

Curriculum Vitae

John Fraser Mustard

Professor of Earth, Environmental and Planetary Sciences and
Environment and Society

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

6/2017-1/2018 Distinguished Visiting Scholar, Jet Propulsion Laboratory/CalTech, Pasadena, CA
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* Kluwer Netherlands (2004).

Book Chapters

Mustard, J.F. and T. D. Glotch, Chapter 2: Theory of Reflectance and Emittance Spectroscopy of Geologic Materials in the Visible and Infrared Regions, in *Remote Compositional Analysis: Techniques for Understanding Spectroscopy, Mineralogy, and Geochemistry of Planetary Surfaces*, Janice L. Bishop, Jeffrey Moersch and James F. Bell, III (eds), Cambridge University Press (2019)

Murchie, S. L., J. P. Bibring, R. E. Arvidson, J. L. Bishop, J. Carter, B. L. Hellmann, Y. Langevin, J. F. Mustard, F. Poulet, L. Riu, K. D. Seelos and C. E. Viviano, Visible to Short-Wave Infrared Spectral Analyses of Mars from Orbit Using CRISM and OMEGA, in *Remote Compositional Analysis: Techniques for Understanding Spectroscopy, Mineralogy, and Geochemistry of Planetary Surfaces*, Janice L. Bishop, Jeffrey Moersch and James F. Bell, III (eds), Cambridge University Press (2019)

Mustard, J. F., Sequestration of Volatiles in the Martian Crust Through Hydrated Minerals: A Significant Planetary Reservoir of Water, in *Volatiles in the Martian Crust* (Filibert, J. and S. Schwenzer eds). (2018)

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* Kluwer 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

Submitted

2023

Kaufmann, S.V., J. F. Mustard, K. Maher P. Keleman, Short, Cold, and Mostly Dry Conditions in NE Syrtis Leading to the Olivine-Carbonate Unit Formation: Results from Reactive Transport Modeling (2023) (submitted to Earth and Planetary Science Letters)

Kremer, C.H., J. F. Mustard, C. M. Pieters, (2023) (Submitted). Cross-over infrared spectroscopy of pyroxenes: Determination of Mg-Fe composition in the 4-8 micron wavelength range.

Kremer, C.H., J. F. Mustard, C. M. Pieters, B. T. Greenhagen, K. L. Donaldson Hanna. (In Prep for JGR: Planets). Cross-over infrared (4-8 microns) spectroscopy of particulate mixtures: Effects of modal abundance, simulated lunar environment, and composition on detection and characterization of mafic minerals.

Published

2022

Case, Nicola T., Min Song, Avery H. Fulford, Heather V. Graham, Victoria J. Orphan, Jason E. Stajich, Arturo Casadevall, J. F. Mustard, J. Heitman, B. Sherwood Lollar and E. Cowen (2022) Exploring Space via Astromycology: A Report on the CIFAR Programs Earth 4D and Fungal Kingdom Inaugural Joint Meeting, Astrobiology, <https://doi.org/10.1089/ast.2021.0186>.

Das, E., J.F. Mustard, J.D. Tarnas, A.C. Pascuzzo, C.H. Kremer (2021) Investigating the origin of gypsum in Olympia Undae: Characterizing the mineralogy of the basal unit, Icarus <https://doi.org/10.1016/j.icarus.2021.114720>

Hundal, C. B., J. F. Mustard, C. H. Kremer, J. D. Tarnas, and A. C. Pascuzzo (2022) The Circum-Isidis Capping Unit: An Extensive Regional Ashfall Deposit Exposed in Jezero Crater. *Geophysical Research Letters*: e2021GL096920

Michalski, J. R., Goudge, T. A., Crowe, S. A., Cuadros, J., Mustard, J. F., & Johnson, S. S. (2022). Geological diversity and microbiological potential of lakes on Mars. *Nature Astronomy*, 6(10), 1133-1141.

Nikitczuk, M. P., G. E. Bebout, T. Ota, T. Kunihiro, J. F. Mustard, R. L. Flemming, R. Tanaka, S. A. Halldórsson, and E. Nakamura (2022) Nitrogenous Altered Volcanic Glasses as Targets for Mars Sample Return: Examples from Antarctica and Iceland, *Journal of Geophysical Research - Planets* (in press)

Nikitczuk, M. P., Gray E. Bebout, Charles A. Geiger, Tsutomu Ota, Takuya Kunihiro, John F. Mustard, Sæmundur A. Halldórsson, and Eizo Nakamura. (2022) "Nitrogen Incorporation in Potassic and Micro-and Meso-Porous Minerals:

Potential Biogeochemical Records and Targets for Mars Sampling." *Astrobiology* 22, no. 11: 1293-1309.

Pascuzzo, A. C., T. Conduz, S. Li, J.F. Mustard (2022) Sensitivity analysis of ice/dust aerosol and phase function assumptions on Hapke spectral unmixing and band depth parameters of martian water ice, *Icarus*
<https://doi.org/10.1016/j.icarus.2021.114804>

Published

2021

Ferguson, G., McIntosh, J.C., Warr, O., Sherwood Lollar, B., Ballentine, C.J., Famiglietti, J.S., Kim, J.H., Michalski, J.R., Mustard, J.F., Tarnas, J. and McDonnell, J.J., (2021). Crustal groundwater volumes greater than previously thought. *Geophysical Research Letters*, 48 (16) doi: e2021GL093549.

Lin, H., J. D. Tarnas, J. F. Mustard, X. Zhang, Y. Wei, W. Wan, F. Klein, J. R. Kellner Dynamic aperture factor analysis/target transformation (DAFA/TT) for Mg-serpentine and Mg-carbonate mapping on Mars with CRISM near-infrared data, *Icarus Remote Sens.* 2021, 13(3), 500; <https://doi.org/10.3390/rs13030500> (2021)

Tarnas, J. D., Mustard, J. F., Sherwood Lollar, B., V. Stamenković V., K.M. Cannon, K. M., Lorand J. P., T.C. Onstott, T. C., Michalski, J. R., Warr, O., Palumbo. A., and A.-C. Plesa, (2021), Earth-like habitable environments in the subsurface of Mars, *Astrobiology* <https://doi.org/10.1089/ast.2020.2386>

Tarnas, J. D., J. F. Mustard, X. Wu, E. Das, K. M. Cannon, C. B. Hundal, A. C. Pascuzzo, J. R. Kellner, and M. Parente. (2021) Successes and challenges of factor analysis/target transformation application to visible-to-near-infrared hyperspectral data. *Icarus* <https://doi.org/10.1016/j.icarus.2021.114402>

Tarnas, J.D., Stack, K.M., Parente, M., Koeppel, A.H.D., Mustard, J.F., Moore, K.R., Horgan, B.H.N., Seelos, F.P., Cloutis, E.A., Kelemen, P.B. and Flannery, D., (2021) Origins of carbonate-bearing rocks in Jezero crater: Importance of ancient subsurface habitable environments, *JGR Planets*
<https://doi.org/10.1029/2021JE006898>

Wu, X., Mustard, J.F., Tarnas, J.D., Zhang, X., Das, E. and Liu, Y. (2021). Imaging Mars analog minerals' reflectance spectra and testing mineral detection algorithms. *Icarus*, 369, p.114644.

Wu, Xing, Xia Zhang, John Mustard, Jesse Tarnas, Honglei Lin, and Yang Liu. "Joint Hapke Model and Spatial Adaptive Sparse Representation with Iterative Background Purification for Martian Serpentine Detection." *Remote Sensing* 13, no. 3 (2021)

2020

Connor Matherne, J.R. Skok, J.F. Mustard, Suniti Karunatillake, Peter Doran (2020) Multistage ice-damming of volcanic flows and fluvial systems in Northeast Syrtis Major, *Icarus*, Volume 340, <https://doi.org/10.1016/j.icarus.2019.113608>.

Kremer, C.H., Mustard, J.F. and Pieters, C.M., (2020). Cross-Over Infrared Spectroscopy: A New Tool for the Remote Determination of Olivine Composition. *Geophysical Research Letters*, 47(20), p.e2020GL089151

Tarnas, J. D., Mustard, J. F., Lollar, B. S., Bramble, M. S., Cannon, K. M., Palumbo, A. M., & Plesa, A. C. 2020. Radiolytic H₂ production on Noachian Mars: Implications for habitability and atmospheric warming. [*Earth Planet. Sci. Lett.* 502 (2018)]

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- Stamenković, M., N. Lanza, R. E. Grimm, J. Mustard, V. Orphan, K. Rogers, K. Zacny et al. Probing the Modern-Day Martian Subsurface Habitability with Valkyrie, *V. Astronomy* 3 (2020): 116-120.

2019

- Beatty, David W., Monica M. Grady, Harry Y. McSween, Elliot Sefton-Nash, Brandi L. Carrier, Francesca Altieri, Yuri Amelin et al. "The potential science and engineering value of samples delivered to Earth by Mars sample return: International MSR Objectives and Samples Team (iMOST)." *Meteoritics & planetary science* 54 (2019): S3-S152 doi: 10.1111/maps.13232
- Bramble, M. S., Goudge, T. A., Milliken, R. E., & Mustard, J. F. (2019). Testing the deltaic origin of fan deposits at Bradbury Crater, Mars. *Icarus*, 319, 363-366.
- Bramble, Michael S., Yazhou Yang, William R. Patterson III, Ralph E. Milliken, John F. Mustard, and Kerri L. Donaldson Hanna. "Radiometric calibration of thermal emission data from the Asteroid and Lunar Environment Chamber (ALEC)." *Review of Scientific Instruments* 90, no. 9 (2019): 093101.
- Kremer, Christopher H., John F. Mustard, and Michael S. Bramble. "A widespread olivine-rich ash deposit on Mars." *Geology* 47, no. 7 (2019): 677-681
DOI: 10.1130/G45563.1
- Lin, Honglei, John F. Mustard, and Xia Zhang. "A methodology for quantitative analysis of hydrated minerals on Mars with large endmember library using CRISM near-infrared data." *Planetary and Space Science* 165 (2019): 124-136
DOI: 10.1016/j.pss.2018.11.005
- Mayes, M., Melillo, J., Neill, C., Palm, C, Mustard, J. and Nayadi, G., Nitrogen Cycle Patterns During Forest Regrowth in an African Miombo woodland Landscape, *Journal of Geophysical Research-Biogeosciences*, Vol. 124, pp. 1591-1603 (2019)doi: DOI: 10.1029/2018JG004803
- Pascuzzo, A. C., Mustard, J. F., Kremer, C. H., & Ebinger, E. (2019). The formation of irregular polygonal ridge networks, Nili Fossae, Mars: Implications for extensive subsurface channelized fluid flow in the Noachian. *Icarus*, 319, 852-868.
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silica in Jezero crater, Mars." *Geophysical Research Letters* 46, no. 22 (2019): 12771-12782 DOI: 10.1029/2019GL085584

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- Michalski, J. R., T. C. Onstott, S. Mojzsis, J. Mustard, Q. Chan, P. B. Niles and S. S. Johnson (2018) *The Mars subsurface as a potential window into the origin of life*, *Nature Geoscience*, <https://doi.org/10.1038/s41561-017-0015-2>
- Salvatore, M. R., Goudge, T. A., Bramble, M. S., Edwards, C. S., Bandfield, J. L., Amador, E. S., Mustard, J. F., and Christensen, P. R. "Bulk mineralogy of the NE Syrtis and Jezero crater regions of Mars derived through thermal infrared spectral analyses." *Icarus* 301 (2018): 76-96.
- Tarnas, J. D., J. F. Mustard, B. Sherwood Lollar, M. S. Bramble, K. M. Cannon, A. M. Palumbo, and A-C. Plesa. "Radiolytic H₂ production on Noachian Mars: Implications for habitability and atmospheric warming." *Earth and Planetary Science Letters* 502 (2018): 133-145.
- Lin, H., J. F. Mustard, X. Zhang (2018) *A methodology for quantitative analysis of hydrated minerals on Mars with large endmember library using CRISM near-infrared data*, *Planetary and Space Science*, <https://doi.org/10.1016/j.pss.2018.11.005> 2018
- Lin, H., X. Zhang, X. Wu, J. D. Tarnas, and J. F. Mustard, (2018) *Target transformation constrained sparse unmixing (TTCSU) Algorithm for retrieving hydrous minerals on Mar: Application to Southwest Melas Chasma*. *International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences* 42, no. 3.

2017

- Bramble, M. S., Mustard, J. F., & Salvatore, M. R. (2017). *The geological history of Northeast Syrtis Major, Mars*. *Icarus*, 293, 66-93. doi: 10.1016/j.icarus.2017.03.030
<http://www.sciencedirect.com/science/article/pii/S0019103516303499>
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- Goudge, T. A., Milliken, R. E., Head, J. W., Mustard, J.F., and Fassett, C. I. (2017), *Sedimentological evidence for a deltaic origin of the western fan deposit in Jezero crater, Mars and implications for future exploration*, *Earth Planetary Science Letters* vol. 458, p. 357-365, doi 10.1016/j.epsl.10.056
- Goudge, T. A., Russell, J. M., Mustard, J. F., Head, J. W., & Bijaksana, S. (2017), *A 40,000 year record of clay mineralogy at Lake Towuti, Indonesia: Paleoclimate reconstruction from reflectance spectroscopy and perspectives on paleolakes on Mars*. *Geological Society of America Bulletin GSA Bulletin* (2017) 129 (7-8): 806-819 DOI:10.1130/B31569.
- Mayes, M., J Mustard, J Melillo, C Neill, G Nyadzi (2017), *Going beyond the green: senesced vegetation material predicts basal area and biomass in remote sensing of tree cover conditions in an African tropical dry forest (miombo woodland) landscape*, *Environ. Res. Lett.* 12 085004
<https://doi.org/10.1088/1748-9326/aa7242>
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- Spera S. A., VanWey L. K., Mustard J. F. (2017) *The drivers of sugarcane expansion in Goiás*. *Land Use Policy* 66: 111–119.

2016

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2015

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- Fassett, C.I., T.A. Goudge, J.W. Head, and J.F. Mustard (2015) Open-Basin Lakes and the Climate and Surface Environment of Early Mars, *46th Lunar and Planetary Science Conference*, Abstract #1880.
- Goudge, T.A., K.L. Aureli, J.W. Head, J.F. Mustard, and C.I. Fassett (2015) Candidate Closed-Basin Lakes on Mars: Insights into Timing and Intensity of Fluvial Activity, *46th Lunar and Planetary Science Conference*, Abstract #1190.
- Goudge, T.A., J.F. Mustard, J.M. Russell, and J.W. Head (2015) Paleolake Deposits on Mars: Perspectives on Source-to-Sink Mineralogy from Lake Towuti, Indonesia, *46th Lunar and Planetary Science Conference*, Abstract #1191.
- Greenberger, R.N., J.F. Mustard, G.R. Osinski, L.L. Tornabene, A. Pontefract, C.L. Marion, R.L. Flemming, J.H. Wilson, and E.A. Cloutis (2015) Hyperspectral mapping of a hydrothermal vug and its weathering products at the Haughton impact structure, Canada, *GSA Annual Meeting*, Abstract 21-25.
- Greenberger, R.N., J.F. Mustard, G.R. Osinski, L.L. Tornabene, A. Pontefract, C.L. Marion, R.L. Flemming, J.H. Wilson, and E.A. Cloutis (2015) Hydrothermal Formation and Oxidation of a Calcite-Marcasite Vug at the Haughton Impact Structure: Mapping of Alteration Assemblages with Hyperspectral

- Imaging, *46th Lunar and Planetary Science Conference*, Abstract #2267.
- Head, J., J. Dickson, J. Mustard, R. Milliken, D. Scott, B. Johnson, D. Marchant, J. Levy, K. Kinch, and C. Hvidberg (2015) Mars Human Science Exploration and Resource Utilization: The Dichotomy Boundary Deuteronilus Mensae Exploration Zone, *First Landing Site/Exploration Zone Workshop for Human Missions to the Surface of Mars*, Abstract #1033.
- Mayes, M., J. Melillo, J. Mustard, C. Neill, and G. Nyadzi (2015), Carbon and nitrogen cycle dynamics during forest regrowth in the dry tropical Miombo Woodlands of western Tanzania, paper presented at EGU General Assembly Conference Abstracts.
- Mayes, M.T., J. Melillo, J.F. Mustard, C. Neill, and G. Nyadzi (2015) Carbon, nitrogen cycling and land cover changes during regrowth in African dry tropical forests: integrating perspectives from field and satellite data across a chronosequence in the Miombo Woodlands of western Tanzania, *AGU Fall Meeting 2015*, Abstract #B21L-08
- Murchie, S. L., Adams, E. Y., Mustard, J. F., Rivkin, A., & Paplowksi, P. N. (2015). *The Advanced Jovian Asteroid Explorer (AJAX)*. Paper presented at the 2015 AGU Fall Meeting, San Francisco, CA.
- Mustard, J. (2015), Mechanisms for Olivine Carbonation at the Nili Fossae/Isidis Basin Boundary, Mars: Evidence of Intense Surface Aqueous Activity, in 2015 AGU Fall Meeting, edited, pp. Abstract P31F-05, Agu, San Francisco, CA.
- Mustard, J.F. (2015) Mineralogic Constraints on Late Noachian Climate, *46th Lunar and Planetary Science Conference*, Abstract #2362.
- Mustard, J.F., and K.M. Cannon (2015) Biosignatures Preserved in Quenched Impact Glass at Mars Landing Sites: A Case Study from the Nili Fossae Trough, *Astrobiology Science Conference 2015*, Abstract #7654.
- Mustard, J.F., T.A. Goudge, M.S. Bramble, B.L. Ehlmann, J.W. Head, J.L. Dickson, and C.I. Fassett (2015) Jezero Crater Watershed, Isidis Basin, Sulfate Deposits and Syrtis Major: A Compelling Exploration Zone for Human Exploration, *First Landing Site/Exploration Zone Workshop for Human Missions to the Surface of Mars*, Abstract #1034.
- Mustard, J.F., S.M. Wiseman, and T.A. Goudge (2015) Mechanisms for olivine carbonation at the Nili Fossae/Isidis Basin boundary, Mars: Evidence for intense surface aqueous activity or low temperature surface alteration, *GSA Annual Meeting*, Abstract 21-11.
- Spera, S., M. Coe, G.L. Galford, M. Macedo, and J.F. Mustard (2015) The Expansion of Agriculture and Its Effects of Evapotranspiration in Brazil's Newest Agricultural Frontier, *AGU Fall Meeting 2015*, Abstract #H13S-01
- Wiseman, S.M., and J.F. Mustard (2015) Relative carbonate abundances throughout Nili Fossae, Mars, *GSA Annual Meeting*.
- Yang, X., J.E. Lee, J. Berry, J. Tang, J.F. Mustard, C. Van der Tol, J. Kellner, and C. Silva (2015) Solar-induced Fluorescence as a Proxy for Canopy Photosynthesis in a Temperate Deciduous Forest: Comparisons between Observations and Model Results, *AGU Fall Meeting 2015*, Abstract #B21K-07

2014

- Blaney, D.L., S.L. Murchie, R.O. Green, J. Mustard, M. Jeganathan, P. Mouroulis, B. Van Gorp, J. Rodriguez, S. Tucker, J. Nastal, T. Glavich, M. Helmlinger, J. Ferdosi, A. Santo, F. Morgan, F. Seelos, K. Strobehbeh, J. Lees, E. Smith, A. Allwood, J. Bishop, J. Boardman, N. Bridges, B. Ehlmann, J. Farmer, T. Hoehler, J. Johnson, P. King, K. Lewis, N. Mangold, R. Milliken, M. Minitti, M. Smith, M. Vinedon, and M. Wolff (2014) MinMap: An Instrument Concept for the Mars 2020 Mission, *45th Lunar and Planetary Science Conference*, Abstract #2037.
- Cannon, K.M., and J.F. Mustard (2014) Vitreous, Brecciated Mars: Integrating Global Imaging Spectroscopy with Rover Data and Martian Meteorites, *GSA Annual Meeting*, Abstract 202-215.
- Cannon, K.M., and J.F. Mustard (2014) Oobleck and Order: The Amorphous History of Mars, *45th Lunar and Planetary Science Conference*, Abstract #1962.

- Cannon, K.M., J.F. Mustard, and C.B. Agee (2014) What Mars is Made of: Reconciling Orbital Datasets with Clues from the Spectrum of Northwest Africa 7034, *77th Annual Meeting of the Meteoritical Society*, Abstract #5072.
- Cannon, K.M., J.F. Mustard, C.B. Agee, J.H. Wilson, and R.N. Greenberger (2014) Black Beauty's Rainbow: Hyperspectral Imaging of Northwest Africa 7034, *Eighth International Conference on Mars*, Abstract #1361.
- Cannon, K.M., J.F. Mustard, C.D.K. Herd, and J. Filiberto (2014) Melting Mars with Impacts: Proximal Melt Deposits and Their Compositions as Determined by Remote Sensing, *45th Lunar and Planetary Science Conference*, Abstract #1954.
- Cannon, K.M., J.F. Mustard, R.E. Milliken, C.M. Pieters, T. Hiroi, and J.H. Wilson (2014) A Tool for Rapid Non-Destructive Characterization of Planetary Materials: Hyperspectral Imaging in the Visible/near-Infrared, *Meteorit Planet Sci*, A64-A64.
- Cannon, K.M., J.F. Mustard, and S.W. Parman (2014) Preserved Quenched Impact Melts on the Martian Surface from the Detection of Glass and Chromian Spinel, *Eighth International Conference on Mars*, Abstract #1341.
- Ehlmann, B.L., J.F. Mustard, S.L. Murchie, R.O. Green, P. Mouroulis, B. Van Gorp, M. Jeganathan, Y.-H. Wu, T. Glavich, R. Bartos, J. Nastal, K. Strohbehn, D.L. Blaney, J. Boardman, J. Farmer, W. Fischer, J. Grotzinger, C.D.K. Herd, T. Hoehler, J. Hurowitz, M.E. Schmidt, F. Seelos, M. Wadhwa, A. Santo, and J. Ferosi (2014) Microimaging Spectroscopy on Mars with CIMMBA, Proposed for Mars-2020: The Caching-Supporting Infrared Microimager for Mineralogy and Biosignature Assessment, *45th Lunar and Planetary Science Conference*, Abstract #2824.
- Filiberto, J., J. Gross, J. Trela, K.M. Cannon, S. Penniston-Dorland, A. Wittmann, B. Jolliff, P. Carpenter, E.C. FerrÈ, and J. Mustard (2014) Gabbroic Shergottite Northwest Africa 6963, *77th Annual Meeting of the Meteoritical Society*, Abstract #5064.
- Goudge, T.A., J.W. Head, J.F. Mustard, and C.I. Fassett (2014) A Transported Origin for Alteration Minerals Within the Jezero Crater, Mars Paleolake Basin: Evidence from Catchment and Delta Mineralogy, *45th Lunar and Planetary Science Conference*, Abstract #1164.
- Goudge, T.A., J.W. Head, J.F. Mustard, C.I. Fassett, and K.L. Aureli (2014) Insights from Paleolake Hydrologic Setting: A Comparison of Hydrologically Open and Candidate Hydrologically Closed Basins on Mars, *Eighth International Conference on Mars*, Abstract #1367.
- Goudge, T.A., J.F. Mustard, J.W. Head, and J.M. Russell (2014) Source to Sink Mineralogy in Lake Towuti, Indonesia: Perspectives on Open-Basin Lakes on Mars, *45th Lunar and Planetary Science Conference*, Abstract #1190.
- Goudge, T.A., J.F. Mustard, J.W. Head, and J.M. Russell (2014) Source to sink mineralogy in Lake Towuti, Indonesia from reflectance spectroscopy: Insights into paleolake deposits on Mars, *GSA Annual Meeting*, Abstract 170-111.
- Greenberger, R.N., J.F. Mustard, E. Cloutis, L.M. Pratt, P.E. Sauer, P. Mann, K. Turner, and M.D. Dyar (2014) Aqueous Conditions and Habitability Associated with Formation of a Serpentine: Using Analyses of Ferric Iron and Stable Carbon Isotopes to Reconstruct Hydrogen Production, *AGU Fall Meeting Abstracts*, Abstract #P33C-4040.
- Greenberger, R.N., J.F. Mustard, E.A. Cloutis, P. Mann, K.M. Cannon, and J.H. Wilson (2014) Mineral Assemblages and Spectral Signatures of Altered Lacustrine Pillow Basalts: A Northeastern U.S. Analog for Lava-Water Interactions on Mars, *49th Annual GSA Northeastern Section meeting*, Abstract #236217.
- Greenberger, R.N., J.F. Mustard, E.A. Cloutis, P. Mann, and J.H. Wilson (2014) Aqueous Alteration Rinds in Basalt: Mineralogic Characterization from Hand Sample to Outcrop with Hyperspectral Imaging and Implications for Mars 2020, *Eighth International Conference on Mars*, Abstract #1028.
- Greenberger, R.N., J.F. Mustard, E.A. Cloutis, P. Mann, J.H. Wilson, and K.M. Cannon (2014) Remote Sensing of Volcano-Lacustrine Interactions: Implications for Mars, *45th Lunar and Planetary Science Conference*, Abstract #1543.
- Greenberger, R.N., J.F. Mustard, E.A. Cloutis, P. Mann, J.H. Wilson, and R.L. Flemming (2014)

- Characterization of Alteration of Lacustrine Pillow Basalts: Insights from Hyperspectral Imaging and Implications for Water-rock Interactions on Mars, *GSA Annual Meeting*, Abstract #170-172.
- Greenberger, R.N., J.F. Mustard, E.A. Cloutis, L.M. Pratt, P.E. Sauer, P. Mann, K. Turner, and M.D. Dyar (2014) Understanding the Nature of Water-rock Interactions in a Serpentinizing System: Implications for Planetary Exploration and Subsurface Habitability, *GSA Annual Meeting*, Abstract #111-119.
- Greenberger, R.N., J.F. Mustard, G.R. Osinski, L.L. Tornabene, C.L. Marion, A. Pontefract, and E.A. Cloutis (2014) Spectral Mapping of Alteration Phases Within a Hydrothermal Vug at the Haughton Impact Structure, *45th Lunar and Planetary Science Conference*, Abstract #1923.
- Mann, P., E.A. Cloutis, R.N. Greenberger, R.E. Millikin, T. Hiroi, J.F. Mustard, R.L. Klima, C.A. Hibbitts, J.B. Plescia, J.F.I. Bell, T.L. Roush, J.L. Bishop, and B.L. Ehlmann (2014) An Interlaboratory UV/VIS/NIR Wavelength Calibration Study, *45th Lunar and Planetary Science Conference*, Abstract #2392.
- Mustard, J.F. (2014) Water meets rock in the shallow subsurface of Mars: Extent and duration of crustal hydrothermal systems, *GSA Annual Meeting*, Abstract 111-113.
- Mustard, J.F. (2014) Accessing Surface and Subsurface Habitable Environments of Ancient Mars, *AGU Fall Meeting Abstracts*, Abstract #P32A-05.
- Mustard, J.F., and S.M. Wiseman (2014) Carbonate-Olivine-Phyllosilicate Associations Across the Noachian-Hesperian Boundary, *45th Lunar and Planetary Science Conference*, Abstract #2583.
- Mustard, J.F., S.M. Wiseman, and T.A. Goudge (2014) Carbonate in Nili Fossae at the Noachian-Hesperian Boundary: Importance of post-Syrtis Hydrological Systems, *Eighth International Conference on Mars*, Abstract #1344.
- Ody, A., K.M. Cannon, F. Poulet, J.F. Mustard, C. Quantin, and J. Filiberto (2014) Search for Analogue Sites of New Martian Shergottite Spectra Using NIR Data, *45th Lunar and Planetary Science Conference*, Abstract #2207.
- Ody, A., F. Poulet, C. Quantin, K.M. Cannon, J.F. Mustard, and J.-P. Bibring (2014) Candidate Source Regions for SNC Meteorites on Mars, *Eighth International Conference on Mars*, Abstract #1227.
- Skok, J.R., and J.F. Mustard (2014) Glaciation and Volcanic Interaction to form the Modern Northeast Syrtis Region of Mars, *45th Lunar and Planetary Science Conference*, Abstract #1924.
- Spera, S., J.F. Mustard, L. VanWey, and A. Cohn (2014) Quantifying and Assessing Land Use and Land Cover Change Dynamics in a Global Breadbasket, *2nd Global Land Project Open Science Meeting*.
- Spera, S.A., J.F. Mustard, and L. VanWey (2014) Mapping Large-Scale Mechanized Agriculture Across the Brazilian Cerrado Between 2001-2013, *AGU Fall Meeting Abstracts*, Abstract B33E-0231.
- Tornabene, L.L., G.R. Osinski, R.N. Greenberger, J.L. Bishop, E.A. Cloutis, C.L. Marion, J.F. Mustard, A. Pontefract, and M.S. Ramsey (2014) The Pre-, Syn- and Post-Impact Origin of Hydrated Phases: A Case Study Based on the Remote Sensing and Ground-Truth at the Haughton Impact Structure, Nunavut, Canada, *45th Lunar and Planetary Science Conference*, Abstract #2710.
- Viviano-Beck, C.E., F.P. Seelos, S.L. Murchie, E.G. Kahn, K.D. Seelos, H.W. Taylor, K. Taylor, B.L. Ehlmann, S.M. Wisemann, J.F. Mustard, and M.F. Morgan (2014) Revised CRISM Spectral Parameters and Summary Products, *45th Lunar and Planetary Science Conference*, Abstract #2444.
- Wiseman, S.M., B.L. Ehlmann, and J.F. Mustard (2014) Characterization of Carbonate Compositions and Mineral Assemblages to Constrain Geochemical Conditions, *45th Lunar and Planetary Science Conference*, Abstract #2249.
- Wiseman, S.M., B.L. Ehlmann, and J.F. Mustard (2014) Characterization of Carbonate Compositions and Mineral Assemblages in Nili Fossae to Constrain Geochemical Conditions, *Eighth International Conference on Mars*, Abstract #1346.
- Yang, X., J. Tang, J.F. Mustard, J.E. Lee, M. Rossini, J. Joiner, J.W. Munger, and A.D. Richardson (2014) Seasonal pattern of solar-induced fluorescence as a proxy for canopy photosynthesis in a temperate deciduous forest, *AGU Fall Meeting Abstracts*, Abstract #B31F-0092.

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*, Institut 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 Records 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*, Institut 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.
- *Skyscappers Astroassembly, Smithfield Rhode Island: What's next for Mars Exploration* October 1, 2011
- *Presentation to the American Meteorological Society Annual Meeting of Broadcast Meteorologist: Mars: Understanding the Red Planet* August 2012
- *Evolving Concepts of Mars Habitability*, Origins Institute, McMaster University September 2012.
- *Invited Keynote, Canadian Space Summit, Evolving Concepts of Mars Habitability*, November 2012
- *Georgia Institute of Technology, School for Earth and Atmospheric Science, Evolving Concepts of Mars Habitability*, November 2012
- *Talk to the Boston Museum of Science*, August, 2013
- *Talk to the Department of Geography, Clark University* Sept. 2013
- *Invited SCUGOG Keynote, Western University of London, Ontario, February 2015*
- *Talk to the Brown Club of New Mexico*, October 2015
- *Talk to the Brown Club of San Diego*, October 2015
- *University of South Dakota*, November 2016
- *MIT short course on Astrobiology*, January 2017
- *Mars Forum, Jet Propulsion Laboratory*, November 2017
- *Lunar and Planetary Laboratory, University of Arizona, Tucson, December 2017*
- *American Museum of Natural History, Hayden Planetarium, March 2, 2020*
- *Walrus Talks Exploration, at TELUS Spark, Calgary AB, Canada March 5, 2020*
- *Lehigh Department of Earth and Environmental Sciences, October 2, 2020*

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
 Tucson, November, 2004
 Washington DC, April 2005
 Greenwich, CT, April 2009

Boldly Brown Celebration
San Francisco October 2009
Seattle, October 2009
Naples FL Brown Club 2012
Parents Weekend 2012

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.
Committee to Review the Environmental Studies Concentration-2012-2013
Member of the Search Committee for Brown University Provost 2014
Member of the Deficit Reduction Working Group 2014-2015
Member of the Academic Priorities Committee 2013-2016
University Resource Committee 2020-2024
Member of the Search Committee for Brown University Provost 2022

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, 2009-2022
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.
Chair Search Committee, Planetary Faculty position, 2010-11.
Chair Search Committee, Planetary Faculty position, 2011-12.
Chair Search Committee, ECI Faculty Position in remote sensing, 2012-2013.
Chair Search Committee, Planetary Faculty position, 2013-2014.
Chair Search Committee, Planetary Faculty position, 2014-2015.
Ethics Committee Case, 2019
Chairs Advisory Committee 2011-2022
IBES Seed Grant Evaluation Committee 2022
Tenure and Promotion Committee Dr. Manu Di Lorenzo 2022
Lincoln Field Renovation Committee 2021-2022
DEEPS Awards Committee 2020-2025

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
Senior Editor of the journal Astrobiology
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
Member of the Planetary Science Subcommittee of the NASA Advisory Council 2007-2010
Co-organized Phyllosilicate Workshop, Paris, 2008
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
Aga Khan University planning committee for Interdisciplinary Undergraduate Education, Babson College, 2009.
Member of the Space Studies Board 2010-2014
Chair of the Mars 2020 Science Definition Team 2014
Member of the Mars 2020 Standing Review Board 2014-2020
Member of the Mars Architecture Strategy Working Group 2019-2020
Member of the AGU Bowie Award committee 2022-2025
Member of AGU Planetary Sciences Section Awards Committee, 2012-2016

Spacecraft Involvement

- CRISM on Mars Reconnaissance Orbiter, Deputy PI, 2001-2016
- OMEGA on Mars Express, Co-Investigator, 2002-2013
- 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.
- Elected as a Fellow of the American Association for the Advancement of Science 2011.
- Awarded the NASA Medal for Exceptional Public Service 2012
- Elected fellow of the American Geophysical Union 2014

Memberships

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

Teaching

Courses:

EEPS 0050 Mars, Moon, and the Earth. Lecture course, the planets and their histories are compared to gain insight and a new perspective on planet Earth. Fall Semester 2016-2022 (Enrollment ≈165)

EEPS 1330 Global Environmental Remote Sensing. Lecture course with lab developed for undergraduate and graduate students with environmental science interests. Spring semester, 1996-2022 (Enrollment 20-25)

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)

GEOL2330 Advanced Remote Sensing and GIS, New lecture and lab course for advanced topics in
remote sensing, Fall semester 1997/2002/2005/2007/2016/2019 (Enrollment 4-8)

EEPS 2700 Life Beyond Earth Spring Semester 2020 Seminar course on Astrobiology taught jointly
with Alex Evans (Enrollment 6)

EEPS 2910 Planetary Crusts. Lecture course for advanced topics in the development and
characteristics of Planetary Crusts. Fall 2015 Spring 2022 (Enrollment 10-15)

Independent Study:

Jasper Oshun, fall 2005/2006

Undergraduate Advising:

6 students/year for the past 3 years

Graduate Advising:

Master's

J. Hays M.Sc. 1995.
A. Sen MSc, Environmental Studies 1997, (Joint with S. Hamburg)
H. Chen M.Sc. 2001
L. Kanner M.Sc. 2006
T. Garcia M.Sc. 2008
J. Wilson M.Sc. 2012
E. Fisher began 9/2016 M.Sc. 2016 M.Sc. 2020

Ph.D. Bolded names are now professors

S. Tompkins (joint with C. M. Pieters),			Ph.D. 1996.
L. Lin,	began 9/1995	M.Sc. 1998	Ph.D. 2002
C. Cooper	began 9/1996	M.Sc. 1998	Ph.D. 2004
A. Elmore	began 9/1997	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
G. Galford	began 9/2004	M.Sc. 2006	Ph.D. 2010
B. Ehlmann	began 9/2006	M.Sc. 2008	Ph.D. 2010
J. Skok	began 9/2007	M.Sc. 2009	Ph.D. 2012
M. Salvatore	began 9/2008	M.Sc. 2010	Ph.D. 2013
X. Yang	began 9/2010	M.Sc. 2012	Ph.D. 2014
R. Greenberger	began 9/2010	M.Sc. 2012	Ph.D. 2015
T. Goudge	began 9/2010	M.Sc. 2012	Ph.D. 2015
M. Mayes	began 9/2011	M.Sc. 2014	Ph.D. 2016
S. Spera	began 9/2011	M.Sc. 2013	Ph.D. 2016
K. Cannon	began 9/2012	M.Sc. 2014	Ph.D. 2017
M. Bramble	began 9/2014	M.Sc. 2016	Ph.D. 2019
A. Pascuzzo	began 9/2015	M.Sc. 2018	Ph.D. 2021

S. Kaufmann	began 9/2016	M.Sc. 2018	Ph.D. 2022
J. Tarnas	began 9/2016	M.Sc. 2018	Ph.D. 2021
C. Kremer	began 9/2017	MSc. 2019	Ph.D. 2022
Carol Hundal	began 9/2019	MSc. 2021	
Kierra Wilk	began 9/2021		

Post-Doctoral Advising:

Shannon Pelkey 2004-2007
 Aline Gendrin 2005-2008
 Mathieu Vincendon 2008-2010
 Mario Parente 2010-2012
 Sandra Wiseman 2010-2014

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
 J. Oshun, Geological Sciences, '09
 L. Saper, Geological Sciences, '12
 M Swann, Geological Sciences, '14
 Eashan Das EEPS 2020-2021
 Katie O'Leary EEPS 2020-2021
 Jean Allen EEPS 2020-2021
 Tamara Rudic EEPS 2020-2021
 Amanda Cutler Science and Society concentration 2020-2021