Nathaniel E. Putzig

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***Planetary Geophysicist*,** studying the geology, climate, and resources of Mars with radar, thermal, and other spacecraft data since 2001. 14 years prior experience with terrestrial active-source seismic data in academia and industry. Expertise in processing, modeling, and interpretation of remote-sensing data, software development, training course design and instruction, personnel and project management, and team leadership.

Education

PhD Geophysics, University of Colorado, Boulder, Colorado, 2006
GPA: 3.9/4.0. SEG Scholarship. Advisors: Michael Mellon, Bruce Jakosky
Dissertation: *Thermal inertia and surface heterogeneity on Mars*

Industry Training, 1989 – 1999. 23 weeks in geoscience and computer systems

MA Geophysics, Rice University, Houston, Texas, 1988
GPA: 3.8/4.0. Presidential Fellowship. Advisor: Alan Levander
Thesis: *Modeling wide-angle seismic data from the central California margin*

BS Geophysical Engineering, Colorado School of Mines, Golden, Colorado, 1986
GPA: 3.7/4.0. Minor in geology; six weeks geophysical field course

Valedictorian, Berne–Knox–Westerlo High School, Berne, New York, 1982

NASA Mission Science Teams

SHARAD, the Shallow Radar on Mars Reconnaissance Orbiter (MRO), 2006 – present
US/Deputy Team Leader, appointed in 2015 to succeed Roger Phillips
Co-Investigator, appointed in 2013
Liaison to Phoenix and Mars Science Laboratory landing site analysis teams

InSight Landing Site Analysis Team, ***Co-Investigator***, 2014 – 2018

MARSIS, Mars Advanced Radar for Subsurface and Ionosphere Sounding, 2006 – present

THEMIS**,** the Thermal Emission Imaging System on Mars Odyssey, 2002 – present

TES**,** the Thermal Emission Spectrometer on Mars Global Surveyor, 2001 – 2006

Beagle II, MER *Spirit* and *Opportunity* Landing Sites Analysis Team, 2002 – 2006

Experience

Planetary Science Institute (PSI), Lakewood, CO, 2016 – present
Associate Director (since 2023) and ***Senior Scientist***. Analyzing near-surface ices and the regolith of Mars using orbital radar, thermal observations, and other data
Founder and ***Manager*** of PSI's Colorado office (established July 2016)
PI, CO-SHARPS, the Colorado SHARAD Processing System
PI, MARSTHERM Thermophysical Analysis Tools for Mars Research

Experience (continued)

Co-PI, Mars Subsurface Water Ice Mapping (SWIM) Team, 2018-present
Research Advisor to one post-doc, two research scientists, four research associates, three research assistants, three PGGURP/SUPPR interns, and seven high-school interns

Colorado School of Mines (CSM), Department of Geophysics, Golden, CO, 2017 – present
Adjunct Professor. Collaborative research and student advising since 2016

Univ. of Colorado, Laboratory for Atmospheric and Space Physics, Boulder, 2015 – present
Adjoint Associate Professor. Advising graduate students and supporting their research through NASA PG&G, MFRP, and JPL CDP grants since 2010

Southwest Research Institute, Department of Space Studies, Boulder, CO, 2007 – 2016
Principal Scientist. Research and project management activities same as for PSI above
Research Advisor to one post-doc, four grad students, and three PGGURP students

Washington University, Earth and Planetary Sciences, St. Louis, Missouri, 2006 – 2007
Postdoctoral Research Associate. Analysis of subsurface radar from SHARAD and MARSIS. Advisor: Roger Phillips

Univ. of Colorado, Laboratory for Atmospheric and Space Physics, Boulder, 2001 – 2006
Graduate Research Assistant. Global derivation, mapping, and analysis of thermal inertia with TES and THEMIS. Advisor: Michael Mellon

Geomancer, Houston, Texas, 1996 – 2000
Geophysical Consultant. Founded consultancy offering exploration and systems services to the oil and gas industry. Carried out 2D and 3D seismic processing and interpretation, mapping prospects in Texas, Oklahoma, Louisiana, Mississippi, Alabama, the Gulf of Mexico, and Paradox Basin. Provided network and systems administration services. Developed training courses and provided on-site instruction for seismic interpretation and Unix. Primary clients: PetroCorp; JN Oil & Gas; Broughton Operating

CogniSeis Development, Inc., Houston, Texas, 1995 – 1996
Manager, Customer Support. Oversaw 28-person department providing technical support, system staging, software installation, and applications training for several hundred clients encompassing six geoscience application suites.

Photon Systems Inc., Houston, Texas, 1993 – 1995
Manager, Geoscience Support. Supervised four professionals and provided support and training of seismic and well interpretation software for 100 clients. Provided technical assistance in client evaluations critical to dozens of workstation and software sales. Developed training courses and provided training to 45 clients in twelve one-week courses. Performed 50 custom site installations and wrote an extensive body of code for format conversion, third-party product integration, and software problem tracking.

Experience (continued)

Shell Oil Company, Houston, Texas, 1988 – 1993

Exploration Geophysicist. Provided acquisition design and processing of seismic data for exploration prospects in Yemen, West Texas, and Michigan Basins. Expertise with mixed-source datasets and with refraction statics modeling to address near-surface noise. Cash award for leading seven-person team in developing a cost-saving, superior processing method for a Yemen dataset. Performed user training and coordinated user feedback for internal and vendor refraction statics software.

Rice University, Department of Geology and Geophysics, Houston, Texas, 1986 – 1988

Graduate Research Assistant. Participated in design and acquisition of a deep crustal, wide-angle reflection–refraction survey across the North American–Pacific plate boundary in central California. Led refraction-data interpretation.
Advisor: Alan Levander

Memberships and Certifications

American Geophysical Union
Division of Planetary Scientists of the American Astronomical Society
Society of Exploration Geophysicists
Geological Society of America
Registered *Engineer in Training*, State of Colorado, April 1986
Certified *White Water Raft Guide*, Arkansas River, Colorado, June 1997

NASA Service Activities

2023	Int'l Mars Ice Mapper VHF Sounder Instrument Definition Team
2021 – 2022	Int'l Mars Ice Mapper Measurement Definition Team
2019 – 2020	Member, NASA Mars Architecture Strategy Working Group
2018 – 2019	Co-Chair, MEPAG Ice & Climate Evolution Science Analysis Group
2015	Member, MEPAG Next Mars Orbiter Science Analysis Group

Awards and Grants

NASA Group Achievement Awards
RESOURCE Team, Ames Honor Award, 2020
MRO Comet Siding Spring Observing Team, 2015
MRO SHARAD Science Team, for polar/ice studies, 2011
US SHARAD Team, for radar sounder processing and analysis tools, 2009

NASA Early Career Fellowship Program
PI, *ARES: The Autonomous Roving Exploration System for Mars,* 2016

NASA Jet Propulsion Laboratory Critical Data Products Program
Co-PI, *Subsurface Water Ice Mapping (SWIM) on Mars,*
Co-PI: Gareth Morgan (PSI), 2019
Co-PI, *Subsurface Water Ice Mapping* (*SWIM) in the Northern Hemisphere of Mars*
Co-PI: Gareth Morgan (PSI), 2018

Grants and Awards (continued)

NASA Jet Propulsion Laboratory Critical Data Products Program (continued)

PI, *Mapping of Buried Water Ice in Arcadia Planitia and Beyond with Radar and Thermal Data,* 2017

PI, *Surface Properties from Radar and Thermophysical Data for InSight,* 2013

NASA Mars Data Analysis Program

PI, *High-resolution three-dimensional radar mapping, analysis, and modeling of the internal layers within the north polar layered deposits,* 2022

Co-I*, The Modification of Circumpolar Craters in the Martian Cryosphere,* PI: Asmin Pathare (PSI), 2020

Co-I*, 3D subsurface imaging and analysis of the Martian polar regions with MARSIS data,* PI: Fritz Foss (FREAQS), 2018

Co-I, *Deciphering the Martian Surface and Near-surface with Radar Statistics,* PI: Cyril Grima (UT-Austin), 2018

Co-I*, Determining the radar loss properties of the south polar layered deposits on Mars,* PI: Jennifer Whitten (Tulane), 2018

Co-I, *Characterization of Hydrated, Layered Deposits at the Valles Marineris Plateau from SHARAD, HiRISE, and CRISM, a Multidisciplinary Approach,* PI: Isaac Smith (PSI), 2016

PI, *Adv. 3-D Subsurface Imaging & Analysis of Planum Boreum w/SHARAD,* 2015

Co-I, *Understanding Layered Ejecta ("Lobate") Craters on Mars,* PI: Stuart Robbins (SwRI), 2014

PI, *3-D Subsurface Imaging and Analysis of Planum Australe with SHARAD,* 2012

Co-I, *Mars sediment production: roles of chemical & mechanical weathering,* PI: Victoria Hamilton (SwRI), 2010

PI, *3-D Subsurface Imaging and Analysis of Planum Boreum with SHARAD,* 2009

Co-I, *Linking Visible & Radar Stratigraphy in the Martian Polar Deposits* PI: Kathryn Fishbaugh/Patrick Russell (Smithsonian), 2008

NASA Mars Fundamental Research Program

PI, *Thermal Effects of Physical Heterogeneity on Mars*, 2010

NASA NextSTEP-2 Appendix D: In Situ Resource Utilization Technology Program

Co-I, *RedWater: Extraction of Water from Mars' Ice Deposits,* PI: Kris Zacny (Honeybee Robotics), 2018

NASA Planetary Data Archiving, Restoration, and Tools Program

PI, *MARSTHERM 2.0: Enhanced Thermophysical Analysis Tools for Mars Research,* 2021

PI, *Planetary Orbital Radar Processing and Simulation System (PORPASS),* 2019

Co-I, *High resolution 3D imaging of SHARAD data,* PI: Paul Sava (CSM), 2018

NASA Planetary Geology and Geophysics Program

Early Career Fellow, selected in conjunction with 2013 grant, 2014

PI, *Material Properties of Dune Fields in the Southern Highlands of Mars,* 2013

PI, *Thermophysical behavior of the north polar erg on Mars,* 2007

Grants and Awards (continued)

NASA Planetary Mission Concept Studies Program

Co-PI, *Mars Orbiter for Resources, Ices, and Environments (MORIE),*
PI: Wendy Calvin (UNR), 2019

NASA Solar System Exploration Research Virtual Institute (SSERVI)

Co-I, *Geophysical Sounding Services for Mars In Situ Resource Utilization Field Analog Study,* a subcontract of the *Resource Exploration and Science of OUR Cosmic Environment (RESOURCE)* Project, PI: Jennifer Heldmann (NASA Ames), 2020

Southwest Research Institute Internal Research Program

Co-I*, Modeling of Exotic Ice Glaciers on Pluto and Mars*
PI: Isaac Smith (SwRI), 2016

Co-I*, Search for Chemical and Mechanical Weathering Processes on Mars*
PI: Victoria Hamilton (SwRI), 2010