

# CURRICULUM VITAE

## Dr. Brian Michael Hynek

Associate Professor in the Department of Geological Sciences and  
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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 an Associate 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*

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

2018

**Hynek, B. M.,** K. L. Rogers, M. Antunovich, G. Avard, 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., Moskowicz, 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.
- McCullom, T. M. and B. M. Hynek, Geochemical Trends Indicate a Link Between Sediment Sources for the Grasberg Formation and the Overlying Burns Formation on Meridiani Planum, Mars, *Journal of Geophysical Research - Planets*, in revision, 2018.
- Fernandez-Remolar, D. C. et al., How the geochemical cycle of chlorine may have controlled the global sedimentary conditions on early Mars, *Nature Communications*, in revision, 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.

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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

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Hargitai, H., (**B. M. Hynek**, editor), *Encyclopedia of Planetary Landforms*, Springer Press, ISBN 978-3-319-26559-9, 2460 p., 2015.

2014

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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.

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**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.

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McCullom, T. M., **B. M. Hynek**, K. L. Rogers, B. Moskowitz, and T. S. Berquo, 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.

McCullom, T. M. M. Robbins, B. Moskowitz, T. S. Berquo, 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.

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#### 2012

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#### 2011

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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.

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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.

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Hynek, B. M., Ancient Equatorial Ice on Mars?, *Nature Geoscience (News and Views)*, 2, 169-170, 2009.

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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.

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2006

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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.

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

2005

McCullom, 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

**Hynek, B. M.**, and R. J. Phillips, New Data Reveal Mature, Integrated Drainage Systems on Mars Indicative of Past Precipitation, *Geology*, 31, 757-760, 2003.

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2002

**Hynek, B. M.**, R. E. Arvidson, and R. J. Phillips, Geologic Setting and Origin of Terra Meridiani Hematite Deposit on Mars, *Journal of Geophysical Research - Planets*, 107, doi:10.1029/2002JE001891, 2002.

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 180 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, *49<sup>th</sup> 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.

Hynek, B. M., et al., Unlocking Mercury's geological history with detailed mapping of Rembrandt basin, *Lunar and Planetary Science Conference*, 47, 2312, 2016.

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- systems on Mars, *44th Lunar and Planetary Science Conference*, The Woodlands, Texas, abs. 1633, 2013.
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- 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.
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