Dr. Stefano Nerozzi

Pronouns: He/Him/His
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Research work and interests:

I am the PI on a funded MDAP project that will employ a wide variety of radar sounding and geologic mapping techniques to reveal the nature of icy sedimentary deposits comprised within the so-called basal unit at the north pole of Mars. This project is the continuation of my doctoral research work.

Until recently, I was the Science PI on a selected NASA Mars Data Analysis Program (MDAP) proposal to study the fluvial and volcanic history of outflow channel systems in Utopia Planitia, Mars. This project integrated several remote sensing techniques to unravel the history of landforms shaped by ancient water flows and interactions between volcanic processes and ground ice.

I currently mentor an enthusiastic and diverse team of two undergraduate research assistants, who assist me in my primary research work and conduct exploratory investigations for future projects.

My past postdoctoral research work at UT Austin involved processing and analysis of Gamma Ray Spectrometer elemental concentration data from Mars Odyssey to reveal possible formation mechanisms of boulder halos and their spatial relationship with mapped geologic units and terrain surface composition.

My doctoral research focused on constraining which driving forces and surface processes are responsible for the initial emplacement of the north polar cap of Mars in the Late Amazonian. This work included stratigraphy and morphology mapping via orbital radar and high-resolution imagery, and climate modeling with general circulation models.

I have many other interests, including the design and construction of electronic measurement devices for geophysical application on debris covered glaciers, such as ground temperature profilers and 3D-component seismometers for passive seismic microtremor studies. I also have a growing interest and involvement in instrument development, such as landed and orbital radar sounders.

Education:

Ph.D. Geological Sciences — Aug 2014 – Aug 2019
University of Texas at Austin, TX, USA. Advisor: Dr. John Holt
GPA: 4.00/4.00

M.Sc. Geology and Land Management — Oct 2011 – Mar 2014
University of Bologna, Italy. Advisors: Dr. John Holt, Dr. Alessandro Amorosi
GPA: 3.93/4.00, Final grade: 110/110 cum laude

B.S. Geological Sciences — Sep 2008 – Oct 2011
University of Bologna, Italy. Advisor: Dr. Francesco Mulargia
GPA: 3.89/4.00, Final grade: 110/110 cum laude

Research work experience:

Assistant Research Professor, UA Lunar and Planetary Laboratory — Jan 2025 – present
Lead of a team of two undergraduate research assistants and mentor to Dr. Jack Holt's Terrestrial And Planetary Investigations and Reconnaissance (TAPIR) group.

Postdoctoral Research Associate, UA LPL Jan 2020 – December 2024
Lead of a team of two undergraduate research assistants and mentor to Dr. Jack Holt's Terrestrial And Planetary Investigations and Reconnaissance (TAPIR) group.

Research Collaborator, UA LPL Dec 2019 – Aug 2020
Subsurface radar mapping of Terra Cimmeria and Terra Sirenum quadrants on Mars for the Subsurface Water Ice Mapping 2.0 (SWIM 2.0) project (work executed as Postdoctoral Research Associate at UA LPL).

Postdoctoral Fellow, Institute for Geophysics, UT Austin Sep 2019 – Dec 2019
Processing and analysis of Mars Odyssey Gamma Ray Spectrometer elemental concentration maps in relation to the spatial distribution of boulder halo sites on Mars.

Graduate Research Assistant, Institute for Geophysics, UT Austin Jun 2017 – Aug 2019
Analysis of orbital radar sounding profiles (SHARAD), high-resolution imagery (HiRISE, CTX) and global circulation models (LMD GCM) to reveal the recent history of Planum Boreum on Mars (PhD project).

Graduate Research Assistant, Institute for Geophysics, UT Austin Sep 2014 – Aug 2016
Includes Jackson School Entry Fellowship for 1 year. Analysis of orbital radar sounding profiles (SHARAD), high-resolution imagery (HiRISE, CTX) and global circulation models (LMD GCM) to reveal the recent history of Planum Boreum on Mars (PhD project).

Laboratory Assistant, Institute for Geophysics, UT Austin Jun 2013 – Nov 2013
Analysis of orbital radar sounding profiles (SHARAD) to reveal the early evolution of the North Polar Layered Deposits on Mars (M.Sc. project).

Undergraduate Research Assistant, Institute for Geophysics, UT Austin Sep 2012 – May 2013
Analysis of orbital radar sounding profiles (SHARAD) to reveal the early evolution of the North Polar Layered Deposits on Mars (M.Sc. project).

Teaching experience:

Guest Lecturer Nov 2024
Taught radar instrument design and operation for PTYS/GEOS 551 Remote Sensing of Planetary Surfaces.

Lecturer, UA Department of Geosciences Aug 2023 – Dec 2023
Instructor for GEOS 322 Introduction to Geophysics. Topics covered: planetary interiors and tectonics, EM methods, gravity and magnetic anomalies, seismology and seismic techniques. Also prepared weekly lab assignments. Assisted by a graduate TA and an undergraduate preceptor.

Instructor Jan 2023 – May 2023
Co-taught PTYS/GEOS 549 Radar Remote Sensing of Planetary Surfaces. Topics covered: sounding and imaging radar basics, instrument design and operation, signal processing, radar data analysis. Prepared lab assignments and homework.

Instructor Jan 2023 – May 2023
Co-taught PTYS 595B Ices Across the Solar System. Topics covered: primordial solar system volatiles and ices, terrestrial planets, small bodies (e.g., comets and asteroids), ocean worlds, and Kuiper belt objects.

Teaching Assistant, Jackson School of Geosciences, UT Austin Sep 2016 – May 2017
GEO 303 – Intro to Geology – Fall 2016: Taught 3 weekly lab sessions of 2 hours each to a total of 50 non-geoscience-major students, administered quizzes and midterm exams, graded homework.
GEO 325J & GEO 391 – Intro to Geoscience Computation – Spring 2017: Assisted undergraduate and graduate students during Matlab lab sessions, graded homework.

Current research funding and selected proposals:

PI 2022 – 2025
Reconstructing the stratigraphy, composition, and climate record of the north polar basal unit, Mars, NASA Mars Data Analysis Program (MDAP), $411,767.

Co-I (student advising) 2024 – 2027
Searching for the oldest mid-latitude ice on Mars, NASA Future Investigators in NASA Earth and Space Science and Technology (FINESST), FI: Roberto Aguilar, LPL.

Pending proposals:

PI 2025 – 2028
Title omitted due to DAPR requirements, NASA Mars Data Analysis Program, approx. $620k.

PI 2025 – 2028
Title omitted due to DAPR requirements, NASA Mars Data Analysis Program, approx. $620k.

Publications:

Morgan, G.A. and Putzig, N.E., Baker, D.M.H., Pathare, A., Dundas, C.M., Russell, M., Perry, R.M., Chojnacki, M., Sizemore, H.G., Bramson, A.M., Petersen, E.I., **Nerozzi, S.**, Hoover, R.H. , Bain, Z., Refined Mapping of Subsurface Water Ice on Mars to Support Future Missions, *in press*, the Planetary Science Journal.

Nerozzi, S., Christoffersen, M.S., Holt, J.W., Hamilton, C.W., 2023, Evidence of Widespread Volcanic Activity near Hebrus Valles on Mars Revealed by SHARAD, Remote Sensing, 15, 4967. doi:10.3390/rs15204967.

Voigt, J., Hamilton, C.W., Steinbruegge, G., Christoffersen, M.S., **Nerozzi, S.**, Kerber, L., Holt, J.W., Carter, L., 2023, Revealing Elysium Planitia's Young Geologic History: Constraints on Lava Emplacement, Areas, and Volumes, Journal of Geophysical Research: Planets, 2023JE007947.

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. In Badescu, V., Zacny, K., Bar-Cohen, Y. (Eds.), Handbook of Space Resources, Springer Nature Switzerland AG.

Putzig, N.E., Campbell, B.A., Christoffersen, M.S., Foss II, F.J., Holt, J.W., Mueller, I.H., **Nerozzi, S.**, Perry, M.R., Russell, A.T., Sava, P.C., Smith, I.B., 2022, New Views of the Internal Structure of Planum Boreum from Enhanced 3D Imaging of Mars Reconnaissance Orbiter Shallow Radar Data, Planet. Sci. J. 3:259, 14 pp. doi:10.3847/PSJ/ac9d3b.

Becerra, P., Smith, I. B., Diniega, S., Andres, C., Bapst, J., Bramson, A., Buhler, P., Coronato, A., Emmett, J., Grau Galofre, A., Herny, C., Hibbard, S., Kahre, M., Knightly, J.P., **Nerozzi, S.**, et al., 2021, Past, Present and Future of Mars Ice Research: Conclusions and outlook from

the 7th International Conference on Mars Polar Science and Exploration.

Nerozzi, S., Ortiz, M.R., and Holt, J.W., 2021, The north polar basal unit of Mars: An Amazonian record of surface processes and climate events: Icarus, p. 114716, doi:10.1016/j.icarus.2021.114716.

Smith, I.B., Lalich, 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.

Moore, K., Courville, S., Ferguson, S., Schoenfeld, A., Llera, K., Agrawal, R., Buhler, P., Brack, D., Connour, K., Czaplinski, E., DeLuca, M., Deutsch, A., Hammond, N., Kuettel, D., Marusiak, A., **Nerozzi, S.**, Stuart, J., Tarnas, J., Thelen, A., Castillo-Rogez, J., Smythe, W., Landau, D., Mitchell, K., Budney, C., 2020. Bridge to the stars: A mission concept to an interstellar object. Planetary and Space Science, 105137, doi:10.1016/j.pss.2020.105137

Ojha, L., Karimi, S., Buffo, J., **Nerozzi, S.,** Holt, J.W., Smrekar, S., and Chevrier, V., 2020, Martian Mantle Heat Flow Estimate from the Lack of Lithospheric Flexure in the South Pole of Mars: Implications for Planetary Evolution and Basal Melting, Geophysical Research Letters, p. e2020GL091409, doi:10.1029/2020GL091409.

Ojha, L., **Nerozzi, S.,** and Lewis, K., 2019, Compositional Constraints on the North Polar Cap of Mars from Gravity and Topography: Geophysical Research Letters, doi:10.1029/2019GL082294.

Nerozzi, S., and Holt, J.W., 2019, Buried ice and sand caps at the north pole of Mars: revealing a record of climate change in the cavi unit with SHARAD: Geophysical Research Letters, doi:10.1029/2019GL082114.

Nerozzi, S., and Holt, J.W., 2018, Earliest Accumulation History of the North Polar Layered Deposits, Mars from SHARAD, Icarus. doi:10.1016/j.icarus.2017.05.027

Guallini, L., and **Nerozzi, S.**, 2014, Polar Layered Deposits, *in* Encyclopedia of Planetary Landforms, Springer New York, p. 1–14.

Publications in review and near submission (* indicates advised student work):

*Spurling, R., **Nerozzi, S.,** and Hamilton, C.W., Crater-Based Age Dating of outflow channel and tectonic activity in Hebrus Valles and Hephaestus Fossae, Mars, *in review*, Planetary Science Journal.

Meng, T.M., Tober, B., Aguilar, R.J., Daniel, M., Jacobo Bojoroquez, R.A., **Nerozzi, S.**, Holt, J.W., Effects of rock glacier dynamics on surface morphology and deformation, *in review*, Journal of Geophysical Research: Earth Surface.

Nerozzi, S., Spurling, R., and Hamilton, C.W., Geologic Mapping of the Hebrus Valles and Hephaestus Fossae Outflow Channel Region: Evidence of a Magmatic Trigger of Water Release, to be submitted to the Planetary Science Journal

*Aguilar, R.J., Holt, J.W., Christoffersen, M.S., Meng, T.M., **Nerozzi, S.**, Revealing the internal structure of Mars-analog glaciers from drone-based GPR, to be submitted to Journal of Geophysical Research: Earth Surface.

*Willis-Reddick, M., **Nerozzi, S.**, Revealing circumpolar icy deposits and Hesperian-Amazonian lithospheric flexure at the north pole of Mars with SHARAD, to be submitted to the Journal of Geophysical Research: Planets.

Spacecraft mission participation:

Shallow Radar (SHARAD), Mars Reconnaissance Orbiter 2012 – present
Science team collaborator. Biweekly observation targeting and planning, definition of new target zones.

International Mars Ice Mapper Instrument Definition Team Jun 2023 – July 2023
Member of the VHF subsurface radar sounder definition team. Collaborated in defining and discussing instrument design and tradeoffs to meet the reconnaissance and science goals of the IMIM mission.

International Mars Ice Mapper Measurement Definition Team Jan 2022 – July 2022
Early career lead for the measurement definition team. Collaborated in defining and discussing L-Band radar capabilities and suggested additional payloads to meet the reconnaissance and science goals of the IMIM mission.

Selected Oral Presentations:

Nerozzi, S., Spurling, R., and Holt, J.W., 2024, The Fluvial and Volcanic History of Hebrus Valles and Hephaestus Fossae on Mars, Europlanet Science Congress 2024, EPSC2024-648, https://doi.org/10.5194/epsc2024-648, 2024.

Nerozzi S., Christoffersen M. S. Jacobo R. Holt J. W., 2024, MARSIS Reveals New Insights on the Structure and Composition of the Planum Boreum Basal Unit, Eighth International Conference on Mars Polar Science and Exploration Abstract #6050.

Nerozzi, S., Holt, J.W., Knapp, M., Paritsky, L., Perry, B., Fenn, A., 2024, ACORN: the Advanced Compact Orbiting Radar for luNar sounding, *in* 10th Interplanetary Small Satellite Conference, Abstract #G7.

Nerozzi, S., Spurling, R., Holt, J.W., 2023, Evidence of a Magmatic Trigger of Water Release and Widespread Volcanic Activity in the Hebrus Valles and Hephaestus Fossae Outflow Channel Region, Mars, *in* 54th Lunar and Planetary Science Conference, Abstract #2764.

Nerozzi, S., Ortiz, M.R., Holt, J.W., 2020, The Basal Unit: An Amazonian Record of Mars' North Polar History, *in* 51st Lunar and Planetary Science Conference, Abstract #2461.

Nerozzi, S., Holt, J.W., Forget, F., Spiga, A., Millour, E., 2020, The Early History of Planum Boreum: An Interplay of Water Ice and Sand, *in* Seventh Mars Polar Science Conference, Abstract #6064.

Nerozzi, S., Holt, J.W., Forget, F., Spiga, A., Millour, E., 2019, Reconstructing the Climate-Driven Evolution of Planum Boreum with Sounding Radar, Visible Imagery and General Circulation Models, *in* Ninth International Conference on Mars, Abstract #6433.

Nerozzi, S., Holt, 2019, Buried ice and sand caps at the north pole of Mars: revealing a record of climate change in the cavi unit with SHARAD, *in* IGS - International Symposium on Five Decades of Radioglaciology, Abstract #81A3036.

Nerozzi, S., Holt, J.W., Forget, F., Spiga, A., Millour, E., 2019, Combining Radar Sounding and General Circulation Models to Reveal the Initial Accumulation of the Martian North Polar Layered Deposits, *in* 50th Lunar and Planetary Science Conference, Abstract #2854.

Nerozzi, S., and Holt, J.W., 2018, Revealing the History of Polar Ice Caps within the Planum Boreum Cavi Unit with SHARAD, *in* 2018 Late Mars Workshop, LPI Contrib. 2088, #5008.

Nerozzi, S., and Holt, J.W., 2018, Ice caps under sand caps under an ice cap: revealing a record of climate change on Mars with SHARAD, *in* 49th Lunar and Planetary Science Conference, Abstract #1075.

Nerozzi, S., and Holt, J.W., 2017, Newly Mapped Extent, Morphology, and Internal Stratigraphy of the Martian North Polar Cavi Unit, *in* 48th Lunar and Planetary Science Conference, Abstract # 1722.

Nerozzi, S., and Holt, J.W., 2016, Stratigraphic Reconstruction of the Cavi Unit-NPLD Transition with SHARAD, *in* The 6th International Conference on Mars Polar Science and Exploration, Abstract # 6080.

Invited talks and interviews:

Lunar and Planetary Laboratory Colloquium, University of Arizona — Oct 2024
Off-Nominal podcast — Nov 2023
Special Seminar, Hawaii Institute of Geophysics and Planetology, Univ. of Hawaii — June 2023
25th Annual International Mars Society Convention, Arizona State University — Oct 2022
WeMartian podcast — Mar 2020

Student advising:

Undergraduate Research Assistant and Arizona Space Grant Intern — Apr 2021 – present
Maia Willis-Reddick, research topic: *Subsurface radar mapping of icy terrains surrounding the north polar cap of Mars.* Maia Willis-Reddick was also a NASA/Arizona Space Grant intern for the Aug 2021 – May 2022 academic year.

Undergraduate Research Assistant — Apr 2021 – present
Reed Spurling, research topic: *Impact crater statistical analysis in Hephaestus Fossae and Hebrus Valles, Mars.*

Undergraduate Research Assistant and Arizona Space Grant Intern — Sep 2022 – May 2023
Madeline Procter, research topic: *Optimization and calibration of Mars Advanced Radar for Subsurface and Ionosphere Sounding (MARSIS) multiband profiles.* Madeline Procter was a NASA/Arizona Space Grant intern for the Aug 2022 – May 2023 academic year.

Undergraduate Research Assistant — Apr 2021 – Aug 2022
Leah Panzarella, research topic: *Processing and analysis of Thermal Emission Imaging System (THEMIS) decorrelation stretch mosaics of the Hephaestus Fossae and Hebrus Valles region on Mars.*

Undergraduate Research Assistant — May 2019 – May 2021
Maya Ortiz, research topics: *Orbital imaging data processing and geologic mapping of the north polar basal unit on Mars, Mars imaging data (CTX, THEMIS) selection and geologic mapping in Hebrus Valles and Hephaestus Fossae, Mars.*

Honors B.S. thesis — December 2017 – May 2019
Michael Christoffersen, thesis title: *Applying a Mass Balance Approach to Constrain Ice Thickness of Hubbard Glacier.*

Guided research project (UT Austin GEO 371C) — September 2016 – May 2017
Christopher Eason, research topic: *Geological mapping of the north polar basal unit on Mars.*

Professional training:

Postdoc Pathway Program — Sep 2022 – May 2023
Fast-track certificate program combining training in theory and pedagogy of evidence-based teaching and an intensive co-teaching assignment with a faculty mentor.

NASA Planetary Science Summer Seminar May 2019 – Aug 2019
End-to-end design of a NASA New Frontiers-class mission to an interstellar object.
Roles and responsibilities: UV-VIS spectrometer instrument lead, Team X telecom chair, geology and geophysics science group member.

Bystander Intervention Workshop Mar 2019
In-person training organized by the Geoscience Empowerment Network and Prof. Sarah Horst with the goal of learning how to identify and assist those who are being harassed by others in a wide variety of scenarios.

Science Communication Workshop Feb 2019
Learning to overcome communication barriers, exploring different perspectives, identifying jargon, finding points of connection, optimizing short speeches, visualizing science, science in social media, STEMprov.

Outreach activities:

Skype a Scientist Nov 2022 – present
Zoom calls with middle- and high-school students across the country presenting my personal path to become a scientist and overview of my research work.

Science mentor for 6th grade students at Sahuarita Middle School (AZ) Mar 2021 – May 2021
Weekly mentorship of 6th grade students in a science project involving the design of a habitable planet. Gave presentation on the main drivers of inner Solar System planetary evolution (e.g., habitable zone, magnetic field, plate tectonics and volcanism, biosphere).

AP Research Project Mentor Oct 2016 – April 2017
AP Research project by H. Kansara at Carnegie Vanguard High School, Houston, TX. Research topic: *How Would Terraforming Mars Question Society's Morals according to the Utilitarian Approach?*

UT Science Olympiad Regional Tournament Feb 2018
Prepared a test on Remote Sensing and Meteorology and served as a proctor for the regional tournament at UT Austin.

Other activities and leadership:

Postdoc representative, UA LPL Department Life Committee Oct 2024 – present
Attend meetings and actively participate in Department Life Committee activities, such as drafting and review of departmental code of conduct document.

Postdoc representative, UA LPL faculty meetings Aug 2024 – present
Attend faculty meetings and represent the postdoctoral body at UA LPL, including presentation of agenda items and relaying of discussion notes.

UT Amateur Radio Club - President Jan 2018 – Apr 2019
Manage club activities and meetings, teach amateur radio licensing classes, define club goals, recruiting, and treasury. Club member since Jan 2015, officer since Sep 2016.

Student representative Jan 2018 – Apr 2019
Manage club activities and meetings, teach amateur radio licensing classes, define club goals, recruiting, and treasury. Club member since Jan 2015, officer since Sep 2016.

Awards, fellowships, and scholarships:

Early Career Professional bursar, Europlanet Science Congress 2024
Group Achievement Award, NASA Administrator Bill Nelson 2024
Galileo Circle Postdoc Award, College of Science, University of Arizona 2022
Best Seminar – UTIG Brown Bag, Institute for Geophysics, University of Texas at Austin 2019
Mars Student Travel Grant, Mars Exploration Program Aug 2018
Mars Student Travel Grant, Mars Exploration Program Apr 2018
Graduate School Summer 2018 Fellowship, University of Texas at Austin 2018
Endowed Presidential Scholarship, University of Texas at Austin 2017
Global Research Fellowship, University of Texas at Austin 2016
Travel grant for 6th Mars Polar Science Conference, European Geosciences Union (EGU) 2016
Jackson School of Geosciences Fellowship, University of Texas at Austin 2014
Outstanding Student Poster Award, European Geosciences Union (EGU) 2014
TASSEP scholarship, University of Bologna 2012
Certificate of Merit, Prof. Ivano Dionigi, Chancellor of the University of Bologna 2012
Certificate of Merit, Prof. Ivano Dionigi, Chancellor of the University of Bologna 2010

Review and panelist service:

Guest editor for Icarus special issue, reviewer for Nature Astronomy, Science Advances, Geophysical Research Letters, Earth and Planetary Science Letters, Journal of Geophysical Research, Icarus, The Cryosphere, IEEE Transactions on Geoscience and Remote Sensing.

Group chief for NASA MDAP, panelist for NASA MDAP and FINESST, external reviewer for NASA SSW and PDART.

Field experience & Internships:

Thermal profiling data retrieval and drone photogrammetry, Absaroka Range, WY 2024
GPR, passive seismic soundings, and thermal profiling on debris covered glacier, Absaroka Range, WY 2023
GPR on aeolian sand dunes, Imperial Sand Dunes, CA 2023
GPR, passive seismic soundings on debris covered glacier, Absaroka Range, WY 2022
GPR, active and passive seismic on debris covered glacier, Wrangell-St. Elias Mtns., AK 2021
TDEM, GPR, passive seismic soundings on debris covered glacier, Absaroka Range, WY 2020
Remote sensing and geomorphology of volcanic fields, aeolian dune fields and alluvial fans, NV & CA 2016
TDEM and GPR soundings on debris covered glacier, Absaroka Range, WY 2015
TDEM soundings on debris covered glacier, Wrangell-St. Elias Mtns., AK 2014
GPR and LIDAR surveys on debris covered glacier, Uinta Mtns., UT 2013
Carbonate sequence stratigraphy, Guadalupe Mtns., TX & NM 2013
ER, FDEM, GPR, and gravimetric surveys on karst area, Austin, TX 2012
Carbonate stratigraphy and geological mapping, Western Sicily, Italy 2012
Rock mechanics, stratigraphic logging and geological mapping, Central Alps, Italy 2011
Internship: Seabed bathymetry, navigation planning on research vessel Maria Grazia, Southern Adriatic Sea, Italy 2011
Stratigraphic logging and geological mapping, Central Alps, Italy 2010

Computational skills & experience:
NASA GMAT, ArcGIS, QGIS, Seisware, Landmark DecisionSpace, USGS ISIS, NASA Ames Stereo Pipeline, LMD General Circulation Model, Python, Matlab, Linux shell scripting.

Languages:
English – fluent, full professional proficiency
Italian – native speaker
Spanish – elementary proficiency
French – elementary proficiency