

MICHAEL T. THORPE

Sedimentary Geochemist & Mineralogist

NASA Goddard Space Flight Center | University of Maryland | CRESST
michael.t.thorpe@nasa.gov | 845-661-6397 | mikethorpe.weebly.com

PROFILE

My research centers on exploring chemical weathering and sediment generation in basaltic terrains, both on Earth and Mars; ultimately tracking geochemical and mineralogical transformations from source-to-sink. My work has the overarching themes of unraveling sedimentary processes, reconstructing paleoenvironments, planetary exploration, and preparing for Mars sample return. The foundation of this work is embedded in field work in environments around the globe as well as exploration of the martian surface with rovers. My passion for this career extends far beyond cutting edge laboratory analysis and leading innovative science expeditions, but bridges into outreach and teaching, where I find the most gratifying experiences come from sharing science with the community and students.

Key Qualifications

- Over three years of specialized experience in the geochemistry and mineralogy of sediments and sedimentary rocks, focusing on clays & clay minerals.
- Science PI on funded terrestrial analog research (i.e., NASA SSW) and Co-I on submitted proposals to study basalt weathering, astrobiology, & planetary missions.
- Mission experience with Mars rovers, analyzing planetary datasets, preparing for Mars sample return, and proposing future planetary mission concepts.
- Experience leading large teams in the field, advising & teaching the next generation, managing labs, preparing & analyzing geological samples.

Core Competencies

- Actively engaged in grant and manuscript writing, with a particular skillset for distilling big science concepts in illustrations and oral communications.
- Passion for teaching, advising, and outreach, with over 32 outreach/invited speaker talks. Dedicated to building a diverse research group and partnership with students.
- Strong interpersonal skills most notably demonstrated in leading research projects domestic and abroad, with collaborators across the globe and diverse teams.
- Deeply rooted teamwork mentality, illustrated by working on multiple science teams (e.g., Curiosity and Mars Sample Return) and building collaborative projects.

ACADEMIC EXPERIENCE

2018	Ph.D., Geosciences- Stony Brook University
2014	M.S., Geosciences- Stony Brook University
2012	B.S., Geology- Towson University

PROFESSIONAL EXPERIENCE

2022-present	Visiting Assistant Research Scientist- NASA GSFC/University of Maryland/CRESST
2022-present	Mars Sample Return Science Group (MSCG) team member
2020-2022	Mars Sample Return Scientist- Jacobs/NASA JSC/ Texas State University
2018-present	Mars Science Laboratory Science and Operation Team Collaborator, CheMin Team
2018-2022	Visiting Scientist, Rice University, Department of Earth, Environmental, and Planetary Sciences (DEEPS)
2018-2020	NASA Postdoctoral Program (NPP) Research Fellow at the Johnson Space Center (JSC)
2018	Rice University Postdoctoral Fellow, Department of Earth, Environmental, and Planetary Sciences (DEEPS)
2015-2018	NASA Earth and Space Sciences Fellow (NESSF) Graduate Researcher
2014-2015	Suffolk County Water Authority: GIS project to identifying sources of contamination to local water supplies.
2007-2008	Tim Miller Associates, Inc., Intern at Environmental Planning Company

REFERENCES

Dr. Elizabeth Rampe	<i>Mars Research Scientist: NASA JSC</i>	elizabeth.b.rampe@nasa.gov		(281) 483-0216
Dr. Joel Hurowitz	<i>Associate Professor: Stony Brook University</i>	joel.hurowitz@stonybrook.edu		(631) 632-5355
Dr. Kirsten Siebach	<i>Assistant Professor: Rice University</i>	ksiebach@rice.edu		(713) 348-6751
Dr. Deanne Rodgers	<i>Associate Professor: Stony Brook University</i>	deanne.rogers@stonybrook.edu		(631) 632-1509

TEACHING and ADVISING EXPERIENCE

Present	University of Maryland: Co-mentor a senior research project (393/394)
Present	University of Houston Graduate student, co-advising on Mars and terrestrial analog projects.
2022	NASA and LPI Summer Undergraduate Program for Planetary Research (SUPPR) mentor: DIGMARS project
2022	LPI Summer Intern Program: Co-mentor
2021	Rice University Graduate Student; training two graduate students in the field and lab.
2020	NASA SEES (STEM Enhancement in Earth Science) Mentor: Mars 2020 and Roving on Mars
2019	Rice University Undergraduate Seminar: Discoveries in Earth, Environmental & Planetary Sciences (ESCI 114).
2019	Rice University Master STEM Teacher Seminar: Getting Young STEM Students Engaged in Mar Science.
2019	Rice University Undergraduate Seminar: Field work on Earth and Mars.
2019	Undergraduate Mentor, Rice University: Plagioclase weathering from source to sink.
2018-2019	Undergraduate Mentor and Training, Rice University: Utility of using drones and GIS in geological studies.
2014	Field/Teacher Assistant, Stony Brook University: Renewable energy in Costa Rica.
2013	Teacher Assistant, Department of Geosciences, Stony Brook University: Remote Sensing (GEO 347).
2012	Teacher Assistant, Department of Geosciences, Stony Brook University: Physical Geology (GEO112).
2009	Team Leader, Power Shift Conference, Washington D.C.: Strategies for becoming carbon neutral in Puerto Rico.

FIELD GEOLOGY EXPERIENCE

Pending	Mojave Desert and Cape Verde, if funded, three trips will be from 2023-24
2022	Iceland, Lake Apavatn for DIGMARS in 2022
2021	Iceland, Lake Sandvatn for DIGMARS, SSW- Early diagenesis in lake sediments from basaltic terrains
2021	Iceland Kverkfjöll mountain range and Vatnajökull and glacier for SAND-E project
2021	Iceland, Askja lake and the adjacent acidic lake for a pilot project.
2020	Trips planned but canceled for COVID: Ethiopia and Iceland (2x).
2019	Langjökull, Iceland- Fluvial to aeolian environments in basaltic terrains for the SAND-E project.
2019	Ottawa, Canada- Operational testing for SAND-E (Semi-Autonomous Navigation for Detrital Environments).
2017	Little Ambergis, Turks and Caicos- Microbial mat preservation in the rock record.
2015	Hvítá River, Iceland- Basaltic sediments from source-to-sink in a cold and icy environment.
2014	Columbia River Basalts, Idaho- Basaltic sediments from source-to-sink in a warm and wet environment.
2014	Hawaii Volcanoes National Park, HI-Field techniques for astronauts.
2014	Costa Rica- Global renewable energy education.
2013	Stony Brook and Port Jefferson Harbor, New York- trace metal gradients in the subterranean estuary.

HONORS, AWARDS, and FUNDING

2020	NASA Solar System Workings (\$1.2 Million; 3 years)- Science PI; Collaborators: <i>NASA JSC, Old Dominion University, Rice University; Stony Brook University; Brookhaven National Lab, Advanced Photon Source; University of Hawaii; University of Cambridge; Texas A&M; LPI.</i>
2019	Brookhaven National Lab General User Proposal
2019	Rice Natural Sciences Scientific Image Contest (2 nd place for drone images from Iceland)
2018-2020	NASA Postdoctoral Program (NPP) Fellowship (\$200,000)
2015-2018	NASA Earth and Space Fellowship (NESSF; \$90,000)
2015	David E. King Field Award- second year awardee (\$5,000)
2014	David E. King Field Award- endowment for graduate student field research (\$5,000)

CURRENT PROPOSALS & PENDING FUNDING

11/22	NASA's Solar System Workings (SSW); Co-I working with NASA GSFC Scientist Title: <i>Characterizing Poorly Ordered Weathering Products in Mars Analog Materials: Implications for Identifying X-ray Amorphous Materials in Martian Surface Materials and Preparing for Mars Sample Return.</i>
12/22	NASA's Exobiology Program; Co-I; working with NASA JSC; Lunar Planetary Institute Title: <i>Subsurface Biological Signatures in Lake Sediments in Basaltic Terrains: Implications For Exploring Ancient Lacustrine Environments on Mars.</i>
09/22	Brookhaven National Lab Beam Time; PI; working with Brookhaven Nation Lab and NASA JSC Title: <i>Characterizing clay minerals and amorphous materials from basaltic terrains with high-resolution XRF; implications for exploring the sedimentary rock record of Mars.</i>
10/23	NASA's Planetary Science and Technology from Analog Research (PSTAR); Co-I; working with / NASA JSC; NASA JPL; MIT; University of Chicago; Rice University; Cardiff University; Instituto Nacional de Meteorologia e Geofísica; Harvard University

Title: An Airborne Field Geologist: Deciphering paleoclimates and ancient environments of Mars with a stand-alone Mars Science Helicopter

INVITED TALKS

Upcoming	SUNY Oswego
Upcoming	Brookhaven National Lab Science Seminar for XPD group
2022	NASA GSFC 690 Science Seminar
2022	Texas State University
2022	NASA Goddard Planetary Group Seminar; <i>Breakfast and Learn</i>
2022	Mars Science Laboratory Team Meeting
2021	NASA TV: <i>DIGMARS</i>
2021	Mars Science Laboratory Team Meeting
2021	<i>AAPG's Astrogeology "My favorite Outcrop": My Favorite Martian Outcrop.</i>
2021	<i>Rice University Planetary Group Reading: Source-to-Sink Terrestrial Analogs for the Paleoclimate of Gale Crater.</i>
2021	<i>Lunar Planetary Institute (LPI) Seminar Talk: Exploring Mars with Curiosity and Earth for Sedimentary Clues.</i>
2021	<i>AAPG's Astrogeology: Perseverance and the Geology of Mars: What We're Finding Out from the Rover and More.</i>
2021	Minnesota Public Radio; What you need to know about NASA's next mission to Mars
2021	<i>Reykjavik University and the Iceland Space Agency: From Iceland to Mars.</i>
2020	<i>Society of Exploration Geophysicists 90th Annual Meeting; Keynote: Mining for Clays on Mars.</i>
2020	<i>Towson University PAGS Seminar: Source-to-Sink on Earth and Mars</i>
2020	<i>Brookhaven National Lab: Phyllosilicates and X-ray Amorphous Materials on Earth and Mars.</i>
2019	Mars Science Laboratory Team Meeting
2019	<i>NASA Hyperwall at AGU 2019: Latest Results from the Mars Science Laboratory Curiosity Rover.</i>
2019	<i>NASA ARES Brown Bag Seminar: Terrestrial Analogs for Sedimentary Processes on Mars.</i>
2019	<i>Rice University Master STEM Teacher Seminar: Getting Young STEM Students Engaged in Mar Science.</i>

OUTREACH

2022	Planetary Resources and Content Heroes (ReaCH), engage public audiences, particularly Black and Latinx audiences
2022	Pathways to Careers in NASA Science
2022	Inclusion Diversity Equity and Access (IDEA) committee for LPSC conference 2022
2022	Space Exploration Educators Conference
2021	NASA ARES webinar: <i>DIGMARS</i>
2021	Haldane Middle School, Cold Spring, NY: <i>From Haldane to Mars</i>
2021	St. Mark's Episcopal School- 5 th grade: <i>Roving on Mars</i>
2021	Geological Society of America's Planetary Science Division Twitter takeover
2021	<i>American Institute of Aeronautics and Astronautics: Space Geek Speak</i>
2021	<i>Haldane Middle School, Cold Spring, NY: Mars Rocks Haldane!</i>
2021	<i>Houston Cub Scott Troop 55 Annual Award Banquet: Exploring Mars with Curiosity and Perseverance!</i>
2021	<i>Haldane Elementary School, Cold Spring, NY: Exploring Mars with Curiosity and Perseverance!</i>
2021	<i>Featured Scientist at the Jacobs Booth for the Lunar Planetary Science Conference</i>
2021	<i>Hillsborough Elementary School, NJ: Space week and Exploring Mars</i>
2021	<i>Mars Perseverance: Mission Overview and Countdown to Mars: Panelist: NASA JSC Webinar Event</i>
2021	American Geophysical Union's Earth and Planetary Surface Process group Twitter takeover.
2020	<i>Woods Road Elementary School, Hillsborough, NJ- 3rd Grade: Curiosity and Perseverance on Mars.</i>
2020	<i>NASA SEES Mentor: Roving on Mars</i>
2019	<i>St. Vincent de Paul- 5th Grade: Naming the Mars 2020 Rover!</i>
2019	<i>Bendwood Elementary, Houston, TX, STEM students: To Mars & Back; future of planetary exploration</i>
2019	<i>Waltrip High (Houston) & Woodroffe High (Ottawa)- High School: Mission Control Academy...Driving Rovers!</i>
2019	<i>Rice University STEM engagement talk- M.S. students: Getting Young STEM Students Engaged in Mar Science.</i>
2018	<i>School of the Woods, Houston, TX- 12th Grade: Shadowing a Geologist for a day.</i>
2017	<i>Woods Road Elementary School, Hillsborough, NJ- 3rd Grade: Rocks on Earth and Mars by Geologist Mike</i>
2014-2018	<i>Hillsborough Elementary School, Hillsborough, NJ. Invited- 3rd Grade: Rocks on Earth and Mars by Geologist Mike</i>

SCIENCE TEAMS and AFFILIATIONS

2022-present	Mars Sample Return Campaign Science Group (MCSG)
2018-present	Mars Science Laboratory Science and Operations Team
2019-present	DIGMARS: Digging Iceland Geology for Mars Analog Research Science
2018-present	SAND-E: Semi-Autonomous Navigation for Detrital Environments
2018-present	Society for Sedimentary Geology (SEPM)

2016-present	American Geophysical Union
2015-present	Mineralogical Society of America (MSA)
2013-2014	Global Renewable Energy Education Network LLC (GREEN LLC) Costa Rica
2012-present	New York Academy of Sciences
2012-present	Geological Society of America (GSA)
2012-present	American Association of Petroleum Geologist (AAPG)
2010-present	Golden Key National Honor Society

PROFESSIONAL CERTIFICATIONS and TRAININGS

2022	Planetary Resources and Content Heroes (ReaCH), engage public audiences, particularly Black and Latinx audiences
2020	Unlearning Racism in Geosciences (URGE)
2020	Brookhaven National Lab Synchrotron Work on XRD and XRF Beamlines
2019	Arizona State Universities High Resolution Electron Microscopy (HREM) Winter School
2014	Geographic Information Systems (GIS) Graduate Certification

INSTRUMENT EXPERIENCE

Inductively Coupled Plasma Spectroscopy (ICP-MS, LA-ICP-MS & ICP-OES)
 X-ray Diffraction (XRD; Quantitative and clay mineral identification)
 X-ray Fluorescence (XRF); both benchtop and handheld
 Remote Sensing (Raman and Thermal Emission Spectroscopy)
 Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray (EDX)
 Unmanned Aerial Vehicles (UAV; e.g., Drones: Phantom 4 pro v2.0)
 Microtomography
 Transmission Electron Microscopy (TEM)

TECHNICAL SKILLS

Microsoft Office	Sigma Plot	NewMOD	Illustrator	Photoshop	JADE	Tableau
Google Suite	ArcGIS	ENVI	NASA-MSLICE	Scilab	Davinci	BGMN
Sybillia	Match!	Highscore	Gatan	Agisoft	PIX4d	ClaySIM

PROFESSIONAL SERVICE

Guest Editor:	Minerals		
Peer Reviewer:	Chemical Geology Journal of Soils and Sediments Canadian Journal of Earth Sciences	Catena Planetary Science Data System	Geochimica et Cosmochimica Acta Minerals
Panel Secretary:	NASA Science Mission Directorate		
Panel Reviewer:	NASA Science Mission Directorate Graduate Women in Science		
External Review:	NASA Science Mission Directorate		
Session Chair:	Lunar and Planetary Science Conference (LPSC)		
Award judge:	LPSC; Dwornick award		

COMMUNITY INVOLVEMENT

2022	Route Life- Club Football Coach for middle school students from St. Mark's in Houston, TX. Working on building character and chooses the right "routes" in both football and life
2017	Invited Speaker for Haldane High School Varsity Football team

MEDIA

2022	Standard-bearers for Mars Sample Return science
2022	Meet the Martians
2021	Towson University Feature Article
2021	DIGMARS Also premiered on NASA TV
2021	The Highlands' Martian Connection
2021	Mars Once had a climate similar to Iceland; Houston Chronicle
2021	What you need to know about NASA's next mission to Mars; MPR news
2019	Texas A&M 360 feature of SANDE

- 2019 [NASA Test Mars Systems in Iceland](#)
- 2019 [Featured in the NASA Postdoctoral Program Newsletter](#)
- 2019 [Mission Control Academy outreach at Waltrip High \(Houston\) & Woodroffe High \(Ottawa\)](#)
- 2019 Field Work in Iceland for the SANDE project
[Link 1: Space.com](#)
[Link 2: NBC New](#)
[Link 3: French News Outlet](#)
- 2014 [Field Work in Hawaii for "Boots on the Ground" project](#)

LABORATORY TRAININGS

X-ray safety	Laser safety	Hazard communication
Clean Room Etiquette	Nitric acid safety	Chemical hazards/Hazardous waster

PUBLICATIONS (selected)

[ORCID](#)
[Google Scholar](#)

Thorpe, M.T., T.B., Bristow, E.B. Rampe, N. Tosca, and the CheMin team (2022). Mars Science Laboratory CheMin data from the Glen Torridon region and the significance of lake-groundwater interactions in interpreting mineralogy and sedimentary history. *Accepted for Special Issue to JGR-Planets*.

Thorpe, M.T., E.B. Rampe, J. Thieme; E. Dooryhee, S. Lee, R. Christoffersen (2022). High-Resolution Analysis of Phyllosilicates and Amorphous Materials in Martian Analog Environments. *In Preparation*.

Thorpe, M.T., E.B. Rampe, R. C. Ewing, J. Thieme; E. Dooryhee, (2022). Nano-phase Secondary Phases in Basaltic Terrains: Implications for the Alteration History of Mars. *In preparation*.

Bennet, K.A., et al., including **Thorpe, M.T.**, (2021), An Overview of the Curiosity rover's Campaign in Glen Torridon, Gale Crater, Mars, *Submitted for Special Issue to JGR-Planets*.

McAdam, A., et al., including **Thorpe, M.T.**, (2021), Evolved gas analyses of sedimentary rocks from the Glen Torridon Clay-Bearing Unit, Gale crater, Mars: Results from the Mars Science Laboratory Sample Analysis at Mars Instrument Suite, *Submitted for Special Issue to JGR-Planets*.

Dehouck, E., et al., including **Thorpe, M.T.**, (2021), Bedrock geochemistry and alteration history of the clay-bearing Glen Torridon region of Gale crater, Mars, *Accepted for Special Issue to JGR-Planets*.

Gasda, P., et al., including **Thorpe, M.T.**, (2021), Overview of the Morphology and Chemistry of Diagenetic Features in the Clay-Rich Glen Torridon Unit of Gale Crater, Mars, *Accepted for Special Issue to JGR-Planets*.

Smith, R. et al., including **Thorpe, M.T.**, (2021), X-ray amorphous sulfur-bearing phases in sedimentary rocks of Gale crater, Mars. *Submitted to JGR-Planets*.

Payre, V., Siebach, K.L., **Thorpe, M.T.**, Antoshechkina, P., Rampe, E.B., (2021), Tridymite in a Lacustrine Mudstone in Gale Crater, Mars: Evidence for an Explosive Silicic Eruption during the Hesperian, *Earth and Planetary Science Letters*, In revision.

Thorpe, M.T., J.A. Hurowitz, and K.L., Siebach (2021). Source-to-Sink Terrestrial Analogs for the Paleoenvironment of Gale Crater, Mars, *Journal of Geophysical Research: Planets*, 126(2). DOI: 10.1029/2020JE006530

Sehppard, R.Y., **Thorpe, M.T.**, Fraeman, A.A., Fox, V.K., Milliken, R.E., (2021). Merging perspectives on secondary minerals on Mars: A review of ancient water-rock interactions in Gale crater inferred from orbital and in-situ observations. *Minerals*, 11(9), 986, doi: 10.3390/min11090986

Tu, V. M., Rampe, E. B., Bristow, T. F., **Thorpe, M. T.**, et al., (2021). A Review of the Phyllosilicates in Gale Crater as Detected by the CheMin Instrument on the Mars Science Laboratory, Curiosity Rover. *Minerals*, 11(8), 847.

Present, T. M.; Trower, L.; Stein, N.; Alleon, J.; Bahniuk, A.; Gomes, M. L.; Lingappa, U.; Metcalfe, K.; Orzechowski, E. A.; Riedman, L. A.; Sanders, C. B.; Morris, D. K.; O'Reilly, S.; Sibert, E. C.; **Thorpe, M.T.**; Tarika, M.; Fischer, W. W.; Knoll, A. H.; Grotzinger, J. P. (2021). Non-lithifying microbial ecosystem dissolves peritidal lime sand, *Nature Communications*, accepted.

Thorpe, M.T., and J.A. Hurowitz (2020). Unraveling sedimentary processes in fluvial sediments from two basalt dominated watersheds in northern Idaho, USA. *Chemical Geology*, 119673, DOI: 10.1016/j.chemgeo.2020.199673.

Rampe, E. B., et al., including **Thorpe, M. T.** (2020). Mineralogy and geochemistry of sedimentary rocks and eolian sediments in Gale crater, Mars: A review after six Earth years of exploration with Curiosity. *Geochemistry*, 80(2), p.125605.

Rampe, E. B., et al., including **Thorpe, M. T.** (2020). Mineralogy of Vera Rubin Ridge from the Mars Science Laboratory CheMin Instrument. *Journal of Geophysical Research: Planets*, 125(9), p.e2019JE006306.

Morris, R.V., et al., including **Thorpe, M.T** (2020). Hydrothermal precipitation of sanidine (adularia) having full Al, Si structural disorder and specular hematite at Maunakea Volcano (Hawai'i) and at Gale Crater (Mars). *Journal of Geophysical Research: Planets*, 125(9), p.e2019JE006324.

Achilles, C.N et al., including **Thorpe, M.T** (2020). Evidence for Multiple Diagenetic Episodes in Ancient Fluvial-Lacustrine Sedimentary Rocks in Gale Crater, Mars. *Journal of Geophysical Research: Planets*, 125(8), p.e2019JE006295.

Thorpe, M.T., J.A. Hurowitz, and E. Dehouck (2019). Sediment geochemistry and mineralogy in a glacio-marine river system in southwest Iceland, *Geochimica et Cosmochimica Acta* (GCA), 263 p. 140-166 doi.org/10.1016/j.gca.2019.08.003

Thorpe, M. T., A. D. Rogers, T. F. Bristow, and C. Pan (2015), Quantitative Compositional Analysis of Sedimentary Materials Using Thermal Emission Spectroscopy: 1. Application to Sedimentary Rocks, *J. Geophys. Res. Planets*, 120 doi:[10.1002/2015JE004863](https://doi.org/10.1002/2015JE004863).

Pan, C., A.D. Rogers, and **M.T. Thorpe** (2015), Quantitative compositional analysis of sedimentary materials using thermal emission spectroscopy: 2. Application to compacted fine-grained mineral mixtures and assessment of applicability of partial least squares methods, *J. Geophys. Res. Planets*, 120, 1984-2001, doi: [10.1002/2015JE004881](https://doi.org/10.1002/2015JE004881)

WHITE PAPERS

Blake, D.F., et al., including **Thorpe, M.T.**, (2021). In-Situ Crystallographic Investigations of Solar Systems in the next Decade, *Planetary Science and Astrobiology Decadal Survey 2023-2032*. DOI: 10.3847/25c2cfcb.c5efb6c2

Blake, D.F., et al., including **Thorpe, M.T.**, (2021). MER-Class Rover Investigations of Mars in the Coming Decades, *Planetary Science and Astrobiology Decadal Survey 2023-2032*. DOI: 10.3847/25c2cfcb.a7226c13

Whelley, P.L., et al., including **Thorpe, M.T.**, (2021). The Importance of Field Studies for Closing Key Knowledge Gaps in Planetary Science, *Planetary Science and Astrobiology Decadal Survey 2023-2032*. DOI:10.3847/25c2cfcb.0a087f9f

CONFERENCE ABSTRACTS (selected)

Thorpe, M.T., E.B. Rampe, J. Thieme; E. Dooryhee, S. Lee, R. Christoffersen (2022). Clay minerals and amorphous materials from source to sink in Martian analog sedimentary environments. *International Clay Conference*.

Thorpe, M.T., E.B. Rampe, J. Thieme; E. Dooryhee, S. Lee, R. Christoffersen (2022). High-Resolution Analysis of Phyllosilicates and Amorphous Materials in Martian Analog Environments. *Goldschmidt Conference*.

Tamborski, J.J., Eagle, M., Charette, M., **Thorpe, M.T.**, et al., Trace Element Cycling and Fluxes in a Salt Marsh Subterranean Estuary., *Ocean Sciences Meeting 2022*

Rampe, E.B., Bishop, J., Horgan, B., Smith, R., Achilles, C.N., and **Thorpe, M.T.**, (2021), Characterizing Secondary X-ray Amorphous Materials on Mars vis Mission Data and Analog Studies. *GSA Annual Meeting*. Abstract # 367446

Rampe, E.B., Bristow, T.F. et al., including **Thorpe, M.T.**, (2021), Changes in Lake Water Chemistry and Diagenesis from Mineral Detections in Ancient Lake Sediments in Gale Crater, Mars. *GSA Annual Meeting*. Abstract # 367579

Bristow, T.F. et al., including **Thorpe, M.T.**, (2021), In Situ Mineralogy of a Clay-Sulfate Transition in Gale Crater. *AGU Annual Meeting*.

Bristow, T.F. et al., including **Thorpe, M.T.**, (2021), Climate Driven Diagenetic Processes in Gale Crater, Mars. *AGU Annual Meeting*.

Bedford, C. et al., including **Thorpe, M.T.**, (2021), The Role of Glaciovolcanic Sources In Iceland's Mars-Analog Sedimentary Systems. *AGU Annual Meeting*

Thorpe, M. T., Hurowitz, J.A., and Siebach, K.L., (2021), Weathering and Sedimentation in Basaltic Terrains on Earth; Implications for the Paleoclimate of Gale Crater, Mars. *Workshop on Terrestrial Analogs for Planetary Exploration*.

Thorpe, M.T., T. F. Bristow, E. B. Rampe, J. P. Grotzinger, et al., (2021), The Mineralogy and Sedimentary History of the Glen Torridon Region, Gale Crater, Mars. *Lunar and Planetary Science Conference*. Abstract # 2548

Sinha, I.P., Horgan, B., Rudolph, A., Ewing, R.C., Rampe, E., Lapôtre, M.G.A., Nachon, M., **Thorpe, M.T.**, Bedford, C.C., Mason, K. and Champion, E., 2021. Assessing Sediment Provenance on Earth and Mars Using Visible and Near-infrared (VNIR) Spectroscopy and Decorrelation Stretches (DCS) of Visible Images. *Lunar and Planetary Science Conference*. Abstract # 8082.

Rampe, E.B., **Thorpe, M.T.**, Smith, R.J., Horgan, B.N.H., Rutledge, A.M., Christoffersen, R. and Ewing, R.C., 2021. Characterizing Martian X-Ray Amorphous Materials Through Terrestrial Analogs, *Lunar and Planetary Science Conference*. Abstract # 8102.

Bedford, C.C., Rampe, E.B., **Thorpe, M.T.**, Ewing, R.C., Nachon, M., Horgan, B., Lapôtre, M.G.A., Mason, K.G., Champion, E., Gray, P. and Reid, E., 2021. Investigating the Geochemical and Mineralogical Evolution of Basaltic Sediments in the Mars Analog Þórisjökull Glacio-Fluvio-Aeolian Sedimentary System Using Mars Rover Techniques. *Lunar and Planetary Science Conference*. Abstract # 8091.

Ewing, R.C., Rampe, E.B., Horgan, B., Lapotre, M.G.A., Nachon, M., **Thorpe, M.T.**, Bedford, C.C., Sinha, P., Mason, K.G., Champion, E. and Gray, P., 2021. Overview of logistics and operations for SAND-E: Semi-Autonomous Navigation for Detrital Environment. . *Lunar and Planetary Science Conference*. Abstract # 8119.

McAdam, A.C., et al., including **Thorpe, M.T.**, (2021) Investigation of the Glen Torridon Clay-Bearing Unit and Overlying Greenheugh Pediment by the Sample Analysis at Mars Instrument Suite. *Lunar and Planetary Science Conference*. Abstract # 2337.

Mason, K., Ewing, R.C., Nachon, M., Rampe, E.B., Horgan, B., Lapotre, M.G.A., **Thorpe, M.T.**, Bedford, C.C., Sinha, P., Champion, E. and Gray, P., (2021), Sediment Sorting and Rounding in a Basaltic Glacio-Fluvio-Aeolian Environment: Þórisjökull Glacier, Iceland. *Lunar and Planetary Science Conference*. Abstract # 1752

Payre, V., Siebach, K.L., **Thorpe, M.T.**, Antoshechkina, P. and Rampe, E.B., 2021, March. Is Tridymite a Witness of Explosive Volcanism in Early Mars?, *Lunar and Planetary Science Conference*. Abstract # 2548

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