

CURRICULUM VITAE

Dr. Brian Michael Hynek

Full Professor in the Department of Geological Sciences and
Research Associate at the Laboratory for Atmospheric and Space Physics
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Educational Background

Ph.D. in Earth and Planetary Sciences, Washington University, St. Louis, MO, 2003
M.A. in Earth and Planetary Sciences, Washington University, St. Louis, MO, 2001
B.A. in Earth Science, Earth Science Education, and All Sciences Education,
University of Northern Iowa, Cedar Falls, IA 1998

Profile

Dr. Brian M. Hynek is a Full Professor in the Department of Geological Sciences and Faculty Research Associate in the Laboratory for Atmospheric and Space Physics (LASP), both at the University of Colorado. He is also the Director of CU's Center for Astrobiology. His recent research has focused on the geologic, geochemical, hydrologic, and climatic evolutions of the planet Mars. Brian conducts Mars analog work on acid-sulfate systems including within active Central American and Icelandic volcanoes and laboratory experiments and modeling to help constrain the natural environment and assess habitability. He has been studying the Meridiani hematite site and other regional layered deposits that contain sulfate minerals and their astrobiological potential. He also has research interests in Martian drainage morphometry, the thermophysical properties of Mars, impact craters, and the physics of volcanic eruptions on Earth and other planets. Brian teaches undergraduate and graduate courses at the University of Colorado covering topics such as the geology of the solar system, astrobiology, and geographic information systems.

Research

Planetary Science

Recent Research: Professor in Geological Sciences (2007-present) and Research Associate at the Laboratory for Atmospheric and Space Physics, University of Colorado, 2003-present

- Detailed the geology, chemistry and biology of acidic terrestrial volcanic systems analogous to conditions that were widespread on early Mars.
- Produced a Mars geologic map of the Meridiani region of Mars for the USGS; currently drafting two more planetary geologic maps for the USGS.
- Characterized the geomorphic signatures of water on Mars, including valley networks, deltas, and paleolakes.

- Used analytical and supercomputer modeling techniques to infer the required climatic state and history of water on Mars.
- Studied the mineralogical signatures of water:rock interactions on Mars from orbiting and landed missions to ascertain the character of the water and local paleoconditions.
- Used impact craters to assess the impact flux through time on Mars and determine the history of water and volcanism on the Red Planet.
- Completed the largest crater database and valley network map for Mars, both of which are widely used by the community.
- Developed an advanced, high-resolution, context and microscopic stereo imaging system for future planetary rovers (currently at TRL 5-6).

Doctoral Research: Department of Earth and Planetary Sciences, Washington University (Research Advisor: Dr. Roger Phillips), 1999-2003

- Thesis title: The surface evolution of Mars with emphasis on hydrologic and volcanic processes.
- Major Mars-related projects that resulted in first author papers include geological mapping of the Meridiani landing site, analysis of valley networks, detailing extensive regions of erosion, and examining layered deposits possibly emplaced by explosive volcanic eruptions.

Additional Planetary Science Research Experience

- Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution, (mentor: Dr. James Zimbelman), 1998
 - Mapped large sections of the Medusae Fossae Formation, Mars, to infer its origin.
- USGS Flagstaff Astrogeology Branch, (mentor: Dr. Ken Tanaka) 1997
 - Used multiple data sets to study candidate landing sites in the Valles Marineris, Mars.

Peer-Reviewed Publications (author = student or post-doc formally supervised by Hynek)

2022

Wang, J. L., Dragone, N. B., Avard, G., and **Hynek, B. M.**, Microbial survival in an extreme martian analog ecosystem: Poás volcano, Costa Rica, *Frontiers in Astronomy and Space Sciences*, <https://doi.org/10.3389/fspas.2022.817900>.

2021

McCollom, T. M. and **Hynek, B. M.**, Geochemical data indicate highly similar sediment compositions for the Grasberg and Burns formations on Meridiani Planum, Mars, *Earth and Planetary Science Letters*, <https://doi.org/10.1016/j.epsl.2020.116729>, 2021.

Hoover, R., Robbins, S. J., Putzig, N., Riggs, J., and **Hynek, B. M.**, Insight into formation processes of layered ejecta craters on Mars from thermophysical observations, *Journal of Geophysical Research – Planets*, 126(12), e2020JE006801.

Skjetne, H. L., Singer, K. N., **Hynek, B. M.**, Knight, K. I., Schenk, P. M., Olkin, C. B., ... & Ennico, K., Morphological comparison of blocks in chaos terrains on Pluto, Europa, and Mars. *Icarus*, 356, 113866, 2021.

2020

Hynek, B. M. and Chojnacki, M., Geologic map of the Coprates Chasma Quadrangle (MTM – 15057), Mars, *U.S. Geological Survey Scientific Investigations Map*, scale 1:500,000, in technical review, 2020.

Hynek, B. M., Gemperline, J. D., Robbins, S. J., and Mueller, K. J., Geologic map of the Rembrandt basin, Mercury, *U.S. Geological Survey Scientific Investigations Map*, scale 1:2,000,000, in technical review, 2020.

Fernandez-Remolar, D. C. et al., How the geochemical cycle of chlorine may have controlled the global sedimentary conditions on early Mars, *Nature Scientific Reports*, in revision, 2020.

Black, S. R., **Hynek, B. M.**, McHenry, L. J., McCollom, T. M., Cameron, B. I., and Glenister, C., Bulk mineralogy of surficial hydrothermal acid-sulfate deposits at Námafjall, Þeistareykir Geothermal Field, and Hengill Volcano, Iceland: Implications for the identification and interpretation of hydrothermal deposits on Mars, *Journal of Geophysical Research*, in review, 2020.

Vaz, D. A., Di Achille, G, **Hynek, B. M.**, Nelson, W., and Williams, R. M. E., Martian fan deposits: Insights on depositional processes and origin from mass balance survey, *Earth and Planetary Science Letters*, <https://doi.org/10.1016/j.epsl.2019.116049>, 2020.

Skjetne, H. L., Singer, K. N., **Hynek, B. M.**, et al., Morphological comparison of blocks in chaos terrains on Pluto, Europa, and Mars, *Icarus*, <https://doi.org/10.1016/j.icarus.2020.113866>, 2020.

Yingst, R. A., Cohen, B., Black, S., Gemperline, J., Kronyak, R., Chidsey, T., Williams, R. M. E., Minitti, M., Adams, M., Bartley, J., El-Maarry M. R., Kah, L, Vanden Berg, M., **Hynek, B. M.**, and Lotto, M., Is a linear or a walkabout protocol more efficient for robotic sample selection in a small region of interest?, *Astrobiology*, <https://doi.org/10.1089/ast.2019.2090>, 2020.

2019

Hynek, B. M., McCollom, T. M., and Szyrkiewicz, A., Sulfur cycling and mass balance at Meridiani, Mars, *Geophysical Research Letters*, DOI: 10.1029/2019GL085115, 2019.

2018

Hynek, B. M., K. L. Rogers, M. Antunovich, G. Avar, G. E. Alvarado, Lack of microbial diversity in extreme Mars analog settings: Poás volcano, Costa Rica, *Astrobiology*, 18, DOI: 10.1089/ast.2017.1719, 2018.

Black, S. R., and **Hynek, B. M.**, Characterization of terrestrial hydrothermal alteration products with Mars analog instrumentation: Implications for current and future rover investigations. *Icarus*, 307, 235-259, 2018.

Lotto, M., D., Klaus, and **B. M. Hynek**, In-situ resources and environmental conditions for surface exploration missions on Mars, *Advances in Space Research*, Vol. 6, No. 4, DOI: 10.1089/space.2018.0019, 2018.

El-Maarry, M. R., **B. M. Hynek**, S. R. Black, and A. Yingst, Testing Operational Strategies for a Mars Helicopter using an Unmanned Aerial Vehicle (UAV), *Planetary and Space Science*, in minor revision, 2018.

McCullom, T. M., Donaldso, C., Moskowitz, B., Berquó, T. S., and **B. M. Hynek**, Phosphorous immobility during formation of the layered sulfate deposits of the Burns Formation at Meridiani Planum, *Journal of Geophysical Research-Planets*, 123(5), 1230-1254, 2018.

Yingst, R. A., Bartley, J., Chidsey, T., Cohen, B., Gilleaudeau, G., **Hynek, B.**, Kah, L., Minitti, Williams, R., Black, S., Gemperline, J., Schaufler, and Thomas R., Testing the efficiency of rover science protocols for robotic sample selection: A GeoHeuristic Operational Strategies Test, *Acta Astronautica*, 146, 300-315, 2018.

2017

Hynek, B. M. and G. Di Achille, Geologic map of Meridiani Planum, Mars: *U.S. Geological Survey Scientific Investigations Map 3356*, pamphlet 9 p., scale 1:2,000,000, <https://doi.org/10.3133/sim3356>, 2017.

Hynek, B. M. and S. J. Mojzsis, The great Mars climate paradox redux: REPLY, *Geology*, 45 (2), 410-410, 2017.

Thomas, R. J., Potter-McIntyre, S. L., and **Hynek, B. M.** Large-scale fluid-deposited mineralization in Margaritifer Terra, Mars, *Geophysical Research Letters*, 44(13), 6579-6588, 2017.

Thomas, R. J., **Hynek, B. M.**, Osterloo, M. M., and Kierein-Young, K. S., Widespread exposure of Noachian phyllosilicates in the Margaritifer region of Mars: Implications for paleohydrology and astrobiological detection, *Journal of Geophysical Research: Planets*, 122(3), 483-500, 2017.

Herrick, R. R., and **Hynek, B. M.**, Investigating target versus impactor influences on Martian crater morphology at the simple-complex transition, *Meteoritics & Planetary Science*, 52(8), 1722-1743, 2017.

Yingst, R. A., Berger, J., Cohen, B. A., **Hynek, B.**, and Schmidt, M. E. (2017). Determining best practices in reconnoitering sites for habitability potential on Mars using a semi-autonomous rover: a GeoHeuristic Operational Strategies Test. *Acta Astronautica*, 132, 268-281.

2016

Hynek, B.M., Research Focus: The great climate paradox of Mars, *Geology*, 44 (10), 879-880, 2016.

R. J. Thomas, **B. M. Hynek**, D. A. Rothery, and S. J. Conway, Mercury's low-reflectance material: Constraints from hollows. *Icarus*, 277, 455-465, 2016.

S. R. Black, R. A. Yingst, and **B. M. Hynek**, Field-portable VNIR spectrometry: Applications for Mars rover operational strategies testing at terrestrial analog sites, *Advances in Portable and Handheld Spectroscopy*, 29-36, 2016.

R. A. Yingst, J. Berger, B. A. Cohen, **B. M. Hynek**, and M. E. Schmidt, Determining best practices in reconnoitering sites for habitability potential on Mars using a semi-autonomous rover: A GeoHeuristic Operational Strategies Test, *Acta Astronautica*, 132, 268-281, 2016.

2015

Hynek, B.M., M. K. Osterloo, and K. S. Young, Late Stage Formation of Martian Chlorides, *Geology*, doi:10.1130/G36895.1, 2015.

- Dohm, J. M., et al., Geological and hydrological histories of the Argyre province, Mars. *Icarus*, 253, 66-98, 2015.
- Small, E. E., Blom, T., Hancock, G. S., **Hynek, B. M.**, & Wobus, C. W., Variability of rock erodibility in bedrock-floored stream channels based on abrasion mill experiments, *Journal of Geophysical Research: Earth Surface*, 120(8), 1455-1469, 2015.
- Hargitai, H., (**B. M. Hynek**, editor), *Encyclopedia of Planetary Landforms*, Springer Press, ISBN 978-3-319-26559-9, 2460 p., 2015.

2014

- Hoke M. R. T., **Hynek B. M.**, Di Achille G., Hutton E. W. H, The effects of sediment supply and concentrations on the formation timescale of martian deltas, *Icarus*, 228, 1-12, 2014.
- Robbins, S. J., and **B. M. Hynek**, The Secondary Crater Population of Mars, *Earth & Planetary Science Letters*, 400, 66-76, doi: 10.1016/j.epsl.2014.05.005, 2014.
- Yingst R. A., B. A. Cohen, **B. M. Hynek**, M. E. Schmidt, C. Schrader, and A. Rodriguez, Testing Mars Exploration Rover-inspired operational strategies for semi-utonomous rovers on the moon II: The GeoHeuristic operational Strategies Test in Alaska. *Acta Astronautica*, 99, 24-36, 2014.
- McCollom, T. M., B. L. Ehlmann, A. Wang, **B. M. Hynek**, B. Moskowitz, T. S. Berquó, Detection of iron substitution in natroalunite-natrojarosite solid solutions and potential implications for Mars, *American Mineralogist*, 99, 948-964, 2014.

2013

- Hynek, B. M.**, T. M. McCollom, E. C. Marcucci, K. Brugman, and K. L. Rogers, Assessment of Environmental Controls on Acid-Sulfate Alteration at Active Volcanoes in Nicaragua: Applications to Relic Hydrothermal Systems on Mars, *Journal of Geophysical Research - Planets*, 118, 1–22, doi:10.1002/jgre.20140, 2013.
- Marcucci, E. C., and **B. M. Hynek**, Experimental and theoretical alteration of basalt and basaltic minerals under acid-sulfate conditions at elevated temperatures: Implications for early Mars, *Journal of Geophysical Research - Planets*, 119, doi:10.1002/2013JE004439, 2013.
- Marcucci, E. C., **B. M. Hynek**, K. S. Kierein-Young, and K. L. Rogers, Visible to near-infrared spectroscopy of volcanic acid-sulfate weathering systems in Nicaragua: Analogs for early Mars alteration, *Journal of Geophysical Research - Planets*, 118, 2213-2233, 2013.
- McCollom, T. M., **B. M. Hynek**, K. L. Rogers, B. Moskowitz, and T. S. Berquó, Chemical and mineralogical trends during acid-sulfate alteration of pyroclastic basalt at Cerro Negro volcano, a Mars analog site, *Journal of Geophysical Research - Planets*, doi:10.1002/jgre.20114, 2013.
- McCollom, T. M. M. Robbins, B. Moskowitz, T. S. Berquó, N. Jöns, and **B. M. Hynek**, Experimental study of acid-sulfate alteration of basalt and implications for sulfate deposits on Mars, *Journal of Geophysical Research - Planets*, 112,577–614, doi:10.1002/jgre.20044, 2013.
- Robbins, S.J., and **B.M. Hynek**, Utility of laser altimeter and stereoscopic terrain models to derive complex morphology: Application to Martian craters, *Planetary and Space Science*, 86, 57-65, doi: 10.1016/j.pss.2013.06.019, 2013.

Robbins, S. J., **B. M. Hynek**, R. J. Lillis, and W. K. Bottke, The Large Impact Crater History of Mars, *Icarus*, 225, 173-184, doi: 10.1016/j.icarus.2013.03.019, 2013.

Yingst, R. A., B. A. Cohen, **B. M. Hynek**, J. B. Johnson, M. E. Schmidt, and C. M. Schrader, Science-Driven Strategies for Semi-Autonomous Rovers on the Moon: Field Test at an Ice-Bearing Regolith Analog, *Acta Astronautica*, doi: 10.1016/j.actaastro.2014.01.019, 2013.

2012

Dohm, J.M., et al., Mars Evolution, in *Mars: Evolution, Geology and Exploration*, Ed. A. Fairen. Nova Science Publishers, Inc., Hauppauge, NY, 2012.

Eppler, D. et al., Desert Research and Technology Studies (D-RATs) 2010 Science Operations: Operational Approaches and Lessons Learned for Managing Science During Human Planetary Surface Missions, *Acta Astronautica*, 2012.

Hynek, B. M., Uninhabitable Martian Clays?, *Nature Geoscience (News and Views)*, 5, 683-684.

Robbins, S. J. and **B. M. Hynek**, A New Global Database of Mars Impact Craters ≥ 1 km: 1. Database Creation, Properties, and Parameters, *Journal of Geophysical Research - Planets*, 117, doi: 10.1029/2011JE003966, 2012.

Robbins, S. J. and **B. M. Hynek**, A New Global Database of Mars Impact Craters ≥ 1 km: 2. Global and Regional Properties and Their Implications to Gravity Scaling, *Journal of Geophysical Research - Planets*, 117, doi:10.1029/2011JE003967, 2012.

2011

Hynek, B. M., S. J. Robbins, O. Sramek, S. J. Zhong, Geological Evidence for a Migrating Tharsis Plume on Early Mars, *Earth and Planetary Science Letters*, 310, 327–333, 2011.

Hynek, B. M., K. L. Rogers, and T. M. McCollom, Cerro Negro, Nicaragua: Mars Analog for Acid-Sulfate Weathering of Basalts, GSA Special Paper 483: Planetary Analog Environments, (Bleacher and Garry, eds.), p. 287–300, doi:10.1130/2011.2483(19), 2011.

Collins G. S., D. Elbeshausen, T. M. Davison, S. J. Robbins, **B. M. Hynek**, The Size-Frequency Distribution of Elliptical Impact Craters, *Earth and Planetary Science Letters*, 310, doi: 10.1016/j.epsl.2011.07.023

Hoke, M.R.T., **B. M. Hynek**, and G. E. Tucker, Formation Timescales of Large Martian Valley Networks, *Earth and Planetary Science Letters*, 311, doi:10.1016/j.epsl.2011.09.053, 2011.

Robbins, S. J. and **B. M. Hynek**, Distant Secondary Craters from Lyot Crater, Mars, and Implications for Surface Ages of Planetary Bodies, *Geophysical Research Letters*, 38, doi:10.1029/2010GL046450, 2011.

Robbins, S. J. and **B. M. Hynek**, Secondary Crater Fields from 24 Large Primary Craters on Mars: Insights into Nearby Secondary Crater Production. *Journal of Geophysical Research - Planets*, 116, doi:10.1029/2011JE003820, 2011.

Robbins, S. J., G. Di Achille, and **B. M. Hynek**, The Volcanic History of Mars: High-Resolution Crater-Based Studies of the Calderas of 20 Volcanoes, *Icarus*, 211, 1179–1203, 2011.

2010

Hynek, B. M., M.R.T. Hoke, and M. Beach, Updated Global Map of Martian Valley Networks and Implications for Climate and Hydrologic Processes, *Journal of Geophysical Research - Planets*, 115, E09008, doi:10.1029/2009JE003548, 2010.

- Hynek, B. M.**, Extraterrestrial Digital Elevation Models: Constraints on Planetary Evolution, with Focus on Mars, *International Journal of Remote Sensing*, 31:23, 6259-6274, 2010.
- Di Achille, G.**, and **B. M. Hynek**, Ancient Ocean on Mars Supported by Global Distribution of Deltas and Valleys, *Nature Geoscience*, 3, 459-463, doi:10.1038/ngeo891, 2010.
- Di Achille, G.** and **B. M. Hynek**, Chapter 10: Deltas and Valley Networks on Mars: Implications for a Global Hydrosphere, in Lakes on Mars, N. Cabrol and E. Grin eds., Elsevier, ISBN: 978-0-444-52854-4, 410 pp., 2010.
- Osterloo, M. M., F. S. Anderson, V. E. Hamilton, and **B. M. Hynek**, Geologic Context of Proposed Chloride-Bearing Materials on Mars, *Journal of Geophysical Research - Planets*, 115, doi: 10.1029/2010JE003613, 2010.

2009

- Hynek, B. M.**, Ancient Equatorial Ice on Mars?, *Nature Geoscience (News and Views)*, 2, 169-170, 2009.
- Di Achille, G.**, **B. M. Hynek**, and M. L. Searls, Lake Strandlines Observed by the High Resolution Imaging Science Experiment (HiRISE) in Shalbatana Vallis, Mars, *Geophysical Research Letters*, 36, doi:10.1029/2009GL038854, 2009.
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2008

- Hynek, B. M.** and R. J. Phillips, The Stratigraphy of Meridiani Planum, Mars, and Implications for the Layered Deposits' Origin, *Earth and Planetary Science Letters*, 274, 214–220, 2008.
- Chojnacki, M.**, and **B. M. Hynek** The Geological Context of Water-Altered Minerals in the Valles Marineris, Mars, *Journal of Geophysical Research - Planets*, 113, doi:10.1029/2007JE003070, 2008.
- Des Marais, D. J., B. M. Jakosky, and **B. M. Hynek**, Chapter 26: Astrobiological Implications of Mars Surface Composition and Properties, in Mars Surface Composition, Mineralogy, and Physical Properties, Jim Bell ed., Cambridge University Press, ISBN: 978-0521866989, 652 pp., 2008.

2007

- Hynek, B. M.**, and **K. Singer**, Ground Truth from the Opportunity Rover for Mars Thermal Inertia Data, *Geophysical Research Letters*, 34, L11201, doi:10.1029/2007GL029687, 2007.

2006

- Chojnacki, M.**, B. M. Jakosky, and **B. M. Hynek**, Surficial Properties of Landslides and Surrounding Units in Ophir Chasma, Mars, *Journal of Geophysical Research - Planets*, 111, doi:10.1029/2005JE002601, 2006.
- Jakosky B. M., **B. M. Hynek**, S. M. Pelkey, M. T. Mellon, S. Martínez-Alonso, N. E. Putzig, N. Murphy, P. R. Christensen, Thermophysical Properties of the MER and Beagle II Landing Site Regions on Mars, *Journal of Geophysical Research - Planets*, 111, doi:10.1029/2004JE002320, 2006.

McCollom, T. M., and **B. M. Hynek**, Planetary Science: Bedrock Formation at Meridiani Planum (Reply), *Nature*, 443, doi:10.1038/nature05213, 2006.

2005

McCollom, T. M., and **B. M. Hynek**, A Volcanic Environment for Bedrock Diagenesis at Meridiani Planum on Mars, *Nature*, 438, doi:10.1038/nature04390, 2005.

2004

Hynek, B. M., Extensive Bedrock Throughout Terra Meridiani, Mars: Implications for Hydrologic Processes, *Nature*, 431, doi:10.1038/nature02902, 2004.

2003

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2001

Hynek, B. M., and R. J. Phillips, Evidence for Extensive Denudation of the Martian Highlands, *Geology*, 29, 407-410, 2001.

Phillips, R. J., M. T. Zuber, M. P. Golombek, B. M. Jakosky, W. B. Banerdt, D. E. Smith, R. M. E. Williams, **B. M. Hynek**, et al., Ancient Geodynamics and Global-Scale Hydrology of Mars, *Science*, 291, 2587-2591, 2001.

Sanger, M. J., D. M. Brecheisen, and **B. M. Hynek**, Can Computer Animations Affect College Biology Students' Conceptions About Diffusion & Osmosis?, *American Biology Teacher*, 63, 104-109, 2001.

Conference Proceedings

Brian Hynek's Research Group has presented over 200 non-peer reviewed papers at national and international conferences and professional meetings since 2007. Below are some of Hynek's first-author contributions.

Hynek, B. M. and Szyrkiewicz, A. Mars' global sulfur cycle, (invited talk), *Goldschmidt Geochemistry Conference*, Boston, MA, 2018.

Hynek, B. M., et al., Lack of microbial diversity in an extreme Mars analog setting: Poás volcano, Costa Rica, 49th *Lunar and Planetary Science Conference*, Houston, TX, 2018.

- Hynek, B. M., Hydrothermal systems as abodes for life on ancient Mars, *Goldschmidt Geochemistry Conference*, Paris, France, 2017.
- Hynek, B. M., et al., Unlocking Mercury's Geological history with detailed mapping of Rembrandt basin: Year 2, *LPI Contributions 1920, Planetary Mappers Meeting*, Flagstaff, AZ, 2016.
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- Hynek, B. M., et al., Geologic mapping of the Coprates chasma (mtm -15057), Mars: Year 1, *Planetary Mappers Meeting*, Honolulu, HI, 2015.
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- Hynek, B. M., The History of Water on Mars: Synthesis of New Results from Valley Networks and Deltas, *Exploring Mars Habitability*, Lisbon, Portugal, 2011.
- Hynek, B. M., Interior Layered Deposits in Valles Marineris, Mars, *International Space Sciences Institute Workshop*, Berne, Switzerland, 2011.
- Hynek, B. M., S. J. Robbins, O. Sramek, and S. Zhong, Geological Evidence for a Migrating Tharsis Plume on Early Mars, *42nd Lunar and Planetary Science Conference*, The Woodlands, Texas, abs. 1603, 2011.

- Hynek B. M. Finding and Using Planetary Data: An Alternative to Terrestrial Data, *NSF's On the Cutting Edge - Professional Development for Geoscience Faculty: Designing Effective and Innovative GIS and Remote Sensing Courses*, Pittsburgh, PA and online, 2011.
- Hynek, B. M. and G. Di Achille, Geologic Mapping of the Meridiani Region of Mars, *Annual Planetary Mappers' Meeting*, Flagstaff, AZ, NASA/CP—2010—217041, 2010.
- Hynek, B. M., The Ins and Outs of Planetary Geoscience Data and Tools, *NSF Cutting Edge Workshop on Using GIS and Remote Sensing to Teach Geoscience in the 21st Century*, Montana State University, Bozeman, MT, 2010.
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- Hynek, B. M. Assessing the History of Water on Mars through Global Analysis of Valley Networks, *AGU Annual Meeting*, San Francisco, CA, Eos Trans. AGU, 89(53), Whipple Session, abs. P44C-05, 2008.
- Hynek, B. M., The Potential for Life on Ancient Mars, *National Academy of Sciences Kavli Symposium*, Newport Beach, CA, 2008.
- Hynek, B. M., M. Beach, and M.R.T. Hoke, Updated Global Map of Martian Valley Networks: Implications for Hydrologic Processes, *2nd Martian Valley Network Workshop*, Moab, UT, 2008.
- Hynek, B. M., and T. M. McCollom, Evaluating the Geologic History of Meridiani Planum on Mars through Laboratory Experiments and Modeling, *CU Vice Chancellor's Innovative Seed Grant Program*, Boulder, CO, 2008.
- Hynek, B. M., M. Beach, and M.R.T. Hoke, Updated Global Map of Martian Valley Networks and Implications for Hydrologic Processes, *39th Lunar Planet. Sci. Conf.*, The Woodlands, TX, abs. 2353, 2008.
- Hynek, B. M., K L. Rogers, and T. M. McCollom, Cerro Negro, Nicaragua: A Key Mars Analog Environment for Acid-Sulfate Weathering, *7th Intl. Conf. on Mars*, Pasadena, CA, abs. 3213.pdf, 2007.
- Hynek, B. M., K. L. Rogers, and T. M. McCollom, Cerro Negro Volcano, Nicaragua: An Analog for Geochemical Processes on Early Mars and Assessment of their Potential for Life, *Geological Society of America's Annual Meeting*, Denver, CO, abs. T91-013-4, 2007.
- Hynek, B. M., East Meridiani, *Paper presented at the 2nd Mars Science Laboratory Landing Site Workshop*, Pasadena, CA, 2007.

Grant Funding as the Principal Investigator or Institutional PI

Existing (>\$1M)

- Assessing a Cold-Icy vs. Warm-Wet Climate for Early Mars, NASA-Mars Data Analysis Program, PI, 8/2018-7/2022, \$502,000.

- Evaluation of Formation Mechanisms for Stepped Fans, NASA Mars Data Analysis Program, R. E. Williams, PI; B. M. Hynek, Institutional PI, 4/2014-3/2021, \$105,000 (CU's portion).
- Understanding relict Martian hydrothermal systems using Icelandic analogs, NASA Habitable Worlds, L. McHenry, PI; B. M. Hynek, Institutional PI, 5/2016-4/2021, \$192,509 (CU's portion).
- Understanding Layered Ejecta Craters ("Lobate") on Mars: Keys to Subsurface Water?, NASA Mars Data Analysis Program, 8/2015-7/2021, S. J. Robbins, PI; B. M. Hynek, Institutional PI, \$62,057 (CU's portion).
- Investigating the Influence of Salinity on Aqueous Chemistry, Alteration Mineralogy, and Microbiology at Mars Analog Hydrothermal Systems, NASA-FINESST graduate fellowship, 8/2020-5/2023, B. M. Hynek, PI, Richard Archer, graduate student, \$135,000.

Grant Funding as a Co-Investigator

Existing

- Analysis of Martian Craters within the Simple-Complex Transition, NASA Mars Data Analysis Program, Co-I, 6/2018-5/2021, \$55,000 (CU's portion).
- Investigation of Jarosite and Alunite in Jurassic Sandstones as Analogs for Mars, NASA Mars Fundamental Research Program, T. M. McCollom, PI; B. M. Hynek, Co-I, 4/2019-3/2022, \$640,000.
- Analysis of Geochemical Trends in Mars Rover Data, NASA Mars Data Analysis Program, T. M. McCollom, PI; B. M. Hynek, Co-I, 6/2016-5/2021, \$218,000.

Education and Teaching

University of Colorado Boulder, CO, 2004-present

Courses Taught at The University of Colorado:

2004

Introductory Solar System Astronomy (ASTR-1000, 3 credits, 185 students)

2005

Special Planetary Topics: Mars (GEOL/ASTR/ATOC-5840, 3 credits, graduate level, co-taught)

2007

Introductory Solar System Astronomy and Lab (ASTR-1010, 4 credits, 220 students)

Planetary Field Geology in Hawaii (GEOL-5700, 1 credit, graduate level, 12 students)

Planetary Surfaces and Interiors (GEOL/ASTR/ATOC-5800, 3 credits, graduate level, 14 students)

2008

GIS for Geologists (GEOL-3050, 2 credits, 16 students)

Planetary Field Geology in Yellowstone (GEOL-5700, 1 credit, graduate level, co-taught)

2009

GIS for Geologists (GEOL-3050, 2 credits, 18 students)

GIS for Geologists (GEOL-3050, 2 credits, 20 students)

Planetary Surfaces and Interiors (GEOL/ASTR/ATOC-5800, 3 credits, graduate level, 14 students)

Planetary Science Seminar: Mars Polar Regions (GEOL/ASTR/ATOC-5835, 1 credit, graduate level, 12 students)

Planetary Field Geology in Utah, (GEOL-5700, 1 credit, graduate level, 20 students)

2010

Extraterrestrial Life (ASTR/GEOL-3300, 3 credits, 75 students)

GIS for Geologists (GEOL-3050, 2 credits, 20 students)

2011

Planetary Surfaces and Interiors (GEOL/ASTR/ATOC- 5800, 3 credits, graduate level, 12 students)

GIS for Geologists (GEOL-3050, 2 credits, 20 students)

Natural Catastrophes and Geologic Hazards (GEOL-3950, 3 credits, 170 students)

Planetary Field Geology in Death Valley (GEOL-5700, 1 credit, graduate level, 18 students, co-taught)

2012

GIS for Geologists (GEOL-3050, 2 credits, 20 students)

Planetary Science Seminar: MESSENGER Results from Mercury (GEOL/ASTR/ATOC-5835, 1 credit, graduate level, 9 students)

Extraterrestrial Life (ASTR/GEOL-3300, 3 credits, 75 students)

Planetary Field Geology in Hawaii (GEOL-5700, 1 credit, graduate level, 18 students),

2013

GIS for Geologists (GEOL-3050, 2 credits, 24 students)

Natural Catastrophes and Geologic Hazards (GEOL-3950, 3 credits, 165 students)

2015

Natural Catastrophes and Geologic Hazards (GEOL-3950, 3 credits, 126 students)

Planetary Science Seminar: Mars Science Laboratory Curiosity Results (GEOL/ASTR/ATOC-5835, 1 credit, graduate level, 17 students)

Planetary Surfaces and Interiors, (GEOL/ASTR/ATOC 5800; 3 credits, graduate level, 14 students)

Planetary Field Geology (GEOL 5700), 2 credit, graduate level, 20 students)

2016

GIS for Geologists (GEOL-3050, 2 credits, 24 students)

GIS for Geologists (GEOL-3050, 2 credits, 24 students)

Graduate Seminar (GEOL 5700, 1 credit, 16 students)

2017

Natural Catastrophes and Geologic Hazards (GEOL-3950, 3 credits, ~100 students)

2018

GIS for Geologists, (GEOL-3050, 2 credits, 24 students)

Planetary Surfaces and Interiors (ASTR/GEOL/ATOC 5800, 3 credits, 17 students)

Planetary Sciences Graduate Seminar - Using Earth to Understand the Planets

(ASTR/GEOL/ATOC 5835, 1 credit, 16 students)

Planetary Field Geology, (GEOL 5150, 2 credits, 8 day field course, 21 students)

2019

GIS for Geologists, (GEOL-3050, 2 credits, 24 students)

GIS for Geologists, (GEOL-3050, 2 credits, 24 students)

The Search for Life in the Universe (GEOL/ASTR-2040; 3 credits, 125 students)

2020

GIS for Geologists, (GEOL-3050, 2 credits, 24 students)

The Search for Life in the Universe (GEOL/ASTR-2040; 3 credits, 175 students)

Formal supervision of graduate and undergraduate students

Current PhD Candidates:

- Rachael Hoover (GEOL, *Fall 2018-present*)
- Richard Archer (GEOL, *Spring 2019-present*)
- Amanda Steckel (GEOL, *Spring 2020-present*)
- Justin Wang (AERO, co-advised, *Spring 2021-present*)
- Harry Brodsky (GEOL, *Fall 2020-present*)

Past PhD Candidates:

- Dr. Sarah Black (GEOL, *2013-2018*)
- Dr. Emma Marcucci (GEOL, *2009-2013*)
- Dr. Monica Hoke (APS/Geophysics, *2006-2011*)
- Dr. Stuart Robbins (APS/Geophysics, *2007-2011*)

Past MS Candidates:

- Joseph Butterfield (GEOL, *Fall 2018-present*)
- John Gemperline (GEOL, *Fall 2016-2020*)
- Michael Lotto (GEOL, *Fall 2017-2020*)
- Laura Beckerman (GEOL, *Fall 2013-2016*)
- Dr. Kennda Lynch (AERO, *2008*)
- Wendy Krauser (AERO, *2005*)

Other Formal Supervision of Graduate Students

- Sam van Kooten (APS, *2014-2016*)
- James Dohm (GEOL, *2012*)

- Edward Barrett (APS, 2012-2013)

Formal Supervisor of Paid Undergraduate Student Researchers

- Justin Wang (AERO/MCDB, 2017-present, UROP awardee)
 - Monique Autonovich (MCDB, 2015-2017, UROP awardee)
 - William Nelson (GEOL, 2016-2018)
 - Joe Martin (Oberlin College, 2016)
 - Kara Brugman (APS/GEOL, 2011-2014)
 - Danielle Russell (GEOL 2009-2010)
 - Michael Beach (GEOL/APS, 2007-2008)
 - Kelsi Singer (APS, 2006)
 - Matthew Chojnacki (APS, 2004-2005)
- Supervisor for NASA summer interns Rachel Haber (Scripps College, 2007), David McCormick (Marietta College, 2008), Kevin Delano (UC-Davis, 2010), and Joe Martin (Oberlin College, 2015)
 - Senior Honors Thesis advisor for Rebecca Mickol (APS, Magna Cum Laude, 2010), and Kara Brugman (GEOL/APS, Magna Cum Laude, 2014).
 - Senior Honors Thesis Committee Member for Rachel Haber (Scripps College, 2008), Adam Solon (EBIO, 2016)
 - Mentor of high school student Trevor Bowen (2006-2008).
 - Supervisor of staff researcher Matthew Chojnacki (2005-2007) Kathy Young (2011-2014), Rachael Hoover (2015-2016), John Gemperline (2015-2016) and James Stewart-Moore (2015).
 - Independent research advisor (2 credit hours) for Helle Skjetne (2019)
- Served on the Doctoral dissertation committees of Lindsey Link (GEOL), Nathaniel Putzig (GEOL), Nate Murphy (APS), Hanna Sizemore (APS), Attila Elteto (APS), Daniel Feldkun (ECE), Saeed Saadat (GEOL), Mariela Perignon (GEOL), Elizabeth Frank (GEOL), Arwin Vidal (GEOL), Victoria Hartwick (ATOC), Derek Weller (GEOL), Kaitlin Remfert (GEOL), Graham Lau (GEOL), Daniel Nothaft (GEOL), Nicholas Dragone (EBIO), Sally Potter (University of Utah), and Kennda Lynch (School of Mines) and the Master's thesis committees of Margaret Mitter (APS), Jessica Lovering (APS), Steven Glazer (GEOL), Tiffany Allen (GEOL), and Jamie Riggs (U. of Northern Colorado); in addition to numerous PhD students listed above.
 - Frequent guest lecturer in courses at CU: Space Policy, Extraterrestrial Life, and Cosmology.

National Educational Activities, 2009-2018

- Co-Convener of NSF-sponsored "NSF's On the Cutting Edge - Professional Development for Geoscience Faculty: Designing Effective and Innovative GIS and Remote Sensing Courses" 2011-2012

- Developed an online, yearlong, course to help faculty integrate GIS and remote sensing into their undergraduate curriculum. 45 faculty participants.
- Co-Convener of NSF-sponsored “Using GIS and Remote Sensing to Teach Geoscience in the 21st Century” Conference, Bozeman, MT., 2010
 - Organized, hosted, and orchestrated a four day meeting with 55 faculty participants.
- Created and ran a weeklong astrobiology seminar (20 hours of online class interaction) for gifted students enrolled in the Davidson Institute for Talent Development Program, 2010

Part-Time Faculty, St. Louis Community College, St. Louis, MO, 2001-2003

- Taught a newly-developed, lab-based Introductory Astronomy course for 4 semesters.

Instructor, John Jay High School, San Antonio, TX, 1998-1999

- Taught high school chemistry honors and physics courses in an inner-city school setting.

Additional Teaching Experience

- Observatory Assistant, McCollum Astronomical Observatory, Cedar Falls, IA, 1995-1998
- Planetarium Lecturer, Einstein Planetarium, National Air and Space Museum, Smithsonian Institution, Washington DC, 1998

Service

University of Colorado

Laboratory for Atmospheric and Space Physics

- Chair of Promotion Committee for Margaret Landis (2020)
- Tenure-Track Faculty Annual Review Committee, 2017
- Research Faculty Annual Review Committee, 2012-2013
- Education and Public Outreach Director Hiring Committee, 2009
- Promotion Committee for Tom McCollom, 2008
- Invited Lecturer and Participant for Colorado Space Science Teacher's Summit, 2010, 2012
- Planetary Graduate Student Admissions, 2007-present

Department of Geological Sciences

- Michael Willis Pre-Tenure Promotion Committee, 2019
- Sedimentology Search Committee, 2016-2017
- Graduate Admissions Committee, 2016-2018
- Graduate Admissions Committee (Chair), 2015-2016
- Graduate Curriculum Committee, 2014-2015
- Undergraduate Curriculum Committee, 2011-2012
- Executive Committee, 2009-2011
- Graduate Admissions Committee, 2008-2009
- Undergraduate Curriculum Committee, 2007-2008

University of Colorado

- Director of the CU Center for Astrobiology, 2014-present
- A&S Honors Council Representative from GEOL 2018-present
- Selected as a CU Wizard and giving regular shows, 2017-present

- Panelist for the Chancellor's 4th Annual Aerospace & Stem Summit, Denver, CO, 2019
- Panelist for Conference on World Affairs: All the New Ways We'll Search for Extraterrestrial Life, 2018
- Vice Chancellor's Seed Grant Review Panel, 2008, 2009, 2010, 2018, 2019
- CU Center for Astrobiology Webmaster, 2013-present
- CU Planetary Program Webmaster, 2006-2014
- CU Center for Origins, core faculty member, 2015-present
- Hydrologic Sciences Program Member, 2007-present

NASA Committees and Field Teams

- NASA Desert Research And Technology (D-RATS) Team Member for annual, two-week-long, Space Exploration Vehicle Rover Tests, Flagstaff, AZ and Houston, TX, 2009-2013
- GeoHeuristic Operational Strategies Test (GHOST) in Alaska, 2011 and Team Leader for site selection and organizing the Mars rover tests in Utah, 2014, 2015, 2016, 2018, 2019.
- Antarctic Search for Meteorites (ANSMET) Field Team, 2009-2010 and 2018-2019 field seasons.
- American Climber Science Program Team Member, Cordillera Blanca, Peru, 2013.
- Planetary Science Subcommittee Member of the NASA Advisory Committee (NAC), 2005-2008
- Convened sessions for the Geological Society of America's Annual Meeting, 2007, 2011
- Member of the NAC's Ad Hoc Lunar Science Education and Public Outreach Committee, 2006-2008

Other National Service Activities

- External Advisory Board member for the Department of Earth Sciences, University of Northern Iowa, 2007-present
- Field trip organizer and leader for NASA's Mars Polar and Climate Processes Workshop. 44 participants, Rocky Mountain National Park, 2018.
- International External Reviewer of A. Molina, PhD Dissertation, Spanish Center for Astrobiology, 2017.
- Scientific Organizing Committee for the 3rd Conference on Early Mars, Lake Tahoe, 2011-2012
- NASA Mars Science Laboratory Landing Site Workshops (presented papers and provided scientific input at five different meetings), 2006-2011
- Mars Exploration Program Analysis Group regular participant, 2003-present

Reviewing and Scientific Input (National/International)

- NASA review panel member for PSDS3 (CubeSats for deep space deployment), Washington DC. Reviewed 12, ~\$2M proposals for CubeSat mission development to Mars, deliberated their merits and advised NASA on selection, 2017.
- NASA review panel member for NASA Astrobiology Institute, CAN 8. Reviewed 12, ~\$10M proposals for NASA-NAI CAN 8, St. Louis, MO. Deliberated proposal merits and advised NASA on selection, 2017.

- Review panel member, European Science Foundation Europlanet call, 2015-2018.
- Peer-reviewer for proposals to the Dutch Research Council, 2019.
- Review panel member, NASA Planetary Science and Technology Through Analog Research Program, 2015.
- Review panel member for the NASA Mars Fundamental Research Program and Moon and Mars Mission Analog Program, 2006 and 2009, respectively
- Peer-reviewer for NASA Planetary Data Systems Mars Science Laboratory's CheMin Instrument data and software, 2012.
- Peer-reviewer of ~12 (total) manuscripts per year submitted to *Nature*, *Nature Geoscience*, *Geology*, *Proceedings of the National Academy of Science*, *Geophysical Research Letters*, *Icarus*, *Planetary and Space Sciences*, *Meteoritics and Planetary Science*, and *Journal of Geophysical Research*.
- Annual external peer-reviewer of ~15 (total) NASA proposals submitted to the Mars Data Analysis, Mars Fundamental Research, Planetary Science and Technology Through Analog Research, Planetary Data Archiving, Restoration and Tools, Solar Systems Workings, Planetary Geology and Geophysics, Exobiology, Lunar Data Analysis Program, and Post-Doctoral Scholar Programs.
- Reviewer for proposals submitted to European Space Agency, 2009-2011.

Recent and Ongoing Affiliations

- Member of the American Geophysical Union
- Member of the Geological Society of America (Planetary Geology and Volcanology)
- Member of the European Geochemical Society
- Field Exploration Analysis Team (FEAT) Member

Recognition and Awards

Invited Lectures

- Ball Aerospace, 2015
- LASP Planetary Science Seminar, 2015
- University of Tennessee-Knoxville, 2015
- Lunar and Planetary Science Conference, 2015
- New Mexico State University, 2015
- Chautauqua Space Science Series, 2014
- University of Alaska-Fairbanks, 2014
- IEEE Alaska Remote Sensing Brach, 2014
- University of Northern Iowa Space Science Symposium, 2013
- Distinguished Lecture, University of Utah, 2012
- University of Northern Illinois Geology Colloquium, 2012
- Colloquium in the CU Department of Geological Science, 2012
- Colloquium in the CU Department of Astrophysics and Planetary Sciences, 2012
- Sherlin Annual Public Lecture Series, Community College of Aurora, 2012
- LASP Colorado Science Teacher Symposium, 2012
- Café Scientifique in Denver, 2012
- Geological Society of America's Annual Meeting, 2011
- Ball Aerospace Planetary Science Seminar, 2011

- LASP Public Lecture Series, *2011*
- Southwest Research Institute Colloquium, *2011*
- Mars Society, Boulder Chapter, *2011*
- Colloquium in the CU Department of Geological Science, *2010*
- Fiske Planetarium, *2007, 2008, 2009, 2010, 2011*
- Denver Paleontological Society, *2009*
- LASP Colorado Science Teacher Symposium, *2009*
- Colloquia in the CU Department of Geological Science, *2009*
- American Geophysical Union's Fall Meeting (Whipple Session), *2008*
- Pomona College, CA, *2008*
- Hamilton College, NY, *2008*
- Caltech Planetary Sciences Colloquium, *2007*
- LASP Public Lecture Series Kick-Off Lecture, *2006*
- Colloquium in the CU Department of Astrophysics and Planetary Sciences, *2006*
- The Lunar and Planetary Institute, *2006*
- Discoveries from Mars: Using a Planetary Perspective to Enhance Undergraduate Geoscience Courses, hosted by Arizona State University, *2006*
- Department of Earth Sciences, University of Northern Iowa, *2006*
- Center for Earth and Planetary Studies, Smithsonian Institution, *2005*
- Department of Geological Sciences, Case Western University, *2005*

Professional Awards and Honors

- NASA Early Career Fellowship, *2007*
- Selected for the National Academy of Sciences Kavli Frontiers of Science, *2008*
- Recipient of the American Institute of Aeronautics and Astronautics (AIAA) Abe M. Zarem Educator Award for excellence in student advising, *2008*
- NASA Honor Group Achievement Award for Desert RATS 2010 operations, *2010*
- Johnson Space Center's Steely-Eyed Missile Man Award, *2011*