TYLER M. MENG

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EDUCATION

University of Arizona May 2024
Ph.D. Planetary Sciences

University of Arizona May 2021
M.S. Planetary Sciences

Colorado School of Mines May 2015
B.S. Geophysics *Cum Laude*

RESEARCH EXPERIENCE

Washington University in St. Louis July 2024 - Present
Postdoctoral Research Associate, PI Dr. Roger Michaelides

- Characterizing uncertainty in multisensor measurement architectures targeting periglacial surface topography and topographic deformation.
- Processing available InSAR datasets to analyze the current period of record while defining targeted observables for ongoing missions.

University of Arizona Lunar & Planetary Lab August 2018 - May 2024
Graduate Research Associate, PI Dr. John W. Holt

- Worked with a multidisciplinary team under a NASA Solar System Workings grant to acquire geophysical data at planetary analog field sites in mountain permafrost terrain.
- Led the data analysis and subsequent publication of results in peer-reviewed journals.
- Dissertation title: "*Geophysical measurement and monitoring of planetary rock glacier surface processes*"

University of Texas Institute for Geophysics August 2017 - July 2018
Graduate Research Assistant, Advisor Dr. John W. Holt

- Planned and conducted winter fieldwork at Sourdough Rock Glacier, Alaska.
- Processed, documented, and stored field data in preparation for lab transfer.
- Enrolled as a Ph.D. student before transfer to University of Arizona with advisor.

Colorado School of Mines Planetary Geophysics Lab August 2015 - May 2016
Graduate Research Assistant, Advisor Dr. Jeffrey Andrews-Hanna

- Learned the fundamentals of crater counting on planetary surfaces.
- Gained experience mapping volcanic deposits on Mars with satellite remote sensing data.

Colorado School of Mines Geophysics Department September 2014 - April 2015
Undergraduate Thesis, Advisor Dr. Edwin Nissen

- Collected geophysical data at the Crestone Crater, Colorado, combining it with public high-resolution LiDAR data to investigate hypothesized crater formation mechanisms.

FIELD EXPERIENCE

Rock Glacier Summer Geophysics 2019-2023
Ouray, CO; Cody, WY; McCarthy, AK

- Collected surface-based GPR, EM, seismic, GNSS, and meteorological data.
- Piloted UAV flights to collect airborne photogrammetry data and assisted with the acquisition of UAV-based GPR data.
- Coordinated logistics and served as Deputy Field Lead between multiple data collection teams during NASA's 2023 RESOURCE project.

Snow Measurement Field School March 2023
Heber City, UT

- Gained a theoretical background in snow science and learned both remote and in situ measurement techniques for characterizing snowpack properties.
- Dug snow pits to record profiles of snow density, temperature, and stratigraphic characteristics, making comparisons with nearby SNOTEL data.
- Contributed to final project estimating the dielectric constant and radar backscatter properties of the snowpack.

Lava Tube Geophysics July 2020
Flagstaff, AZ & Grants, NM

- Assisted with planning and implementation of GPR surveys targeting lava tubes that are analogous to observed features on the Moon and Mars.
- Manually measured lava tube roof thickness to provide approximate GPR tie points.

Rock Glacier Winter Geophysics March 2018 & 2019
McCarthy, AK

- Conducted sled-based GPR surveys using alpine ski touring equipment.
- Retrieved data from a continuously operating automated weather station.

Green Geophysics, Inc. Summer 2016 & 2017
EarthScope magnetotelluric technician & crew chief

- Installed passive electrodes, magnetometers, and data loggers at 20–50 km station spacing to measure crustal resistivity in the Pacific Northwest and the Northeast U.S.
- Organized logistics with other field crews to maintain or extract previously installed equipment.

GNSS & Gravimetry Acquisition January 2015
Crestone Crater, CO

- Communicated with the National Park Service to obtain a research permit.
- Performed high-precision GNSS and gravimetry surveys to characterize the crater's morphology and density structure.

TEACHING & LECTURING EXPERIENCE

University of Arizona Fall 2021 & Spring 2024
PTYS170B2 Universe & Humanity

Teaching Assistant to Professors Dr. Tommi Koskinen (2021) & Dr. Travis Barman (2024)

- Facilitated in-class activities and proctored exams.
- Presented guest lectures about Earth Systems, incorporating material from original research.
- Provided detailed feedback to students via office hours and assignment grading.

Washington University in St. Louis 2024–2025
Department of Earth, Environmental, and Planetary Sciences

- Delivered guest lecture about terrestrial analogs for Dr. Paul Byrne's *Solar Systems* course
- Led two class periods with a guest lecture and a lab exercise about InSAR for Dr. Roger Michaelides's *Remote Sensing* course

PEER-REVIEWED PUBLICATIONS

Meng, T.M., Tober, B.S., Aguilar, R.J., Daniel, M.F., Jacobo-Bojórquez, R.A., Nerozzi, S., Holt, J.W. "Effects of rock glacier dynamics on surface morphology and deformation." *Journal of Geophysical Research: Earth Surface*, 2025. doi: 10.1029/2024JF008106.

Meng, T.M., Aguilar, R., Christoffersen, M.S., Petersen, E.I., Larsen, C.F., Levy, J.S., Holt, J.W. "Photogrammetric monitoring of rock glacier motion using high-resolution cross-platform datasets: formation age estimation and modern thinning rates." *Remote Sensing*, 2023. doi: 10.3390/rs15194779.

Kuehn, T., Holt, J.W., Johnson, R., **Meng, T.M.** "Active seismic refraction, reflection and surface-wave surveys in thick debris-covered glacial environments." *Journal of Geophysical Research: Earth Surface*, 2023. doi: 10.1029/2023JF007304.

Meng, T.M., Petersen, E.I., Holt, J.W. "Rock glacier composition and structure from radio wave speed analysis with dipping reflector correction." *Journal of Glaciology*, 2022. doi: 10.1017/jog.2022.90.

PRESENTATIONS

Meng, T.M., "Rock glaciers and the road forward: geophysical measurment and monitoring of mountain permafrost." Earth, Atmospheric, and Planetary Sciences Department, Purdue University. April 2025. Invited Presentation.

Meng, T.M., Tober, B.S., Aguilar, R., Michaelides, R.J. and Holt, J.W. "Multisensor monitoring of rock glacier morphology and debris deformation sheds light on effects of dynamic surface processes." American Geophysical Union Annual Meeting, December 2024. Poster.

Meng, T.M. "Effects of rock glacier dynamics on surface morphology." Seminar for Rock Glacier Inventories and Kinematics, September 2024.

Meng, T.M., Tober, B.S., Nerozzi, S., Aguilar, R., and Holt, J.W. "Multidisciplinary geophysical evidence for modifications to rock glacier morphology and debris distribution through dynamic processes." Symposium on the Application of Geophysics to Engineering and Environmental Problems, March 2024.

Meng, T.M. "Kinematic and dynamic processes impacting rock glacier surface morphology." International Glaciological Society: Global Seminar Series, February 2024.

Meng, T.M., Petersen, E.I., Holt, J.W. "Estimating rock glacier thickness and ice abundance with GPR wave speed measurements." 19th International Conference on Ground Penetrating Radar, June 2022. Poster.

Meng, T.M., Petersen, E.I., Holt, J.W. "A novel technique for wavespeed determination in ground-penetrating radar applied to the problem of constraining ice content and subsurface geometry in rock glaciers." American Geophysical Union Fall Meeting, December 2021. Conference Talk.

Meng, T.M., Petersen, E.I., Holt, J.W. "Insolation-driven variability in debris-covered glaciers on Mars and Earth." Lunar and Planetary Science Conference, March 2020. Conference Talk (abstract accepted but conference cancelled due to COVID19).

Meng, T.M., Petersen, E.I., Tober, B.S., Christoffersen, M.S., and Holt, J.W. "Lack of meltwater may prevent radar sounding measurements of supraglacial debris thickness in the martian midlatitudes." Seventh Mars Polar Science Conference, January 2020. Conference Talk.

Meng, T.M. "Hypothesis testing for the origin of crater-like features near Great Sand Dunes, Colorado." Geological Society of America Annual Meeting, September 2019. Poster.

Meng, T.M., Petersen, E.I., Holt, J.W., and Larsen, C.F. "Debris thickness variability and internal structure of an Alaskan debris-covered glacier from sled-borne ground-penetrating radar." International Glaciological Society: Five Decades of Radioglaciology, July 2019. Conference Talk.

Meng, T.M., Petersen, E.I., Holt, J.W., Levy, J.S., and Larsen, C.F. "Local variability in debris-covered glacier evolution on Earth and Mars." Lunar and Planetary Science Conference, March 2019. Poster.

Meng, T.M., Petersen, E.I., Holt, J.W., Stuurman, C.S., and Levy, J.S. "Searching for climate signals in the internal structure of terrestrial and martian debris-covered glaciers." Mars Workshop of Amazonian and Present Day Climate, June 2018. Conference Talk.

OPEN-ACCESS DATASETS

Meng, T.M., Data and Code for "Effects of rock glacier dynamics on surface morphology and deformation". University of Arizona Research Data Repository. Dataset. 2024. doi: 10.25422/azu.data.27021397.v1

Meng, T.M., Data and Code for "Photogrammetric monitoring of rock glacier motion using high-resolution cross-platform datasets: formation age estimation and modern thinning rates". University of Arizona Research Data Repository. Dataset. 2023. doi: 10.25422/azu.data.23272220.v1

Meng, T.M., Petersen, E.I., and Holt, J.W., Data and Code for "Rock glacier composition and structure from radio wave speed analysis with dipping reflector correction". University of Arizona Research Data Repository. Dataset. 2022. doi: 10.25422/azu.data.19495178.v1

SELECTED PROPOSALS

NASA 2025

Mars Data Analysis Program, "Unveiling the thickness and structure of the debris cover on midlatitude martian glaciers" S. Nerozzi (PI), J.W. Holt (CoI), E.R. Jawin (CoI), ***T.M. Meng*** *(CoI)*

PENDING PROPOSALS

NASA Submitted December 2024

Decadal Survey Incubation, "Characterization of Topographic and Topographic-Change Uncertainty, Vertical Accuracy, and Measurement Error of Multi-Sensor Observing Systems for Periglacial Landscapes" R.J. Michaelides (PI), ***T.M. Meng*** *(Science-PI), M.R. Siegfried (CoI)*

CERTIFICATIONS & SERVICE

Licensed UAV Pilot FAA, 2025

Wilderness First Aid Desert Mountain Medicine, 2023

Executive Secretary for Dual Anonymous Review Panel NASA, 2022

Avalanche Safety Level I Kachina Peaks Avalanche Center, 2019

Peer Review
The Cryosphere, Geophysical Research Letters, Icarus, Journal of Geophysical Research: Earth Surface, Permafrost & Periglacial Processes

AWARDS

Galileo Circle Scholar University of Arizona, 2021

Geosciences Off-Campus Research Seed Grant University of Texas, 2018

John Moore Endowed Scholar Colorado School of Mines, 2011-2015

RELEVANT COURSEWORK

General Science
Science Communication & Ethics
Calculus & Differential Equations
Mechanics & Electromagnetics
Programming in Java & MATLAB
Digital Signal Analysis
Probability & Statistics
Professional Skills & Proposal Writing

Earth & Space Science
Structural Geology & Stratigraphy
Applications of Satellite Remote Sensing
Earth Systems Modeling & Inversion
Planetary Physics & Cosmochemistry
GIS & GPS Applications in Earth Science
Geophysical Methods & Geodynamics
Radar Remote Sensing: Planetary Surfaces