

Isaac B. Smith

Curriculum Vitae

Lassonde School of Engineering, York University, Toronto, Ontario, Canada

email: ibsmith@yorku.ca cell: 647-233-3374

EDUCATION

- 2013** **Ph.D., Geosciences**, The University of Texas at Austin
 • *Dissertation: On the Spiral Troughs of Mars*
- 2007** **M.S., Physics**, University of Missouri - St. Louis, St. Louis, MO
 • *Completed second year at Universität Stuttgart, Stuttgart, Germany*
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RESEARCH EXPERIENCE

- 2018 - pres** **Assistant Professor**: York University, Toronto, Canada
 • *Lassonde School of Engineering, Earth and Space Science and Engineering*
 • *Canada Research Chair*
- 2017 - pres** **Research Scientist**: Planetary Science Institute, Denver, Colorado
 • *PI on two NASA selected ROSES grants*
 • *Co-Investigator on SHARAD instrument of Mars Reconnaissance Orbiter*
 • *Change to part-time August 2018*
- 2016 - 2017** **Postdoctoral Researcher**: Planetary Science Institute, Denver, Colorado
 • *System Scientist for the US SHARAD team's radar processing center*
- 2014 - 2016** **Postdoctoral Researcher**: Southwest Research Institute, Boulder, Co
 • *Conducted research on sedimentary systems on Mars*
- 2013 - 2014** **J. William Fulbright Doctoral Fellow**: Sorbonne University, Paris, France
 • *Modeled atmosphere-surface interactions at Mars' polar ice caps*
- 2010 - 2013** **NASA Earth and Space Science Fellow**: University of Texas at Austin
 • *Combined observations from multiple instruments and simulations*
 • *Created process model to understand surface evolution of Mars' polar caps*
- July 2010** **NASA Planetary Science Summer School**: JPL, Pasadena, CA
 • *Attended 1 week intensive course that taught robotic space mission design*
- 2008 - 2010** **Graduate Research Assistant**: University of Texas, Austin, TX
 • *Investigated the depositional history of Mars' north polar ice cap with radar*
- 2007 - 2012** **Technician**: Paleomagnetism Laboratory, University of Texas, Austin, TX
 • *Reconstructed, calibrated, and maintained all laboratory equipment*
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TEACHING EXPERIENCE

- 2018 - pres** **Assistant Professor**: York University, Toronto, Canada
 • *Taught Geophysics and Space Science, Planetary Systems*
- 2016** **Adjunct Professor**: University of Colorado: Boulder, Co
 • *Summer 2016, Taught astronomy 101 and laboratory section to undergraduates*
- 2015 - 2016** **Adjunct / Affiliate Professor**: Regis University, Denver, Colorado
 • *Fall 2015 - Fall 2016, Taught various sections of Physics I and II laboratory*
 • *Spring 2015, Taught astronomy 101 and laboratory section to undergraduates*

PUBLICATIONS

Google Scholar h-index = 18

‡Senior Scientist/Principle Investigator †Student/Trainee Led Publications

Book Chapters

Putzig, N.E., Morgan, G.A., Sizemore, H.G., Baker, D.M.H., Petersen, E.I., Pathare, A.V., Dundas, C.M., Bramson, A.M., Courville, S.W., Perry, M.R., Nerozzi, S., Bain, Z.M., Hoover, R.H., Campbell, B.A., Mastrogiuseppe, M., Mellon, M.T., Seu, R., **Smith, I.B.** (2023). Ice Resource Mapping on Mars. Ch. 16 in Badescu, V., Zacny, K., Bar-Cohen, Y. (Eds.), *Handbook of Space Resources*, Springer Nature Switzerland AG. [ISBN-13: 9783030979126](https://doi.org/10.1007/978-3-03097912-6)

Peer Reviewed Journal Articles

†Chesal, J, **I. B. Smith** (in review), Cloud Morphologies on the Nightside Middle Atmosphere of Venus Caused by an Equatorial Jet that Produces Meridional Wind Shear, *Planetary Science Journal*.

Izquierdo, K, A. Bramson, T. McClintock, K. Laferriere, S. Byrne, J. Bapst, **I. B. Smith**, (in review) Local Ice Accumulation and Retreat Rates at the North Pole of Mars from Bayesian Fit to Trough Migration Paths, *Journal of Geophysical Research - Planets*.

†Bharti, R. R., **I. B. Smith**, S. H. Shukla (in revision), Constraints on the evolution process of graben system, Mars using SHARAD data. *Geophysical Research Letters*

Putzig, N.E., F. J. Foss II, B. A. Campbell, J. W. Holt, M. R. Perry, **I. B. Smith**, A. T. Russell, S. Nerozzi, M. S. Christoffersen, I. H. Mueller, P. C. Sava (2022), New Views of the Internal Structure of Planum Boreum from Enhanced 3D Imaging of Mars Reconnaissance Orbiter Shallow Radar Data. *Planetary Science Journal* 3: 259. <https://iopscience.iop.org/article/10.3847/PSJ/ac9d3b>

†Acharya, P., **I. B. Smith**, W. Calvin (2023), Tracking the Northern Seasonal Cap Retreat of Mars using Computer Vision. *Icarus* 390, 115295. <https://doi.org/10.1016/j.icarus.2022.115295>

Smith, I. B. (2022). A Retrospective on Mars Polar Science. In P. Read (Ed.), the Oxford Research Encyclopedia of Planetary Science. *Oxford University Press*. <https://doi.org/10.1093/acrefore/9780190647926.013.242>

Diniega, S., N. Barba, L. Giersch, B. Jackson, A. Soto, D. Banfield, M. Day, G. Doran, C. M. Dundas, M. Michna, S. Rafkin, **I. B. Smith**, R. Sullivan, C. Swann, T. Titus, I. Walker, J. Widmer, D. Burr, L. Mandrake, N. Vriend, K. Williams, (2022) It's Time for Focused In Situ Studies of Planetary Surface-Atmosphere Interactions, *IEEE Aerospace Conference (AERO)*, 2022, pp. 1-19, <https://doi.org/10.1109/AERO53065.2022.9843357>

‡**Smith, I. B.**, Schlegel, N.-J., Larour, E., Isola, I., Buhler, P. B., Putzig, N. E., & Greve, R. (2022). Carbon dioxide ice glaciers at the south pole of Mars. *Journal of*

- Geophysical Research: Planets, 127, e2022JE007193. <https://doi.org/10.1029/2022JE007193>
- †Bharti, R. R., **I. B. Smith**, S. K. Mishra, N. Srivastava, S. H. Shukla (2022) SHARAD detection of sedimentary infilling within an unnamed crater near Mangala Fossa region, Mars, *Icarus*. 371(114713) <https://doi.org/10.1016/j.icarus.2021.114713>
- Lillis, R. J., D. Mitchell, L. Montabone, N. Heavens, T. Harrison, C. Stuurman, S. Guzewich, S. England, P. Withers, M. Chaffin, S. Curry, C. Ao, S. Matousek, N. Barba, R. Woolley, A. Tripathi, **I. B. Smith**, G. Osinski, A. Kleinböhl, L. Tamppari, M. Mischna, D. Kass, M. Smith, M. Wolff, M. Kahre, A. Spiga, F. Forget, B. Cantor, J. Deighan, A. Brecht, S. Bougher, C. Fowler, D. Andrews, M. Patzold, K. Peter, S. Tellmann, M. Lester, B. Sánchez-Cano, J. Luhmann, F. Leblanc, J. Halekas, D. Brain, X. Fang, J. Espley, H. Opgenoorth, O. Vaisberg, D. Hinson, S. Asmar, J. Vander Hook, O. Karatekin, A. Barjatya, A. Tripathi (2021), MOSAIC: A satellite constellation to enable groundbreaking Mars climate 1 system science and prepare for human exploration, *The Planetary Science Journal* 2(211), <https://iopscience.iop.org/article/10.3847/PSJ/ac0538>
- Becerra B., **I. B. Smith**, S. Hibbard, C. Andres, J. Bapst, A. M. Bramson, P. B. Buhler, A. Coronato, S. M. Diniega, J. Emmett, A. Grau Galofre, C. Herny, M. Kahre, J. P. Knightly, S. Nerozzi, A. Pascuzzo, G. Portyankina, J. Rabassa, L. Tamppari, T. N. Titus, J. L. Whitten, Z. Yoldi (2021), Past, Present and Future of Mars Polar Science: Outcomes and Outlook from the 7th International Conference on Mars Polar Science and Exploration, *The Planetary Science Journal*, <https://doi.org/10.3847/PSJ/ac19a5>
- Smith, I. B.**, Lalach, D., Rezza, C., Horgan, B., Whitten, J. L., Nerozzi, S., & Holt, J. W. (2021). A solid interpretation of bright radar reflectors under the Mars south polar ice. *Geophysical Research Letters*, 48, e2021GL093618. <https://doi.org/10.1029/2021GL093618>
- Thomas, N., P. Becerra, **I. B. Smith** (2021) Mars and the ESA Science Programme - the case for Mars polar science, *Experimental Astronomy*. <https://doi.org/10.1007/s10686-021-09760-6>.
- †Alwarda, R., **Smith, I.B.**, (2021). Stratigraphy and Volumes of the Units Within the Massive Carbon Dioxide Ice Deposits of Mars. *Journal of Geophysical Research: Planets* 126, e2020JE006767. <https://doi.org/10.1029/2020JE006767>
- Morgan, G., N. E. Putzig, M. R. Perry, H. G. Sizemore, A. M. Bramson, E. I Petersen, Z. M. Bain, D. M. H. Baker, M. Mastrogiuseppe, R. H. Hoover, **I. B. Smith**, A. Pathare, C. M. Dundas, B. A. Campbell (2021) Availability of Subsurface Water-Ice Resources in the Northern Mid-Latitudes of Mars. *Nature Astronomy*. <https://doi.org/10.1038/s41550-020-01290-z>
- Gallagher, C., F. Butcher, M. Balme, **I. B. Smith**, N. Arnold, (2021) Landforms indicative of regional warm based glaciation, Phlegra Montes, Mars., *Icarus*: <https://doi.org/10.1016/j.icarus.2020.114173>
- Berman, D, F. Chuang, **I. B. Smith**, D. Crown (2021) Ice-rich Landforms of Nereidum Montes, Mars, *Icarus* 114170. <https://doi.org/10.1016/j.icarus.2020.114170>

- ‡Cross, A. J., D. L. Goldsby, T. F. Hager, **I. B. Smith**, (2020) The Rheological Behavior of CO₂ ice: Application to Glacial Flow on Mars, *Geophys. Research Letters* V47 I22: <https://doi.org/10.1029/2020GL090431>
- Becerra, P., **I. B. Smith**, A. Coronato, J. Rabassa, (2020) Mars Polar Science visits the End of the World, *Nature Astronomy*. <https://doi.org/10.1038/s41550-020-1127-y>
- Smith, I. B.**, P. O. Hayne, S. Byrne, P. Becerra, M. Kahre, W. Calvin, C. Hvidberg, S. Milkovich, P. Buhler, M. Landis, B. Horgan, A. Kleinbohl, M. R. Perry, R. Obbard, J. Stern, S. Piqueux, N. Thomas, K. Zacny, L. Carter, L. Edgar, J. Emmett, T. Navarro, J. Hanley, M. Koutnik., N. E. Putzig, B. L. Henderson, J. W. Holt, B. Ehlmann, S. Parra, D. Lalich, C. Hansen, M. Hecht, D. Banfield, K. Herkenhoff, D. A. Paige, M. Skidmore, R. L. Staehle, M. Siegler, (2020) The Holy Grail: A Roadmap for Unlocking the Climate Record Stored within Mars' Polar Layered Deposits, *Planetary and Space Science* 184 104841 <https://doi.org/10.1016/j.pss.2020.104841>.
- Ganesh, I., L.M. Carter and **I.B. Smith**, (2020) SHARAD mapping of Arsia Mons caldera, *Journal of Volcanology and Geothermal Research*, 390, <https://doi.org/10.1016/j.jvolgeores.2019.106748>
- Diniega, S. M., **I. B. Smith**, (2019) High-priority Science Questions identified at the Mars Workshop on Amazonian and Present-Day Climate, *Planetary and Space Science* 104813. <https://doi.org/10.1016/j.pss.2019.104813>
- Lalich, D., J. W. Holt, **I. B. Smith**, (2019) Radar Reflectivity as a Proxy for the Dust Content of Individual Layers in the Martian North Polar Layered Deposits, *Journal of Geophysical Research: Planets*, 124. doi:10.1029/2018JE005787
- Adeli, S, E. Hauber, G. G. Michael, P. Fawdon, **I. B. Smith**, R Jaumann, (2019) Geomorphological evidence of well-preserved local ice-rich deposits in Terra Cimmeria, Mars. *Journal of Geophysical Research: Planets*, 124. doi:10.1029/2018JE005772
- Bramson, A.M., Byrne, S., Bapst, J., **Smith, I.B.**, McClintock, T., (2019). A Migration Model for the Polar Spiral Troughs of Mars. *Journal of Geophysical Research - Planets*. 124. doi:10.1029/2018JE005806
- Diniega, S. M., **I. B. Smith**, A. Bramson, (2019) Updating our understanding of Mars' recent and present-day climate: scientific advancements and priorities for future investigations. *EOS*, 100, doi:10.1029/2019EO114411
- Séjourné, A., F. Costard, Z. Swirad, S. Bouley, **I. B Smith**, M. Balme, C. Orgel, J. Ramsdale, E. Hauber, S. Conway, S. van Gasselt, D. Reiss, A. Johnsson, C. Gallaher, J. Skinner Jr., A. Kereszturi, T. Platz, (2019) Grid-mapping the northern plains of Mars: using morphotype and distribution of ice-related landforms to understand multiple ice-rich deposits in Utopia Planitia. *Journal of Geophysical Research - Planets*. doi:10.1029/2018JE005665
- Orgel, C., E. Hauber, S. van Gasselt, D. Reiss, A. Johnsson, J. Ramsdale, **I. B. Smith**, Z. Swirad, A. Séjourné, M. Balme, S. Conway, F. Costard, V. Eke, G. Gallagher, A. Kereszturi, A. Łosiak, R. Massey, T. Platz, J. Skinner Jr., L. F. Teodoro, J. Wilson (2019) Gridmapping the Northern Plains of Mars: A New Overview of

- Recent Water- and Ice-Related Landforms in Acidalia Planitia. *Journal of Geophysical Research - Planets*. doi:10.1029/2018JE005664
- Ramsdale, J., M. Balme, C. Gallagher, S. Conway, **I. B. Smith**, E. Hauber, C. Orgel, A. Séjourné, F. Costard, V. Eke, S. van Gasselt, A. Johnsson, A. Kereszturi, A. Łosiak, R. Massey, T. Platz, D. Reiss, Z. Swirad, L. F. Teodoro, J. Wilson, (2019), Grid Mapping the northern plains of Mars: Geomorphological, Radar and Water-Equivalent Hydrogen results from Arcadia Planitia. *Journal of Geophysical Research - Planets*. doi:10.1029/2018JE005663
- Smith, I.B.**, et al., (2018), 6th international conference on Mars polar science and exploration: Conference summary and five top questions, *Icarus* 308 2-14. doi:10.1016/j.icarus.2017.06.027
- Kostic, S. and **I. B. Smith**, (2018), Do Submarine Cyclic Steps Exist on Mars?, *Progress in Earth and Planetary Science*, 5:76. doi:10.1186/s40645-018-0225-2
- Smith, I.B.**, A. Spiga (2018), Seasonal Variability in Winds in the North Polar Region of Mars, *Icarus* 308 188-196, doi:10.1016/j.icarus.2017.10.005
- Spiga, A, **I. B. Smith** (2018), Katabatic Jumps in the Martian northern polar regions, *Icarus* 308 197-208, doi: 10.1016/j.icarus.2017.10.021
- Putzig, N.E., **Smith, I.B.**, M. R. Perry, F. J. Foss II, B. A. Campbell, R. J. Phillips, R. Seu, (2018), Three-dimensional radar imaging of structures and craters in the Martian polar caps. *Icarus* 308 137-147, doi:10.1016/j.icarus.2017.09.023
- Smith, I.B.**, D. Beaty, T. Thorsteinsson (2017) Mars polar intrigue spurs multidisciplinary collaboration, *EOS*, 98, doi:10.1029/2017EO069599.
- Ramsdale, J. et al., (2017), Grid-based mapping: a method for rapidly determining the spatial distributions of small features over very large areas, *Planetary and Space Science*, 140, 49-61. doi:10.1016/j.pss.2017.04.002
- Golombek, M., et al. (2017), Selection of the InSight Landing Site, *Space Science Reviews* 211(1-4), 5-95. doi: 10.1007/s11214-016-0321-9
- Putzig, N. E., G. A. Morgan, B. A. Campbell, C. Grima, **I. B. Smith**, R. J. Phillips, M. Golombek, (2017). Radar-derived Properties of the InSight Landing Site in Western Elysium Planitia on Mars. *Space Science Reviews*. 211(1-4), 135-146, doi:10.1007/s11214-016-0322-8.
- Smith, I.B.**, N. E. Putzig, J. W. Holt, and R. J. Phillips (2016), An Ice Age Recorded in the Polar Deposits of Mars, *Science*, 352(6289), 1075-1078, doi: 10.1126/science.aad6968
- Bierson, C. J., R. J. Phillips, **I. B. Smith**, S. E. Wood, N. E. Putzig, D. Nunes, S. Byrne, (2016), Stratigraphy and evolution of the buried CO₂ deposit in the Martian south polar cap, *Geophysical Research Letters*, V43 19, 4172-4179, doi:10.1002/2016GL068457.
- Yokokawa, M, **I. B. Smith**, J. W. Holt, (2016) Spiral Troughs Formed on the Polar Ice Caps of Mars, *Journal of Geography* (Chigaku Zasshi), 125(1), ii. doi:10.5026/jgeography.125.ii

- Smith, I.B.**, and J. W. Holt (2015), Spiral Trough Diversity on the North Pole of Mars, as Seen by SHARAD, *Journal of Geophysical Research - Planets*. 120(3) 362-387, doi: [10.1002/2014JE004720](https://doi.org/10.1002/2014JE004720)
- Smith, I.B.**, A. Spiga, J. W. Holt (2014), Aeolian Processes as Drivers of Landform Evolution at the South Pole of Mars, *Geomorphology*. 240:1240 doi: [10.1016/j.geomorph.2014.08.026](https://doi.org/10.1016/j.geomorph.2014.08.026).
- Herny, C.; M. Massé, O. Bourgeois, S. Carpy, S. Le Mouélic, T. Appéré, **I. B. Smith**, A. Spiga, S/ Rodriguez, (2014), Sedimentation waves on the Martian North Polar Cap: analogy with megadunes in Antarctica, *Earth and Planetary Science Letters*. 403: 55-66 doi: [10.1016/j.epsl.2014.06.033](https://doi.org/10.1016/j.epsl.2014.06.033).
- Smith, I. B.**, J. W. Holt, A. Spiga, A. D. Howard, and G. Parker (2013), The spiral troughs of Mars as cyclic steps, *Journal of Geophysical Research - Planets*, 118(9) 1835-1857, doi:[10.1002/jgre.20142](https://doi.org/10.1002/jgre.20142).
- Phillips, R. J., ---, **I. B. Smith**, et al., (2011) Massive CO₂ Ice Deposits Sequestered in the South Polar Layered Deposits of Mars, *Science*, 332(6031), 838-841, doi: [10.1126/science.1203091](https://doi.org/10.1126/science.1203091).
- Smith, I. B.** and J. W. Holt (2010), Onset and migration of spiral troughs on Mars revealed by orbital radar, *Nature*, 465(7297), 450-453, doi:[10.1038/nature09049](https://doi.org/10.1038/nature09049).

Peer Reviewed Reports to NASA and other Space Agencies

- I-MIM MDT (2022) Final Report of the International Mars Ice Mapper Reconnaissance/ Science Measurement Definition Team. 239 pp., posted online at <https://science.nasa.gov/researchers/ice-mapper-measurement-definition-team>
- MEPAG ICE-SAG Final Report (2019), Report from the Ice and Climate Evolution Science Analysis group (ICE-SAG), Chaired by S. Diniega and N. E. Putzig, 157 pages posted 08 July 2019, by the Mars Exploration Program Analysis Group (MEPAG) at <http://mepag.nasa.gov/reports.cfm>

FELLOWSHIPS AND AWARDS (since 2009)

- 2020** Inducted into the International Astronomical Union
- 2018-2023** Canada Research Chair in Planetary Sciences
- 2017** NASA Early Career Fellowship
- 2015** NASA Group Achievement Award for “Excellence in developing and executing the Mars Reconnaissance Orbiter Comet Siding Spring Observing Campaign”
- 2013-2014** J. William Fulbright Scholar international exchange fellowship
- 2012** Steven E. Dwornik GSA Best Graduate Poster
• 43rd Lunar and Planetary Science Conference, Houston, TX
- 2011** Jackson School of Geosciences Best Student Paper
• University of Texas at Austin
- 2010-2013** NASA Earth and Space Science Fellowship

• *University of Texas at Austin*

Fall 2009 Outstanding Student Paper Award, Planetary Science

• *American Geophysical Union, Fall Meeting, San Francisco, CA*

CURRENTLY FUNDED GRANTS AND CONTRACTS

PI, Flights and Fieldwork for the Advancement of Science and Technology (FAST)

(2022-2025): Preparing for Mars Ice Mapper Mission with Airborne SAR, Modeling, and Ground Truth, \$300,000 CAD to SMITH

Co-PI, Lassonde Innovation Fund

(2022-2023): Converting Martian dust into oxygen and structural metals using sunlight. \$35,500

Co-I, Natural Science and Engineering Research Council of Canada CREATE

(2019-2023): \$1,650,000 for 10 investigators, Technologies for Exo-Planetary Science (TEPS)

Co-I, Mars Data Analysis Program

(2021-2024) Seasonal, annual, and multidirectional sand flux trends related to global or regional forcing factors, \$460,588; \$35,992 USD to SMITH

PI, Natural Science and Engineering Research Council of Canada Discovery Grant

(2019-2024) Cryospheres Throughout the Solar System: \$125,000 CAD

(2019-2020) NSERC Discovery Supplement \$12,500 CAD

PI, Canada Research Chair Tier 2 in Planetary Science

(2018-2023) Present and Historical Climate of Mars: \$500,000 CAD for five years

(2018-2023) CRC Supplement: \$100,000 CAD for five years

Co-I, International Space Science Institute International (ISSI) Teams

Ice Beyond Earth: Laboratory Investigations of Planetary Ices

Co-I, Solar System Workings (2020-2023) The Mass Balance of Polar Ice on Mars from the Migration of Spiral Troughs, \$433,337; \$21,781 USD to SMITH

Co-I, NASA Mars Reconnaissance Orbiter Shallow Radar (SHARAD) Mission, 2005-Present. \$4,182,000 USD (From 2014 to 2018, when I was funded). My role was as System Scientist and post-doc, so only ~\$315,000 USD came to me directly.

COMPLETED GRANTS AND CONTRACTS

PI, Canadian Space Agency

(2021): \$42,000, Phase 0 of the International Mars Ice Mapper Mission

PI, NASA ROSES: Solar System Workings (2017-2021) Studying CO₂ Glaciers on Mars with Observations and Laboratory Experiments, \$343,348.00 USD

PI, NASA ROSES: Mars Data Analysis Program (2017-2021) Characterization of Hydrated, Layered Deposits at the Valles Marineris Plateau from SHARAD, HiRISE, and CRISM, a Multidisciplinary Approach, \$396,880.00 USD

Co-I, NASA ROSES: Mars Data Analysis Program Advanced 3-D Subsurface Imaging and Analysis of Planum Boreum with SHARAD Data \$139,300 USD to Smith.

Collaborator NASA Planetary Mission Concept Studies MOSAIC (Mars Orbiters for Surface-Atmosphere-Ionosphere Connections) \$50,000

Co-I, JPL Subsurface Water Ice on Mars (SWIM), two extensions, for \$300,000

Co-I, JPL Mapping of Water Deposits to Support NASA Mars Exploration Program Studies "Task A", \$50,000 for 9 months

Collaborator NASA ROSES: Planetary Data Archiving, Restoration, and Tools (PDART) Creating an improved multiannual dust climatology dataset for Mars

Co-I, NASA ROSES: Mars Data Analysis Program Advanced 3-D Subsurface Imaging and Analysis of Planum Boreum with SHARAD Data. PI: Nathaniel Putzig, PSI

Named Student, MDAP: Evolution of the North Polar Troughs of Mars from SHARAD subsurface mapping. PI: John W. Holt, UTIG

INVITED TALKS

- 2022** **Selected Mars Processes**, Kluane Lake Research Station, Silver City, Yukon
Carbon Dioxide: From Ice Crystals to Glaciers, Jet Propulsion Laboratory, Pasadena, California
The Future of Mars Polar Science, Committee on Space Research (COSPAR), Athens, Greece
- 2021** **Mars Polar Science**, Jamal Nazrul Islam Astronomy Club, JUST Jashore, Bangladesh (virtual)
From Ice Crystals to Ice Caps, Pabna University of Science and Technology, Pabna, Bangladesh (virtual)
- 2019** **From Ice Crystals to Ice Caps**, McGill Space Institute
A High-Resolution View of Mars, Royal Astronomical Society of Canada
A High-Resolution View of Mars, North York Astronomical Assoc., StarFest
Reflections of Mars, University of Missouri - St. Louis
Reflections of Mars, Western University, London Ontario
- 2018** **Reflections of Mars**, North York Astronomical Association, Toronto
Reflections of Mars, Sorbonne University, Paris, France
Reflections of Mars, and Mission Concepts, Lockheed-Martin, Denver, Colorado
Unlocking the Climate Record Stored Within Mars' Polar Layered Deposits. Committee on Space Research, Pasadena, Ca
- 2017** **Summary of the 6th Mars Polar Science Conference**, 33rd MEPAG meeting
Reflections of Mars: Using Orbital Radar Observations to Discover Climate Signals and More. Caltech., Pasadena, Ca
Reflections of Mars: Using Orbital Radar Observations to Discover Climate Signals and More. Lowell Observatory, Flagstaff, Az
- 2016** **What's stored in the Polar Caps of Mars: A record of Recent Climate and Flowing CO₂ Glaciers.** University of Pennsylvania, Philadelphia, Pa
What's stored in the Polar Caps of Mars: A record of Recent Climate and Flowing CO₂ Glaciers. California Technical Institute, Pasadena, Ca

- What's stored in the Polar Caps of Mars: A record of Recent Climate and Flowing CO₂ Glaciers.** Jet Propulsion Laboratory, Pasadena, Ca
- 2015 **The Polar Caps of Mars: a Record of Recent Climate,** UCLA
The Polar Caps of Mars: a Record of Recent Climate, University of Claude Bernard Lyon 1, Lyon, Fr
The Polar Caps of Mars: a Record of Recent Climate, Ball Aerospace, Boulder
The Polar Caps of Mars: a Record of Recent Climate, Laboratory for Atmospheric and Space Physics, Boulder, Co
- 2014 **Aeolian Processes as Drivers of Landform Evolution at the South Pole of Mars,** 45th Ann. *Binghampton Geomorph Symp*, Knoxville, TN
The spiral troughs of Mars North Polar Layered Deposits as Cyclic Steps, *European Geophysical Union*, Vienna, Austria, Abst #EGU2014-15414
- 2012 **The North Polar Troughs of Mars as Aeolian Cyclic Steps,** Laboratoire de Météorologie Dynamique, Paris, France, December
The North Polar Troughs of Mars as Aeolian Cyclic Steps, Laboratoire Atmospheres, Milieux, Observation Spatiales, San Quentin, Fr
The North Polar Troughs of Mars as Aeolian Cyclic Steps, Université Catholique de Louvain, Louvain-La-Neuve, Belgium, December
The North Polar Troughs of Mars as Aeolian Cyclic Steps, The University of Delft, Delft, Netherlands, December
The North Polar Troughs of Mars as Aeolian Cyclic Steps: a framework for understanding the surface evolution of the north polar ice cap, Austin Geological Society
The North Polar Troughs of Mars as Aeolian Cyclic Steps: a framework for understanding the surface evolution of the north polar ice cap, North Texas Geological Society
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FIRST AUTHORED (ONLY) CONFERENCE ABSTRACTS

- 2023 **Smith, I. B.,** R. Karimova, J. Isen, Experiments with Carbon Dioxide Ice at Martian Polar Conditions, 1st Workshop on Ices in the Solar System, Abst #4040
- 2022 **Smith, I. B.** Experiments with Carbon Dioxide at Martian Polar Conditions, 54th Meeting for the Division of Planetary Science
Smith, I. B. The Future of Mars Polar Science, COSPAR
Smith, I. B., W. Calvin, P. Becerra, M. Landis, S. Byrne, P. Hayne, J. Bapst, A. B. Chmielewski, J. Delaune, Bifrost: Mars Polar Science Enabled by a Low-Cost Helicopter, Low-Cost Science Mission Concepts for Mars Exploration. Abst 5066
Smith, I. B., N. Schlegel, E. Larour, I. Isola, P. Buhler, N. E. Putzig, R. Greve, CO₂ Glaciers on the South Polar Layered Deposits of Mars, *53rd LPSC*, Abst #2511
Smith, I. B., W. Calvin, P. Becerra, M. Landis, S. Byrne, P. Hayne, J. Bapst, A. B. Chmielewski, J. Delaune, L. Matthies, Bifrost: Mars Polar Science Enabled by a Low-Cost Helicopter, *Low-Cost Science Mission Concepts for Mars Exploration* Abst# 5066
- 2021 **Smith, I. B.,** N. Schlegel, E. Larour, I. Isola*, P. Buhler, N. E. Putzig, R. Greve, CO₂ Glaciers on the South Polar Layered Deposits of Mars, *52nd LPSC*, Abst #2573
- 2020 **Smith, I. B.,** E. Larour, N. E. Putzig, R. Greve, N. Schlegel, I. Isola*, CO₂ Glaciers on the South Polar Layered Deposits of Mars, *51st LPSC*, Abstract #1101

- Smith, I. B.**, A Hypothesis for the “No-Flow” Mars’ North Polar Layered Deposits Observations, *7th International Conference on Mars Polar Science and Exploration: Abstract #6040*
- 2019** **Smith, I. B.**, Mars Polar, Ice, and Climate Science: A Summary of Recent Work and Our Current State of Knowledge, 9th Mars Conference, Abst #6306
- Smith, I. B.**, N. E. Putzig, C. Viviano, M. Chojnacki, N. E. Putzig, C. Quantin, J. A. P. Rodriguez. Characterization of Hydrated, Layered Deposits at Valles Marineris Plateau, A Multidisciplinary Approach. 50th LPSC, Abst #2713
- 2018** **Smith, I. B.**, N. E. Putzig, J. W. Holt. Renewed Analysis of Buried Deep Structures in the Polar Layered Deposits of Mars with 3-D SHARAD Volumes. *Mars Workshop on Amazonian and Present Day Climate*, Abst #2206
- Smith, I. B.** P. O. Hayne, S. Byrne. Unlocking the Climate Record Stored within Mars’ Polar Layered Deposits *COSPAR-18-B4.1*
- Smith, I. B.**, N. E. Putzig, J. W. Holt. Renewed Analysis of Buried Deep Structures in Planum Boreum with the 3-D SHARAD Volume. *49th LPSC*, Abst #2206
- 2017** **Smith, I. B.**, Why is there evidence for flowing ice at mid-latitudes on Mars but not at the poles? *American Geophysical Union Abstract #P53H-04*
- Smith, I. B.**, Where Ice Flows on Mars; Where Ice does not Seem to Flow; Why the Difference? *48th Lunar and Planetary Science Conference*, #2489.
- Smith, I. B.**, (et al.) The 6th International Conference on Mars Polar Science and Exploration: State of Knowledge and Top Five Questions, *48th LPSC*, #1701.
- 2016** **Smith, I. B.**, E.Larour, N. E. Putzig, R. Greve, N. Schlegel, CO₂ Glaciers on the South Polar Layered Deposits of Mars, 6th International Conference on Mars Polar Science and Exploration, Reykjavik, Iceland, #6072.
- Smith, I. B.**, A. Spiga, D. Tyler, R. Ewing, Wind at the North Pole of Mars: Comparisons of Modeling and Observations, *47th LPSC, Abstract #1632*.
- Smith, I. B.**, C. E. Viviano-Beck, M. Chojnacki, C. Quantin, N. E. Putzig, Characterization of Layered Deposits at the Valles Marineris Plateau With Multiple Instruments *47th LPSC #2725*
- 2015** **Smith, I. B.**, A. Spiga, D. Tyler, R. Ewing, Wind at the North Pole of Mars: Comparisons of Modeling and Observations, *4th Inter Planetary Dunes Workshop*, Abst #8013.
- Smith, I. B.**, N. Putzig, R. Phillips, J. W. Holt, Recent Climate Change Detected on Mars: Implications for the Planetary Ice Budget, *46th LPSC*, #2574, Oral Presentation.
- 2014** **Smith, I. B.**, A. Spiga, J. W. Holt, The Spiral Troughs of Mars: Formation and Evolution, Eighth International Conference on Mars, Pasadena, California, Abstract #1198.
- Smith, I. B.**, A. Spiga, J. W. Holt, Correlation of Martian South Polar CO₂ Seasonal Cap Retreat With Low Altitude Clouds: A Control On Annual Accumulation, *EGU*, #EGU2014-15439.
- Smith, I. B.**, J. W. Holt, Regional Variability in the Spiral Troughs of the North Polar Layered Deposits, Mars, as Observed by SHARAD, *45th LPSC*, Tx, Abstr. #1392
- Smith, I. B.**, A. Spiga, J. W. Holt, SPLD Trough Clouds: Migration and Deposition, *5th InterWorkshop on the Mars Atmosphere: Modeling and Observations*, Oxford, UK
- 2013** **Smith, I. B.**, The North Polar Troughs of Mars as Aeolian Cyclic Steps, *ExoDunes*, Paris
- Smith, I. B.**, J. W. Holt, A. Spiga, A. D. Howard, Aeolian Processes as Drivers of Landform Evolution on the South Pole of Mars, *44th LPSC*, Abst. #1240
- 2012** **Smith, I. B.**, J. W. Holt, Terrestrial-Martian Analogues of Katabatic Flow and Clouds in Polar Environments. Implications for ice deposits, *3rd Conference on Terrestrial Mars Analogues*, Marrakech, Morocco, Oral Presentation.
- Smith, I. B.**, J. W. Holt, The northern spiral troughs of Mars as cyclic steps: a theoretical

- framework for calculating average migration and accumulation rates, *Third International Planetary Dunes Workshop*, Flagstaff, Arizona, Oral Presentation.
- Smith, I. B.**, J. W. Holt, The northern spiral troughs of Mars as cyclic steps: a theoretical framework for calculating average migration and accumulation rates, *43rd LPSC*, #2116.
- 2011 Smith, I. B.**, J. W. Holt, G. Kocurek, A. D. Howard, A. Spiga, A theoretical and observational framework for estimating migration rates of spiral troughs in the north polar layered deposits, Mars, *5th Conference on Mars Polar Science and Exploration*, Fairbanks, Alaska, Abst#6050.
- Smith, I. B.**, J. W. Holt, Temporal and spatial evolution of spiral troughs on Planum Boreum, Mars, from detailed stratigraphic mapping: implications for local atmospheric processes, *42nd Lunar and Planetary Science Conference*, Houston, Texas, Abst. #2742, Oral Pres.
- Smith, I. B.**, J.W. Holt, Implications for Current and Past Atmospheric Conditions of Mars from Radar Stratigraphic Studies of Spiral Troughs in the North Polar Layered Deposits, *4th International Workshop on the Mars Atmosphere: Modeling and Observations*, Paris, Fr.
- 2010 Smith, I. B.**, J.W. Holt, SHARAD Radar investigations into the initiation of spiral troughs on Planum Boreum, Mars, *AGU*, Abstract #P53F-03, Oral Presentation.
- Smith, I. B.**, J.W. Holt, D. Mohrig, W. Kim, and P. Choudary, Quantitative Radar Stratigraphy of the NPLD and Processes Controlling Spiral Trough Migration, *41st LPSC*. #2431.
- 2009 Smith, I. B.**, J.W. Holt, and R.J. Phillips, New Insights into Spiral Trough Migration on the Northern Polar Layered Deposits from SHARAD Observations, *AGU*, Abst #P13B-1278
- Smith, I. B.**, J.W. Holt, S.W. Christian, and A. Safaeinili, Evidence for spiral trough migration and evolution from radar observations of stratigraphy within the NPLD, Mars, *LPSC*#1423.

ADVISING AND MENTORING

Current graduate students

Pruthviraj Acharya	Ph.D.	2024
Kasra Bozorgmehri-Fard	Ph.D.	2025
Akhila Nair	Ph.D.	2025
Chimira Andres	Ph.D.	2025
Ivan Mishev	M.S.	2023
Jamie Isen	M.S.	2024

Completed Degrees

Rushana Karimova	M.S.	2021
Craig Rezza, employed	M.S.	2021

Professional Collaborators

- *Mentored an international collaborator, Bharti on how to use SHARAD data and software that led to two publications (one in review)*

Undergraduate Students

- *Mentored 15 students in space engineering, physics, and planetary science.*
 - *techniques include glacial modeling, laboratory experiments, radar propagation code, data analysis,*
- *Instructed on the use of special software and analysis; reviewed presentations and publications*

STUDENT LED CONFERENCE ABSTRACTS (33 since 2019)

2023

- Chesal, J., **I. B. Smith**, Cloud Morphologies on the Nightside Middle Atmosphere of Venus Caused by an Equatorial Jet That Produces Meridonal Wind Shear, Venus Surface and Atmosphere Conference
- Chesal, J., **I. B. Smith**, Night and Day Side Zonal Winds Retrieved from Venus Express and Venus Climate Orbiter Radio Science Data, Venus Surface and Atmosphere Conference
- Fard, K, **I. B. Smith**, E. Larour, N. J. Schlegel, Modelling CO₂ Glaciers on Mars with the 3D Ice Sheet and Sea-Level System Model (ISSM). 1st Ices in the Solar System Workshop

2022

- J. Isen, **I. B. Smith**, In House-Developed Goniometer to Support Measurements of the Bidirectional Reflectance Distribution Function of CO₂ Ice Made in an Environmental Chamber that Simulates Martian Polar Conditions, 54th Annual Meeting of the Division of Planetary Sciences
- P. Acharya, **I. B. Smith**, Seasonal Variation of the Cold and Bright Anomalies on the North Polar Layered Deposits, 54th Annual Meeting of the Division of Planetary Sciences.
- C. N. Andres, **I. B. Smith**, Estimation of Ice-Depth and Thickness Using Shallow Radar (SHARAD) in Phlegra Montes, Mars, 54th Annual Meeting of the Division of Planetary Sciences.
- A. Nair, **I. B. Smith**, Mapping of Reflectors and Outcrops in Planum Boreum with 3-D SHARAD Data and Imagery, 54th Annual Meeting of the Division of Planetary Sciences.
- P. J. Acharya, **I. B. Smith**, Seasonal Variations of the Cold and Bright Anomalies on the North Polar Layered Deposits, *Mars Atmosphere, Observations, and Modeling Conference*, Paris, France
- P. J. Acharya, **I. B. Smith**, W. Calvin, Interannual Variations in the Retreat of the Northern Seasonal Cap of Mars Using Computer Vision, *Mars Atmosphere, Observations, and Modeling Conference*, Paris, France
- I. Mishev, **I. B. Smith**, Measuring Sediments and Deltoids of Western Valles Marineris Using Imagery, Radar, and Neural Networks to Constrain Past Wet Environments, 7th International Dunes Workshop, Abstract #3030
- P. J. Acharya, **I. B. Smith**, Interannual Variations in the Retreat of the Northern Seasonal Cap of Mars Using Computer Vision, 53 *LPSC*, Abstract #2454
- C. Andres, **I. B. Smith**, Grid-Mapping Phlegra Montes, Mars: New Insights into the Distribution, Geomorphology, and Dichotomy Boundary of Glacial-Periglacial Landystems, 53 *LPSC*, Abstract 2037

- P. Buhler, **I. B. Smith**, Mars' South Polar Carbon Dioxide Glacier Crevasses, *53 LPSC*, Abstract
- J. Chesal, **I. B. Smith**, Cloud Morphologies on the Nightside Middle Atmosphere of Venus Caused by an Equatorial Jet that Produces Zonal Wind Shear, *53 LPSC*, Abstract #1645
- K. Fard, **I. B. Smith**, Modeling CO₂ Glaciers on Mars with the 3D Ice Sheet Sea-Level System Model (ISSM), *53 LPSC*, Abstract #2584
- J. Isen, **I. B. Smith**, In House Developed Goniometer to Support Measurements of the Bidirectional Reflectance Distribution Function of CO₂ Ice Made in an Environmental Chamber that Simulates Martian Polar Conditions, *53 LPSC*, Abstract #1278
- I. Mishev, **I. B. Smith**, Measuring Sediments of Western Valles Marineris Using Imagery, Radar, and Neural Networks to Constrain Past Wet Environments *53 LPSC*, Abstract #2774
- A. Nair, **I. B. Smith**, Mapping of Reflectors in Planum Boreum with 3-D SHARAD Data, *53 LPSC*, Abstract #2541

2021

- I. Mishev, **I. B. Smith**, Measuring sediments of Western Valles Marineris using Imagery, RADAR, and Neural Networks to Constrain Past Wet Environments, *American Geophysical Union Fall Meeting*, Abstract
- Achara, P. J., **I. B. Smith**, Using Computer Vision to Monitor the Recession of the Northern Seasonal Cap, *American Geophysical Union Fall Meeting*, Abstract
- J. Chesal, **I. B. Smith**, A Study of Cloud Morphologies, Horizontal Wind Shear, and the Equatorial Jet on the Nightside Middle Atmosphere of Venus, *American Geophysical Union Fall Meeting*, Abstract
- C. A. Rezza, **I. B. Smith**, The Transmissive Clays of Ganges Chasma: An Investigation into SHARAD Observations on a Phyllosilicate Rich Plateau, *GACMAC*
- Karimova, R., **I. B. Smith**, An Experimental Setup to Study CO₂ Ice in a Simulated Martian Environment, *Lunar and Planetary Science Conference*, Abstract #1577
- P. J. Acharya, **I. B. Smith**, Seasonal Variation of the Cold and Bright Anomalies of the North Polar Residual Cap, *LPSC*, Abstract #2541
- I. Mishev, **I. B. Smith**, Characterization and Mapping of Light-toned, Layered Deposits on the Plateaus of Western Valles Marineris with SHARAD and High-Resolution Imagery, *Lunar and Planetary Science Conference*, Abstract #1694
- C. Rezza, **I. B. Smith**, The Transmissive Clays of Ganges Chasma: An Investigation into SHARAD Observations on a Phyllosilicate-Rich Plateau, *Lunar and Planetary Science Conference*, Abstract #2455

2020

- Rezza, C., **Smith, I. B.**, Light Toned Sedimentary Deposits at Eastern Valles Marineris, Mars: Constraints from Radar Observations and Future Laboratory Experiments, *51st Lunar and Planetary Science Conference*, Abstract #3071
- P. J. Acharya, **I. B. Smith**, Seasonal Variation of the Cold and Bright Anomalies of the North Polar Layered Deposits (Postponed) *Mars Atmospheric Modeling and Observations*
- P. J. Acharya, **I. B. Smith**, Seasonal Variation of the Cold and Bright Anomalies of the North Polar Residual Cap, *American Geophysical Union Fall Meeting* Abstract P039-08

- I. Mishev, **I. B. Smith**, Characterization and Mapping of Light-toned, Layered Deposits on the Plateaus of Western Valles Marineris with SHARAD and High-Resolution Imagery, *American Geophysical Union Fall Meeting*, Abstract P016-0003
- C. Rezza, **I. B. Smith**, Characterization and Mapping of Light-toned, Layered Deposits on the Plateaus of Western Valles Marineris with SHARAD and High-Resolution Imagery, *American Geophysical Union Fall Meeting*, Abstract P016-0005
- Karimova, R., **I. B. Smith**, An Experimental Setup to Study CO₂ Ice in a Simulated Martian Environment, *7th International Conference on Mars Polar Science and Exploration*: Abstract #6014

2019

- Alwarda, R., **I. B. Smith**, Mapping and Characterization of the Bounding Layers of the CO₂ Deposit in Planum Australe, *Mars Lunar and Planetary Science Conference*, Abstract #3026

LEADERSHIP

- 2022** Member, Science Organizing Committee, *Mars Atmosphere, Modeling, and Observations Conference*, Paris France
- 2021** Program Committee Member, *Lunar and Planetary Science Conference*
- 2020** Lead Organizer, Convener, and Program Committee Chair, *7th International Conference on Mars Polar Science and Exploration*, Ushuaia, Argentina.
- Member, Science Organizing Committee, *Mars Atmosphere, Modeling, and Observations Conference*, Paris France (Canceled)
- Main Scientific Organizer, *COSPAR*, Sydney, Australia (Postponed)
- 2019** Science Organizing Committee, 9th International Conference on Mars, Pasadena, California
- 2018** Lead Organizer and Convener, *Mars Workshop on Amazonian and Present Day Climate*, Lakewood, Colorado, June 2018
- 2017** Team lead for Keck Institute for Space Science workshop entitled “Unlocking the Climate Record Stored within Mars' Polar Layered Deposits” DOI: 10.26206/HQ9P-YW49
- Organizer of the LPSC Special Session “*Mars Volatile Surface-Atmospheric Interactions: Past and Present.*”
- Organizer, convener, and session chair of an AGU Special Session “*Cryospheres of Terrestrial Planets*”
- 2016** Lead Organizer, Convener, and Program Committee Chair, *6th International Conference on Mars Polar Science and Exploration*, Reykjavik, Iceland, September 2016
- 2015 - 2016** Colloquium Chair and Organizer, Southwest Research Institute
- 2015, 2017** Lunar and Planetary Science Conference session chair.
- 2012 - 2013** Vice President of the Graduate Student Executive Counsel, Geology Department, University of Texas
- 2011 - 2012** Seminar Chair and Organizer, University of Texas Institute for Geophysics

MEDIA APPEARANCES (highly selected)

- 2022** Columbia Climate School: Space Glaciers: [Carbon Dioxide Ice Forms Glaciers](#)

[on Mars](#)

- Bad Astronomy: [Dry ice glaciers are on the move at the south pole of Mars](#)
space.com: [These dry ice glaciers on Mars are moving at its south pole](#)
Nature: [Carbon dioxide glaciers sculpted Martian south pole](#)
Universe Today: [Mars' Carbon Dioxide Glaciers are on the Move](#)
EOS: [The Bumpy Search for Liquid Water at the South Pole of Mars](#)
Cosmos Magazine: [Martian water nothing but a mirage](#)
thehill.com: [Researchers say no water on Mars, just a 'dusty mirage'](#)
phys.org: [Hope for present-day Martian groundwater dries up](#)
- 2021** CNN: [A new clue emerges of what may lie beneath the Martian south pole](#)
space.com [Mars' buried polar 'lakes' may just be frozen clay](#)
Gizmodo: [Underground 'Lakes' on Mars May Just Be Big Globbs of Clay](#)
Voice of America: [Что скрывается под Южной полярной шапкой Марса](#)
Planetary Society: [Liquid water under the Martian polar ice? Maybe not](#)
Arizona Daily Star (Front Page): [New take on Martian 'lakes'](#)
Forbes Blog: [Mars' South Polar Subsurface Is Mostly Smectite Clay, Not Liquid Water](#)
Popular Science: [Sorry, there's probably no water under the South Pole of Mars](#)
- 2020** Science News: [A 'lake' on Mars may be surrounded by more pools of water.](#)
Forbes Blog: [NASA Eyes Wind Turbines To Power Martian Weather Stations](#)
Cosmic Controversy: [Why Mars Remains So Misunderstood](#)
Forbes Blog: [Mars' Poles Remain Key To Understanding Its Climate, Says Planetary Scientist](#)
The Globe and Mail: [Mars set to dazzle in closest approach to Earth for 15 years](#)
- 2019** The Globe and Mail: ['Surprising' methane result ignites speculation - and caution - about life on Mars](#)
- 2018** CTV: [Television interview with Merella Fernandez](#)
The Globe and Mail: [A Red, White and Cold World](#)
- York University, Y-File Appearances**
- 2021** Y-File: [York U planetary scientist puts Mars lake theory on ice with new study that offers alternate explanation](#)
Y-File: [Exploring a universe of mysteries: Four scientists consider how we fit into the 'vast cosmic dance'](#)
- 2020** Y-File "the Scoop" January 20: <https://yfile.news.yorku.ca/category/the-scoop/>
- 2018** Y-File: [York University collaborates on research to study role of ice in shaping Mars' regions](#)
- 2018** Y-File: [York University gains two new and one renewed Canada Research Chair appointments](#)
-

SERVICE

Journal Reviewer

- 2022** *Nature, Geology, Geophysical Research Letters, Geology, Science Advances, Earth and Planetary Science Letters*
2021 *Journal of Geophysical Research - Planets, Geophysical Research Letters*
2020 *2x Icarus, 2x Geophysical Research Letters, Journal for Geophysical Research*
2019 *Journal of Glaciology, Icarus*
2018 *Journal of Glaciology; 2x Geophysical Research Letters, Nature Astronomy*
2017 *Icarus, 2x Geophysical Research Letters, Dynamic Mars*
2016 *Journal of Geophysics Research: Planets, Geophysical Research Letters, Radio Science*
2015 *Icarus, IEEE, Geophysical Research Letters*
2014 *Icarus, Journal of Geophysical Research, Encyclopedia of Planetary Landforms*
2012 *Nature*
2010, 2011 *Icarus*

Proposal Reviewer

- 2011 -2022** Canada Foundation for Innovation.
Panel member for NASA's PICASSO Program, NASA' Solar System Workings Program, NASA's Cassinni Data Analysis Program, 2x NASA Habitable Worlds Program; NASA Postdoc Program, NASA Earth and Space Science Fellowship
External reviewer: 3x Mars Data Analysis Program

Student Award Judge

- 2013-2017** Lunar and Planetary Science Institute Dworknik Award
2014, 2017 American Geophysical Union Fall Meeting
2012 Humans In Space Youth Art Competition

COURSES TAUGHT

Undergraduate

2019	Winter	ESSE 2030	Geophysics and Space Science
2019	Fall	PHAS 3070	Planets and Planetary Systems
2020	Winter	ESSE 2030	Geophysics and Space Science
2020	Fall	PHAS 3070	Planets and Planetary Systems
2021	Winter	ESSE 2030	Geophysics and Space Science
2021	Fall	PHAS 3070	Planets and Planetary Systems
2022	Winter	ESSE 2030	Geophysics and Space Science
2022	Fall	PHAS 3070	Planets and Planetary Systems
2020/1		ESSE 4000	Undergraduate Research Course
2021/2		ESSE 4000	Undergraduate Research Course

Graduate

2020	Winter	ESS 5010	Technologies for Exo/Planetary Science (co-teacher)
2022	Winter	ESS 5010	Technologies for Exo/Planetary Science (co-teacher)

OUTREACH

- 2022** York University Astronomy Club
2020 Lumières Podcast and live event (partially delayed due to COVID)
2019 "Let's Talk Science" honorary speaker to Grade 6-8 Students.
Panel Discussion, "Should Humans Go to Mars?", Royal Canadian Institute for Science and Royal Astronomical Society of Canada

- 2018 Keynote Speaker at North York Astro. Assoc StarFest
Invited talk at North York Astro. Assoc. about Ice and Climate on Mars
- 2016-2018 Co-Lead Organizer of [Astronomy on Tap](#), Colorado
- 2016 Discussed topics of planetary science with grade school children at Denver Public Library
Led Discussions at Regis University for “Science Night”
- 2015 Seminar Chair at Southwest Research Institute
Discussed “How to Choose a Graduate School” to students at CU Boulder
Presented for [Astronomy on Tap](#), Denver to diverse crowd
Panel Discussion for Pluto Encounter at Fiske Planetarium, Boulder, Co
Tutored Denver area high school students for national Science Olympiad
- 2014 Discussed “Being a Scientist” to science students at several high schools, Alsace, France
- 2013 Visited Denver area elementary schools to discuss planetary science
- 2012 Judged science fair at a minority-dominated elementary school, Austin, Tx
-

FIELD CAMPAIGNS

- 2022/2023 **FAST Yukon**
Comparing airborne L-band Synthetic Aperture Radar and Radar Sounding to ground truth observations
- 2018 **MU69 Astronomical Occultation**
Field deployment of 16” telescopes in Senegal for Astronomy Campaign
- 2008/9 **Antarctica: Investigating the Cryospheric Evolution of the Central Antarctic Plate (ICECAP)**
Installed, tested, and calibrated instruments in preparation for geophysical survey while at McMurdo Station, Antarctica
- 2008 **New Mexico: Seismic Investigation of Edge-Driven Convection Along the Rio Grande Rift (SIEDCAR)**
Installed and tested 3-axes seismometers in survey of deep crust
-

CONTINUING EDUCATION and EQUITY, DIVERSITY, AND INCLUSION TRAINING

- 2018 Teaching Commons Course Design Intensive
- 2020 Unconscious Bias / Affirmative Action Training
- 2022 Certificate in POLARIS: Place of Online Learning for the Adjudication of Researchers Inclusively and Supportively
- 2022 REDDI: Respect, Equity, Diversity, Decolonization and Inclusion
Mini-Series Certificate:
EDI workshop: Challenging Biases in Decision Making and Approaches
EDI workshop: Issues and Impacts of Misogynoir
EDI workshop: Do the Work: Intervening on Sex and Gender Harassment and Discrimination
- 2022 REDDI Certificat
-

SPOKEN LANGUAGES

- English:** Native Language
French: Advanced proficiency

- *Lived and worked in Paris, France for one year*
- *Completed French courses while living in France and Canada*

Spanish: Professional working proficiency

- *Lived and worked while speaking Spanish for extended periods*
- *Completed more than one dozen university courses*

German: Conversational proficiency

- *Studied for one year in Stuttgart, Germany*

PROFESSIONAL AFFILIATIONS

International Astronomical Union
American Geophysical Union
American Astronomical Association
European Geophysical Union
Canadian Aeronautics and Space Institute