E. Moran (eds) *Land Change Science: Observing, Monitoring, and Understanding Trajectories of Change on the Earth's Surface* Kluwier Netherlands (2004).

Book Chapters

Mustard, J. F., R. Defries, T. Fisher and E. Moran, Land Use and Land Cover Change Pathways and Impacts. Chapter 26 in Gutman G. et al (eds) *Land Change Science: Observing, Monitoring, and Understanding Trajectories of Change on the Earth's Surface* Kluwier Netherlands (2004).

Mustard, J. F. and T. Fisher, Land Use and Land Cover Change and Hydrology. Chapter 15 in Gutman G. et al (eds) *Land Change Science: Observing, Monitoring, and Understanding Trajectories of Change on the Earth's Surface* Kluwier Netherlands (2004).

Mustard, J. F., and J. M. Sunshine, Spectral Analysis for Earth Science: Investigations Using Remote Sensing Data, in *Remote Sensing for the Earth Sciences, Manual of Remote Sensing 3rd Ed. Vol. 3*, (Andrew Rencz, Editor), J. Wiley and Sons Inc., New York, Chapter 5, pg. 251-307, 1999.

Pieters, C. M., J. F. Mustard, J. M. Sunshine, Quantitative mineral analyses of planetary surfaces using reflectance spectroscopy, in *Mineral Spectroscopy: A tribute to Roger G. Burns*, (M. D. Dyar, C. McCammon, and M. W. Schaefer, eds.), The Geochemical Society, Houston TX, pp. 307-326, 1996.

Refereed Publications (86)

Submitted and in review:

- Bishop, J.L., M. Parente, C.M. Weitz, P.C. McGuire, E.Z. Noe Dobrea, L.H. Roach, N.K. McKeown, C. Rossi, Brown, W.M. Calvin, R.E. Milliken, S. L. Murchie, and J.F. Mustard, Mineralogy of Juventae Chasma: Sulfates in the Light-toned Mounds, Mafics in the Sand, and Opal in the Plains, (*in press*) *J. Geophys. Res.* 2009.
- Calvin, W. M., L. H. Roach, F. P. Seelos, K. D. Seelos, R. O. Green, S. L. Murchie, and J. F. Mustard, CRISM Observations of Northern Martian Latitudes in Summer, (*in press*) *J. Geophys. Res.-Planets*, 2009.
- Ehlmann, B. L., J. F. Mustard, G. A. Swayze, R. N. Clark, J. L. Bishop, F. Poulet, D. J. Des Marais, L. H. Roach, R. E. Milliken J. J. Wray, O. Barnouin-Jha, and S. L. Murchie, Identification of hydrated silicate minerals on Mars using MRO-CRISM: geologic context near Nili Fossae and implications for aqueous alteration, (*in press*) *J. Geophys. Res.*, 2009.
- Lichtenberg, K. A., R. E. Arvidson, R. V. Morris, S. L. Murchie, J. L. Bishop, T. D. Glotch, E. Noe Dobrea, J. F. Mustard, J. Andrews-Hanna, L. H. Roach, and the CRISM team, Stratigraphy of Hydrated Sulfates in the Sedimentary Deposits of Aram Chaos, Mars, (*in press*) *J. Geophys. Res.*, 2009.
- McKeown, N. K., J. L. Bishop, E. Z. Noe Dobrea, M. Parente, B. L. Ehlmann, J. F. Mustard, S. L. Murchie, J-P. Bibring, and E. Silver, Characterization of phyllosilicates observed in the central Mawrth Vallis region, Mars, their potential formational processes, and implications for past climate, (*in press*) *J. Geophys. Res.*, 2009.
- Murchie, S.L., J. F. Mustard, B. L. Ehlmann, R. E. Milliken, J. L. Bishop, N. K. McKeown, E. Z. Noe Dobrea, F. P. Seelos, D. L. Buczkowski, S. M. Wiseman, R. E. Arvidson, J. J. Wray, G. Swayze, R. N. Clark, J-P. Bibring, and A. S. McEwen, A synthesis of Martian aqueous mineralogy after one Mars year of observations from the Mars Reconnaissance Orbiter, (*in press*) *J. Geophys. Res.*, 2009.
- Murchie, S. L., F. P. Seelos, C. D. Hash, D. C. Humm, E. Malaret, J. A. McGovern, K. D. Seelos, D. L. Buczkowski, M. F. Morgan, O. S. Barnouin-Jha, H. Nair, H.W. Taylor, G. W. Patterson, C. A. Harvel, J. F. Mustard, R. E. Arvidson, P. McGuire, M. D. Smith, M. J. Wolff, and T. N. Titus, The CRISM Investigation and Data Set from the Mars Reconnaissance Orbiter's Primary Science Phase, (*in press*) *J. Geophys. Res.*, 2009.
- Murchie, S., L. Roach, F. Seelos, R. Milliken, J. Mustard, R. Arvidson, S. Wiseman, K. Lichtenberg, J. Andrews-Hanna, J. Bishop, J.-P. Bibring, M. Parente, and R. Morris, Compositional Evidence for the Origin of Layered Deposits in Valles Marineris, Mars, (*in press*) *J. Geophys. Res. - Planets*, (2009)
- Mustard, J. F., B. L. Ehlmann, S. L. Murchie, F. Poulet, N. Mangold, J. W. Head, J-P. Bibring, and L.H. Roach, Composition, Morphology, and Stratigraphy of Noachian/Phyllosian Crust around the Isidis basin, (*in press*) *J. Geophys. Res.*, 2009.
- Noe Dobrea, E. Z., J. L. Bishop, N.K. McKeown, R. Fu, C. Rossi, C. Heinlein, V. Hanus, J.R. Michalski, G. Swayze, F. Poulet, J.-P. Bibring, J.F. Mustard, B.L. Ehlmann; R. Arvidson, R.V. Morris, S. Murchie, A.S. McEwen, E. Malaret, C. Hash, and the CRISM Team, Mineralogy and Stratigraphy of Phyllosilicates-Bearing and Dark Mantling Units in the Greater Mawrth Vallis Area: Constraints Geological Origin, (*in press*) *J. Geophys., Res.* 2009.

Publications in peer-reviewed journals:

2009

- Horgan B. H., J. F. Bell III, E. Z. Noe Dobrea, E. A. Cloutis, D. T. Bailey, M. A. Craig, L. H. Roach, J. F. Mustard, Distribution of hydrated minerals in the north polar region of Mars, *J. Geophys. Res.*, 114, E01005, doi:10.1029/2008JE003187, 2009.
- McGuire, P. C., J. L. Bishop, A. J. Brown, A. A. Fraeman, G. A. Marzo, M. F. Morgan, S. L. Murchie, J. F. Mustard, M. Parente, S. M. Pelkey, T. L. Roush, F. P. Seelos, M. D. Smith, L. Wend, and M. J. Wolff, An improvement to the volcano-scan algorithm for atmospheric correction of CRISM and OMEGA spectral data, *Planetary and Space Science*, doi:10.1016/j.pss.2009.03.007, 2009.

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- Roach L. H., J. F. Mustard, S. L. Murchie, J.-P. Bibring, F. Forget, K. W. Lewis, O. Aharonson, M. Vincendon, J. L. Bishop, Testing evidence of recent hydration state change in sulfates on Mars, *J. Geophys. Res.*, 114, E00D02, doi:10.1029/2008JE003245, 2009.

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- Bradley, B. and J. F. Mustard, Comparison of phenology trends by land cover class: a case study in the Great Basin, USA, *Global Change Biology*, 14, 334-346, doi :10.1111/j.1365-2486.2007.01479.x 2008.
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- McGuire, P.C., M.J. Wolff, M.D. Smith, R.E. Arvidson, S.L. Murchie, R.T. Clancy, T.L. Roush, S.C. Cull, K.A. Lichtenberg, S.M. Wiseman, R.O. Green, T.Z. Martin, R.E. Milliken, P.J. Cavender, D.C. Humm, F.P. Seelos, K.D. Seelos, H.W. Taylor, B.L. Ehlmann, J.F. Mustard, S.M. Pelkey, T.N. Titus, C.D. Hash, E.R. Malaret, and the CRISM Team, MRO/CRISM Retrieval of Surface Lambert Albedos for Multispectral Mapping of Mars with DISORT-based Radiative Transfer Modeling: Phase 1 -- Using Historical Climatology for Temperatures, Aerosol Optical Depths, and Atmospheric Pressures, (in press) *IEEE Trans. Geo. Remote Sens.*, 2008.
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Bibring, J.-P., R. E. Arvidson, A. Gendrin, B. Gondet, Y. Langevin, S. Le Mouelic, N. Mangold, R. V. Morris, J. F. Mustard, F. Poulet, C. Quantin, C. Sotin, Coupled Ferric Oxides and Sulfates on the Martian Surface, *Science* 317, 1206 DOI: 10.1126/science.1144174, 2007.

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Cloutis, E. A., M. A. Craig, J. F. Mustard, R. V. Kruzelecky, W. R. Jamroz, A. Scott, D. L. Bish, F. Poulet, J.-P. Bibring, and P. L. King, Stability of hydrated minerals on Mars, *Planetary and Space Science*, 56, 7, p. 951-975, doi: 10.1029/2007GL031267, 2007.

Combe, J-Ph., S. Le Mouélic, C. Sotin, A. Gendrin, J. F. Mustard, L. Le Deit, P. Launeau, J.-P. Bibring, B. Gondet, Y. Langevin, P. Pinet, and the OMEGA Science team. Analysis of OMEGA / Mars Express data hyperspectral data using a Multiple-Endmember Linear Spectral Unmixing Model (MELSUM): Methodology and first results, *Science*, v56, doi:10.1016/j.pss.2007.12.007, 2007

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Milliken, R. E., J. F. Mustard, Estimating the Water Content of Hydrated Minerals Using Reflectance Spectroscopy II: Effects of Particle Size, *Icarus*, vol. 189, 574-588, 2007.

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- Bradley, B.A., J.F. Mustard, and R. Tausch, "Regional Mapping of Cheatgrass (*Bromus tectorum*) in the Great Basin, US", ESA Annual Meeting, 2003
- Bradley, B., and J. F. Mustard, Invasive species in the Great Basin, US: Identifying regional anomalous vegetation response and local land use drivers using AVHRR and Landsat TM, *AGU Chapman Conference (Ecosystem Interactions with Land Use Change)*, June 2003.
- Fisher, J. I. and J. F. Mustard, Constructing a climatology of Narragansett Bay surface temperature with satellite thermal imagery. *The Rhode Island Natural History Survey Conference*, RI, March 7, 2003.
- Fisher, J. I., and J. F. Mustard, Constructing a high resolution sea surface climatology of Southern New England using satellite thermal imagery. *New England Estuarine Research Society/Southern New England Chapter of the American Fisheries Society Joint Meeting*, Fairhaven, MA, Talk, May 10, 2003.
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- Milliken, R. E. and J. F. Mustard, Observations and Modeling of the Absorbed Water in Montmorillonite with Reflectance Spectroscopy, *Lunar and Planetary Science Conference XXXIV*, CD-ROM, Abstract #1345, 2003.

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- Mustard, J. F., First Look at the Thermophysical Properties of the Dissected Mantle, *Lunar and Planetary Science Conference XXXIV*, CD-ROM, Abstract #2005, 2003.
- Mustard, J.F., Geomorphic Indicators of ground Ice on Mars and Evidence for Climate Change, *Eos Trans. AGU*, 84 (46), Fall Meet. Suppl., Abstract xxxxx-xx, 2003.
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Theses

- Mustard, J. F., The geology of the Mount Brew area, Lillooet, British Columbia, unpublished B.Sc. Thesis, University of British Columbia, Vancouver, B.C. Canada, pp. 33, 1983.
- Mustard, J. F., Methods of quantitative analysis of reflectance spectra and application to imaging spectrometer data, Ph.D. Thesis, Brown University, Providence RI, USA, pp. 231 1990.

Invited Lectures

- *Composition of the Martian Surface*, Spectroscopy from Space, The Spectroscopy Society of Pittsburgh, 10/27/90
- *Considerations of Non-linear Mixing Analysis*, Sub-pixel Analysis Workshop, 20th Applied Imagery Pattern Recognition (AIPR) Workshop, SPIE, Washington D.C., 10/15/91
- Invited Attendee and Panel Member, National Academy of Sciences' Fourth Annual Symposium on Frontiers of Science, Beckman Center, Irvine CA 11/5-11/7 1992
- *Composition of the Martian Crust: Clues from ISM Imaging Spectrometer Data*, Lunar and Planetary Institute, Houston TX, 6/10/93.
- *Scientific Visualization in Earth and Planetary Science: It looks good but will it publish*, North American Serial Interest Group, Brown University, 6/11/93.
- *Lithologic Mapping in the Cape Smith Fold and Thrust Belt with TM and Airborne Radar Data*, Institute for Space and Terrestrial Studies, York University, Toronto, Ont, 9/15/93
- Invited Attendee, National Academy of Sciences' Third Annual Symposium on Frontiers of Science, Beckman Center, Irvine CA 11/4-11/6 1993.
- *Understanding Processes on Mars: Rocks to Dust*, Massachusetts Institute of Technology, May 3, 1995.
- *Planetary Contributions to Environmental Remote Sensing*, GSA Annual Meeting, Nov. 1995.
- *New Insights into Crustal Heterogeneity and Chemical Alteration on Mars*, Geologic Survey of Canada, 2/21/96.
- *Quantitative Methods for Determining Surface Composition with Application to Geologic Mapping and Global Change*, Canadian Center for Remote Sensing, 2/20/96.
- *The Dynamics of Thermal Effluent from the Brayton Point Power Plant*, Mt. Hope Bay Research Forum, Mass. Coastal Zone Management, Executive Office of Environmental Affairs, 6/24/97
- *Seasonal and Tidal Dynamics of Thermal Effluent in the Mt. Hope Bay Estuary*, Environmental Protection Agency, Atlantic Ecology Division, Narragansett RI, 8/97

- *Application of Remotely Sensed Data to Environmental Problems in Narragansett Bay*, Dept. Ecology and Evolutionary Biology, Brown University, 9/97.
- *The Composition of the Martian Crust and Implications for the Mantle*, Department of Geological Sciences, RPI, New York, November, 1997.
- *Impact of Brayton Point thermal effluent on the Mt. Hope Bay estuary*, Environmental Protection Agency, Boston MA, December, 1998.
- *Impact of Brayton Point thermal effluent on the Mt. Hope Bay estuary*, Rhode Island Department of Environmental Management, December, 1998.
- *Quantifying Thermal Impacts of Effluent with Remotely Sensed Data*, Environmental Protection Agency, Research Division, Lexington MA, January, 1999.
- *Mineralogy and Mixing on Mars and the Moon*, invited talk for AGU Fall Meeting special session "Spectroscopy of Solar System Objects: A Session Celebrating the Contribution of John Adams," December, 1998.
- *Remote Sensing of the Narragansett Bay Waters: Progress and Promise*, invited talk to the symposium "Integrating science in the decision making process: Managing estuarine habitats in Narragansett Bay, Northeast Regional GSA Meeting, March, 1999
- *Hyperspectral Remote Sensing of Estuarine Waters*, University of Rhode Island, Graduate School of Oceanography Biological Oceanography colloquium, April, 1999.
- *Water Quality Information from Remotely Sensed Data*, invited speaker for the 1999 Environmental Expo special session on advances in hydrodynamic analyses, May, 1999.
- *Review of the ISM Instrument and Results*, Spectroscopy of the Martian Surface, What Next?, Lunar and Planetary Institute, Houston, June, 1999.
- *Recent Results from the Mars Missions*, Geology Department Colloquium, University of Vermont, 2/2000.
- *Impact of Water Use on Semi-Arid Ecosystems, Owens Valley CA.*, Geology Department Noon Seminar, University of Vermont, 2/2000.
- *Land Use and Land Cover Change in Semi-Arid Ecosystems*, Geography Department, Boston University, 9/2000.
- *Remote Sensing for Monitoring Estuarine Dynamics*, EMAP Symposium 2001, 4/2001.
- *Recent climate change on Mars*, University of Nantes, November, 2001
- *Remote sensing of water optical properties*, University of Nantes, October, 2001
- *The composition of the martian surface from infrared remote sensing*, University of Nantes, October 2001.
- *Ground ice and the evidence for climate change on Mars*, CNRS Toulouse, November, 2001
- *Cemented sulfates and ground ice on Mars: Evidence for recent climate change*, Institute d'Astrophysique Spatial, University of Paris, November 2001
- *New Observations of Narragansett Bay with Remote Sensing*, University of Rhode Island, April, 2002.
- *Remotely Sensed Environmental Parameters of Mt. Hope Bay, Narragansett Bay, and the New England Coastal Ocean* School of Marine Science and Technology, University of Massachusetts , Dartmouth, September 11, 2002
- *Recent Near Surface Ground Ice and Periodic Climate Change on Mars*, Woods Hole Oceanographic Institution, November 1, 2002
- *Beyond Red: The Composition of the Martian Surface*, Invited, presentation to the Fall AGU meeting special session in honor of Tom McCord, 2002.
- *Water, Fish, and Electricity, a Hot Topic in Mt. Hope Bay*, Massachusetts Institute of Technology, January, 2003.
- *Periodic Climate Change on Mars*, California Institute of Technology, March, 2003
- *The Temperature of Mt. Hope Bay*, New England Estuarine Research Society Meeting, May 2003.
- *Mars Exploration* Astro Assembly, Rhode Island, October 2003.
- *Ice Ages on Mars*, MIT EAPS Department, October 2003

- *Geomorphic Indicators of ground Ice on Mars and Evidence for Climate Change*, 2003 AGU, Fall Meeting.
- *Mars Surface Composition Through Pan-spectral Analysis: Mafic Mineralogy, Alteration, And Hydration*, 2003 AGU, Fall Meeting.
- *Mars Composition Diversity from the OMEGA Experiment*, Geological Society of America Annual Meeting, Denver, November 2004
- *Climate Change on Mars*, Rhode Island College Sigma Xi Inauguration Dinner, May, 2005
- *Multi-Instrument Sulfate Detection and Mineral Stability on Mars, Martian Sulfates as Recorders of Atmospheric-Fluid-Rock Interactions*, Houston TX (2006)
- *Mineralogic Evolution of Mars*, Penn State Department of Geological Sciences Colloquium, 2006
- *Blue, White and Red Mars: The mineralogic evolution of the Mars*, Brown University Colloquium, 2007
- *Hydrated Silicate Mineralogy of Mars from the CRISM Investigation*, Institute d'Astrophysique Spatial, University de Paris-Sud, Paris, France June 2008
- *Exploring Mars and Prospects for Habitability* Space Exploration Symposium, University of Alberta and Tellis World of Science, 2008
- *Hydrated Minerals on Mars: Implications for the History of Water*, Brown University Colloquium, 2008
- *Hydrated minerals on Mars and their geologic environments:*, Boston University, 2009
- *Hydrated minerals on Mars and their geologic environments: Implications for the history of water*, Lunar and Planetary Institute, Houston TX, 2009
- *Hydrated minerals on Mars and their geologic environments: Implications for the history of water*, University of Colorado, 2009
- *Hydrated minerals on Mars and their geologic environments: Implications for the history of water*, California Institute of Technology, April 2009.
- *Hydrated minerals on Mars and their geologic environments: Implications for the history of water*, Jet Propulsion Laboratory, April 2009.

Service

University:

Under the Elms (Development Office) Speaker, 1991, 1994, 1995
 Brown Summer Science Adventure, workshop on remote sensing, 1993.
 Brown Parents Council participant
 MacMillan Hall Dedication, seminar and video, 1998
 Member of the Environmental Science Committee
 Parents Leadership Weekend, Speaker and Workshop, Water in the Environment, March 2000
 Freshman Advising, 2000-2001, 2003-2004, 2004-2005, 2005-2006
 Co-developed the Environmental Change Initiative
 Speaker, Parents Weekend, October 2003
 Alumni Office, Meeting of the Minds:
 Dallas, May 2004
 Tuscon, November, 2004
 Washington DC, April 2005
 Greenwich, CT, April 2009
 Development Office, Denver gathering, November 2004.
 Spoke at the President's Leadership Council Dinner, February 2004
 Presentation to Corporation Members, February 2004
 A Day on College Hill Presentation to Parents, April 2005
 Brown University Staff Development Day Presentation, June 2005

Brown- Marine Biological Laboratory Oversight Committee 2004-present
Brown University Environmental Change Advisory Board, 2004-present
Chair of Search, Director, Center for Environmental Studies 2007-2008.

Department:

Departmental Computer Committee, 1993-1995, 1997-1999
Department Undergraduate Field Trip, Organized and Lead, 1992; Assisted 1994, 1995
Chair, Planetary Geoscience Group Computer Committee
Search Committee, Geochemistry of Environmental Change, 1998
Undergraduate Program, Geology concentration advisor, 1997-2001
Chair's Advisory Committee, 2000-2001, 2005-2008
Search Committee, Physics and Chemistry of Magma Processes, 2000-2001
Department Curricular Committee 2002-2003
Department Colloquium Committee 2003-2004
Search Committee, Director, CES and Environmental Change Initiative, 2003-2004
Search Committee, ESH Faculty position, 2004-2005.
Search Committee, Planetary Faculty position, 2006.
Search Committee, ECI Faculty Position, 2005-2006.
Search Committee, ECI Faculty Position, 2007-2008.

Professional Community:

Associate Editor, Proceedings of Lunar and Planetary Science, Volume 21, 1990
Associate Editor, Proceedings of Lunar and Planetary Science, Volume 22, 1991
Associate Editor, Journal of Geophysical Research-Planets, 1/96-12/98
Planetary Astronomy Mars Watch Review Panel, 1992
Organized and Convened AGU Special Session "Why Mars is Red", for Fall AGU 1994.
Member of NASA's Lunar and Planetary Geoscience Review Panel 1993-1995
(Remote Sensing Group Chief, 1994-1995)
Member, Management and Operations Working Group for the NASA Planetary Geology and Geophysics Program (S. Solomon, Chair), 1994-1996.
Executive Secretary, NASA's Terrestrial Planets Science Working Group (TePSWG), 1994-1996.
Member of the Mars Surveyor '98 Instrument Selection Panel, for NASA's division of Solar System Exploration, Oct. 1995.
Member of EOS-AM1 panel to evaluate the algorithms and scientific yield from the Earth Observing System, May 1996
Invited Participant, EPA-NASA Workshop on Water Monitoring, Remote Sensing, and Advanced Technologies, Dec. 1996
Chair of Optics Panel, NASA Planetary Instrument Definition and Development Program Panel Review, fall, 1996 and 1997.
Member, NASA Science Definition Team for Mars Surveyor 2001 Orbiter, 1996-1997.
Member of Earth System Science Pathfinder Step 1 review panel, 1998.
Member of Review Panel for NASA's Land Use Land Cover Change program, 2000.
Member, NASA Science Definition Team for Mars'05 Mars Reconnaissance Orbiter, 2000-2001
Elected Secretary for the Planetary Sciences Section of AGU and member of the AGU Fall Program Planning Committee, 2000-2002.
Presentations on Liberal Arts Undergraduate Science Curricula to the Aga Khan University Planning Committee, 2001-2002
Member of the Space Studies Board Committee on Planetary and Lunar Exploration (COMPLEX), 9/98-01/02
Member, Space Studies Board, Solar System Exploration Survey Committee for the study "A New Strategy for Solar System Exploration", 5/01-7/02
NASA Mars Exploration Program, Pathways Steering Group, member, 02/01-06/01

Organized and Convened Workshop, Infrared Spectroscopy of Mars: From Theory and the Laboratory to Field Observations, LPI, Houston, 2002
 Member, NASA Science Concept Definition Team for Project Prometheus, 2003-2004
 Member NASA Astrobiology Field Laboratory Science Definition Team, 2003-2004
 Invited Participant: Applications of NASA's Land Cover/Land-Use Change (LCLUC) science results to NASA's national priority areas, 2003
 Invited Participant: Implementation planning process for the Land-Use/Land-Cover Change (LULCC) research element of the U.S. Climate Change Science Program strategic plan, 2003
 Organized and Convened AGU Special Session Evidence for Recent Climate Change on Mars, December 2003
 Development of Interdisciplinary Undergraduate Science Curriculum, Aga Khan University, Karachi Pakistan, June 2004.
 Member, NASA Space Science Advisory Committee (SScAC), 2002-2005
 Co-organized the 41st Brown-Vernadsky Microsymposium, Geological Evidence for Recent Climate Change on Mars, Houston, March, 2005
 Co-organized the special session OMEGA@Mars for the 36th Lunar and Planetary Science Conference, Houston, March, 2005
 Mars Science Laboratory 2009 Landing Site Steering Committee, 2006-2009.
 Co-organized the 45st Brown-Vernadsky Microsymposium, Geological Evidence for Recent Climate Change on Mars, Houston, March, 2007
 Chair of the Mars Exploration Program Assessment Group (MEPAG), 2007-2010
 Co-organized the special session The Noachian Mars for the Fall Meeting of the American Geophysical Union, 2007
 Co-organized the 47st Brown-Vernadsky Microsymposium, Geological Evidence for Recent Climate Change on Mars, Houston, March, 2008
 Co-organized the special session The Noachian Mars for the Fall Meeting of the American Geophysical Union, 2008
 Co-organized Phyllosilical Workshop, Paris, 2008
 Aga Khan University planning committee for Interdisciplinary Undergraduate Education, Babson College, 2009.

Spacecraft Involvement

- CRISM on Mars Reconnaissance Orbiter, Deputy PI, 2001-2009
- OMEGA on Mars Express, Co-Investigator, 2002-2008
- Moon Mineralogy Mapper (M3) on Chandrayan, Co-Investigator 2006-2009
- Earth Observer 1, Science Team Member, 2000-2002

Academic Honors, Awards, etc

- 5 awards for academic excellence at University of British Columbia (1979-1983)
- NSERC post-graduate scholarship (1986-1988)
- Named the Stephen Robert Assistant Professor by the Brown Corporation, 1/7/1998.

Memberships

- Sigma Xi (1992)
- American Geophysical Union
- American Society for Photogrammetry and Remote Sensing
- American Association for the Advancement of Science

Teaching

Courses:

GE133 Global Environmental Remote Sensing. Lecture course with lab developed for undergraduate and graduate students with environmental science interests. Spring semester, 1996/1997/1998/1999/2001/2003/2004/2005/2006/2007 (Enrollment 20-25)

GE233 Advanced Remote Sensing and GIS, New lecture and lab course for advanced topics in remote sensing, Fall semester 1997/2002/2005/2007 (Enrollment 4-8)

GE195 (21) Geographical Information Systems, Lecture and lab course centered around geographical information systems, Fall semester 2000 (Enrollment 10), joint with Lynn Carlson
GE0016 (21) Global Environmental Change. Freshman Seminar, Fall Semester 2003/2004
2004/2005, 2006/2007. (Enrollment 20)

Independent Study:

Jasper Oshun, fall 2005/2006

Undergraduate Advising:

6 students/year for the past 3 years

Graduate Advising:

Master's

J. Hays, 1995.

A. Sen, MSc, Environmental Studies 1997, (Joint with S. Hamburg)

H. Chen, 2001

Ph.D.

S. Tompkins (joint with C. M. Pieters), Ph.D. 1996.

L. Lin, began 9/95, M.Sc. 1998 Ph.D. 2002

C. Cooper, began 9/96, M.Sc. 1998 Ph.D. 2004

A. Elmore, began 9/97, M.Sc. 1999 Ph.D. 2003

B. Bradley began 9/2001 M.Sc. 2003 Ph.D. 2006

J. Fisher began 9/2001 M.Sc. 2003 Ph.D. 2006

R. Milliken began 9/2001 M.Sc. 2003 Ph.D. 2006

L. Roach began 9/2004 M.Sc. 2006 Ph.D. 2009

L. Kanner began 9/2004 M.Sc. 2006

G. Galford began 9/2004 M.Sc. 2006

B. Ehlmann began 9/2006 M.Sc. 2008

T. Garcia began 9/2006 M.Sc. 2008

J. Skok began 9/2007 M.Sc. 2009

Undergraduate Student Theses:

N. Taylor '94 Senior Honors thesis in Biology (Ecology), (D. Murray and S. Gaines)

E. Gonzales '94, Senior Honors thesis in geological sciences

A. Holdsworth '95, Summer research fellowship from National Institute for Global Environmental Change (NIGEC)

A. Ballantine '96, Senior thesis in geological sciences (UTRA Fellowship, 1995)

A. Trueba '96, Senior thesis in geological sciences (Joint with T. Herbert and D. Murray)

A. Sen, '96, Senior Thesis in Environmental Science (with S. Hamburg)
 G. Proctor, Senior Thesis, Geological Sciences, '97 (Prell)
 D. Wexler, Senior Thesis, Geological Sciences, '97 (joint with T. Herbert)
 M. Carney, Senior Thesis Environmental Science, '97 (Hamburg, Prell)
 E. Wolf, Senior Thesis, Geological Sciences, '98.5 (Prell)
 V. Gokaldos, Senior Thesis, Environmental Science, '99 (UTRA 1998, Hamburg)
 D. Lobell, Independent Study and Research, Applied Math '00
 L. Firestone, Senior Thesis, Environmental Science, '00 (A. Foster)
 G. Bulman, Senior Thesis, Geological Sciences, '00 (T. Herbert).
 M. Rifkin, Senior Thesis, Geological Science, '01
 C. Balazs, Senior Thesis, Environmental Science '01.
 A. Bashkar, Geological Sciences, '08

External Funding

Active Grants

<u>Agency</u>	<u>Project Title</u>	<u>Award Amount</u>	<u>Period Support</u>
NASA	The Moon as a Cornerstone to the Terrestrial Planets: The Formative Years (Carle Pieters, PI)	3,523,961	4/9/09-4/8/2013
NASA	Geologic Characterization of Phyllosilicate Deposition on Mars	282,680	7/13/06-9/30/10
NASA	Liaison Activity Between Omega and CRISM Instrument Teams	315,254	9/30/02-9/26/10
NASA	Hydration and Mineral Abundance from Reflectance Spectroscopy	170,000	7/18/07-7/17/10
NSF	Disaster, Resilience and the Built Environment on the Gulf Coast (John Logan, PI)	750,000	8/30/06-12/31/09
MBL	From Early Biospheric Metabolisms to the Evolutions of Complex Systems	191,993	7/1/03-10/31/09
MBL	Biogeochemical Consequences of Land-use Transitions along Brazil's Agricultural Fields	78,000	9/1/06-8/31/09
NASA	Compact Reconnaissance Imaging Spectrometer for Mars (CRISM)	1,900,000	12/1/01-6/28/09
NASA	Moon Mineralogy Mapper for Chandrayaan-1 (Carle Pieters, PI)	3,215,455	3/1/05-5/31/09
Total		\$10,427,343.00	

Completed Grants

<u>Agency</u>	<u>Project Title</u>	<u>Award Amount</u>	<u>Period Support</u>
NASA	Hydration of Geological Materials from Reflectance Spectroscopy	72,181	7/11/06 – 7/10/08
NASA	MDAP Program: Investigation of Martian surface Composition and the record for recent climate change	245,000	6/01/03-5/31/07
JPL	Mineralogy Maps of OMEGA Data to Support Mars Exploration	69,617	2/17/05-4/30/07
NASA	Hydration of Geological Materials from Reflectance Spectroscopy	292,000	4/1/03-3/31/07
NSF	Resistance and Resilience of the Natural and Build Environments In Response to Disaster: Impacts of Katrina	100,000	11/3/05-11/2/06
NASA	Salt Marsh Assessment and Restoration Tool	46,027	6/01/05-5/31/06
NASA	Landscape dynamics and Land Use Land Cover Change in the Great Basin-Mojave Desert Region	350,000	8/1/01-9/1/04
NASA	NOPP Application of an Integrated Monitoring and Modeling System to Narragansett Bay	54,000	8/01/02-8/01/03
NASA	Mineralogy of the Martian Surface: Crustal Composition to Surface Processes	211,000	3/1/00-2/03/03
NASA	MDAP Program: Reflectance and Thermal Infrared Spectroscopy of Mars: Relationship between ISM and TES for compositional determinations Data for Vegetation Monitoring	172,000	5/15/00-5/14/03
NASA	EO-1 Evaluation Precision and Accuracy of EO-1 ALI Data for Vegetation Monitoring	141,000	3/1/00-12/31/02
NASA	Brown University Affiliated Research Center for the Northeast	625,000	8/6/98-6/30/02
CMER	Optical Properties of Temperatures of Narragansett Bay from Remote Sensing for Environmental Monitoring	50,000	6/1/00-7/1/02
NASA	Mineralogy of the Martian Surface: Crustal Composition to Surface Processes	275,000	1/3/96-2/28/00
NASA	Environmental Remote Sensing of Narragansett Bay	640,000	6/96-12/00

NASA	Dynamics of a Semi-Arid Region in Response to Climate Change and Water-Use Policy	350,000	9/97-12/00
NASA	A Computer Learning Center for Remote Sensing and GIS	155,000	10/97-9/99
Desert Research Institute	Spectral Mixture Modelling: Objective Determination of Image Endmembers and the Effects of Nonlinear Mixture Systematics	291,400	7/95-6/98
NASA	Constraints on the Magnitude of Lateral Mass Transport on the Moon	100,000	2/96-1/98
RI DEM	Landsat Data for Environmental Monitoring	24,500	6/96-12/97
NASA	Composition, alteration, and redistribution of low albedo materials on Mars from ISM data.	112,370	1/3/93-2/28/96
NECUSE	Mission to Planet Earth: The Planetary Perspective, Laboratory Modules for Earth System Science	32,500	6/93-6/94
NECUSE	Field Modules for Remote Sensing	21,500	7/94-12/94
JPL Science	Applications of Advanced Sensor Development Using On-board Information Extraction Algorithms	71,487	1/15/92-6/30/94
Total		\$4,501,582.00	