

Alexander Michael Morgan

Planetary Science Institute
1700 E. Fort Lowell Road, Suite 106
Tucson, AZ 85719

Email: amorgan@psi.edu
Web: alexmmorgan.github.io

EDUCATION

Ph.D. in Environmental Sciences

University of Virginia – November 2017

Advisor: Professor Alan D. Howard

Dissertation: *Sedimentology, hydrology, and climatic environment of alluvial fans on Earth and Mars*

B.S. in Earth and Planetary Sciences

University of California Santa Cruz – December 2010

PROFESSIONAL EXPERIENCE

Research Scientist

Planetary Science Institute
2021 – Present

Post-Doctoral Research Geologist

Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution
2017 – 2020

Pre-Doctoral Research Fellow

Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution
2015 – 2017

Research and Teaching Assistant

Department of Environmental Sciences, University of Virginia
2011 – 2015

TEACHING EXPERIENCE

EVSC 2800: Fundamentals of Geology (Four semesters; TA)

EVSC 2801: Fundamentals of Geology Laboratory (Four semesters; Instructor of Record)

EVSC 4890: Planetary Geology/Astronomy (Three semesters; TA)

EVSC 4891: Planetary Geology/Astronomy Laboratory (Three semesters; Instructor of Record)

MENTORING EXPERIENCE

Graduate students at Dartmouth College

Kathrine Lutz, PhD Co-advisor 2024 – present

Emma Rogers: PhD Co-advisor 2021 – present

Noemi Ortega-Dominguez: M.S. mentor 2021 – 2024 (now at Malin Space Science Systems)

Undergraduate Smithsonian Institution summer interns

Nicole Law (Mercyhurst University), 2020 (now at Argo AI)
Sophia Sanders (University of Georgia), 2019 (now at United States Geological Survey)
Nhut Nguyen (Santa Monica College), 2018 (now at UC Berkeley)
Charlie Detelich (NC State), 2017 (now Ph.D. student at Cornell)

AWARDS AND HONORS

Department of Environmental Sciences Chair's Award, University of Virginia, 2016
Raven Honor Society, University of Virginia, 2015
Department of Environmental Sciences Moore Research Award, University of Virginia, 2015
Geologic Society of America Graduate Student Research Grant, 2015
National Center for Airborne Laser Mapping Seed Grant Recipient, 2015
Department of Environmental Sciences Exploratory Research Award, University of Virginia, 2014
Honor Committee, University of Virginia, 2014 – 2015

AWARDED RESEARCH GRANTS

Total individual funding obtained (2015 – present): \$1,953,032

NASA PDART Program

Creating a Mars valley database using CTX data

Principal Investigator. Total budget: \$297,690

2024 – 2027

NASA Mars Data Analysis Program

Investigating controls on martian alluvial fan formation

Principal Investigator. Total budget: \$393,033

2024 – 2027

NASA Mars Data Analysis Program

Composition of Martian Fans, Basin Deposits, and Watersheds Using VNIR Spectroscopy

Co-Investigator. PSI budget: \$84,220

2024 – 2027

NASA Solar Systems Workings Program

Reconstructing basaltic sediment transport on Mars using terrestrial analogues

Principal Investigator. Total budget: \$394,465

2021 – 2024

NASA Mars Data Analysis Program

Timing and spatial variability of post-Noachian fluvial erosion on Mars

Co-Investigator. PSI budget: \$120,345

2021 – 2024

NASA Mars Data Analysis Program

Do delta deposits around the martian crustal dichotomy record an ancient northern ocean?

Co-Investigator. PSI budget: \$26,242

2021 – 2023

NASA Solar Systems Workings Program

Linking alluvial fan morphology and sedimentology with formation processes via Martian analog studies in the Atacama Desert, Chile

Principal Investigator. Total budget: \$263,661

2020 – 2022

Smithsonian Institution Scholarly Studies Program

Reconstructing basaltic sediment transport on Mars using a Hawaiian Analogue

Principal Investigator. Total budget: 37,790

NASA Mars Data Analysis Program

High-Resolution Mapping and Geomorphological Studies of Martian Valley Networks

Post-doc (wrote and executed proposal). Total budget: \$302,976

2016 – 2019

Smithsonian Institution Earth and Space Sciences Predoctoral Fellowship

Investigating alluvial fan formation processes and the implications for Mars' climate

Principal Investigator. Total budget: \$70,400

2015 – 2016

PUBLICATIONS

[Google Scholar](#) | [ResearchGate](#) | [ORCiD](#)

*Indicates student mentees †Indicates equal author contribution

Journal publications

In preparation or review:

E.R. Rogers*, **A.M. Morgan**, M.C. Palucis (*in prep*). Using Clast Morphometry to Reconstruct Basaltic Sediment Transport History.

N. Ortega-Dominguez*, D. Horvath, **A.M. Morgan**, F. Rivera-Hernandez, and M.C. Palucis (*in prep for Icarus*) Timing and source of water supporting early lakes in the Xanthe Terra region of Mars.

E.Z. Noe Dobrea, K.A. Pearson, A. Altinok, **A.M. Morgan**, S. Wood (*in prep for Nature Geoscience*). Brain terrain: testing the rock-sorting formation hypotheses.

A.M. Morgan, K.A. Pearson, E.Z. Noe Dobrea, A. Altinok (*in review*). Crater retention timescales of martian brain coral terrain record past climatic change. *The Planetary Science Journal*.

Published:

[20] B.P. Graves, T.J. Ralph, **A.M. Morgan** (2025) Channel breakdown and avulsion in arroyos feeding the Little Colorado River, Arizona, USA. *Geomorphology* 468.

[DOI:10.1016/j.geomorph.2024.109501](#)

[19] R. Rotz, A.M. Milewski, R.A. Craddock, **A.M. Morgan**, D.S. Leigh (2024) Fluvial-Lacustrine Influences on Linear Dune Erosion at Lake Caroline in the Simpson Desert of Australia. *Geomorphology* 466. [DOI:10.1016/j.geomorph.2024.109438](#)

[18] A.G. Galofre, A.D. Howard, **A.M. Morgan**, S.A. Wilson, J.M. Moore (2024). Glacial sculpting of a martian cratered landscape on the northeastern flank of the Hellas basin. *Icarus* 420.

[DOI:10.1016/j.icarus.2024.116211](#)

- [17] K.A. Pearson, E.Z. Noe Dobrea, D. Zhao, A. Altinok, **A.M. Morgan** (2024). Mapping Brain Terrain Regions on Mars Using Deep Learning. *The Planetary Science Journal* 5(7). DOI:10.3847/PSJ/ad5673
- [16] T.A. Goudge, **A.M. Morgan**, G. Stucky de Quay, C.I. Fassett (2024). Spatial patterns of valley network erosion on early Mars. *Icarus* 421. DOI:10.1016/j.icarus.2024.116224
- [15] **A.M. Morgan** (2024). New maximum constraints on the era of martian valley network formation. *Earth and Planetary Science Letters* 626. DOI:10.1016/j.epsl.2023.118509
- [14] M.C. Palucis, **A.M. Morgan**, J.V. Strauss, F. Rivera-Hernandez, J.A. Marshall, E. Menio, R. Miller (2023). Rates and processes controlling periglacial alluvial fan formation: Implications for martian fans. *GSA Bulletin*. 135(3-4) DOI:10.1130/B36459.1
- [13] **A.M. Morgan**, S.A. Wilson, A.D. Howard (2022). Geospatial data from a global survey of martian fan-shaped sedimentary landforms. *Data in Brief* 44. DOI:10.1016/j.dib.2022.108494
- [12] **A.M. Morgan**, S.A. Wilson, A.D. Howard (2022). The global distribution and morphologic characteristics of fan-shaped sedimentary landforms on Mars. *Icarus* 385. DOI:10.1016/j.icarus.2022.115137
- [11] E.S. Kite, M.A. Mischna, B. Fan, **A.M. Morgan**, S.A. Wilson, M.I. Richardson (2022). Changing spatial distribution of water flow charts major change in Mars's greenhouse effect. *Science Advances* 8(21). DOI: 10.1126/sciadv.abo5894
- [10] S.J. Holo, S.J., E.S. Kite, S.A. Wilson, **A.M. Morgan** (2021). The timing of alluvial fan formation on Mars. *Planetary Science Journal* 2(5). DOI:10.3847/PSJ/ac25ed
- [9] T.A. Goudge[†], **A.M. Morgan**[†], G.S. de Quay, C.I. Fassett (2021). The importance of lake breach floods for valley incision on early Mars. *Nature* 597. DOI:10.1038/s41586-021-038601
- [8] A.D. Howard, Wilson, **A.M. Morgan**, J.M. Moore, O.L. White (2021). Light-toned deposit in the northeastern Hellas basin formed by terrain-conforming airfall sedimentation. *Icarus* 360. DOI:10.1016/j.icarus.2021.114356
- [7] S.A. Wilson, **A.M. Morgan**, A.D. Howard, J.A. Grant (2021). The global distribution of craters with alluvial fans and deltas on Mars. *Geophysical Research Letters* 48(4). DOI:10.1029/2020GL091653
- [6] M.P. Pfeiffer, **A.M. Morgan**, A. Heimsath, T. Jordan, A. D. Howard, R. Amundson (2021). A century scale rainfall in the absolute Atacama Desert: landscape response and implications for past and future rainfall magnitudes. *Quaternary Science Reviews* 254. DOI:10.1016/j.quascirev.2021.106797
- [5] **A.M. Morgan**, R.A. Craddock (2019). Assessing the accuracy of paleodischarge estimates for rivers on Mars. *Geophysical Research Letters* 46(21). DOI:10.1029/2019GL084921
- [4] **A.M. Morgan**, R.A. Craddock (2017). Depositional processes of alluvial fans along the Hilina Pali fault scarp, Island of Hawaii. *Geomorphology* 296. DOI:10.1016/j.geomorph.2017.08.028
- [3] J.M. Moore, A.D. Howard, **A.M. Morgan** (2014). The Landscape of Titan as Witness to its Climate Evolution. *Journal of Geophysical Research-Planets* 119. DOI:10.1002/2014JE004608

- [2] **A.M. Morgan**, A.D. Howard, D.E.J. Hobley, J.M. Moore, W.E. Dietrich, R.M.E. Williams, D.M. Burr, J.A. Grant, S.A. Wilson, Y. Matsubara (2014). Sedimentology and climatic environment of alluvial fans in the martian Saheki crater and a comparison with terrestrial fans in the Atacama Desert. *Icarus* 229. DOI:10.1016/j.icarus.2013.11.007
- [1] D. Durda, N. Movshovitz, D. Richardson, E. Asphaug, **A. Morgan**, A.R. Rawlings, C. Vest (2009). Experimental determination of the coefficient of restitution for meter scale granite spheres. *Icarus* 211. DOI:10.1016/j.icarus.2010.09.003

Books and book chapters

Under contract:

J. Radebaugh[†] and **A.M. Morgan[†]** (*book under contract*). *Erosion, Deposition, and Weathering Across the Solar System*. Elsevier. ISBN: 9780443140204

D. Domingue[†] and **A.M. Morgan[†]** (*chapter under contract*). Weathering processes across the Solar System. In: J. Radebaugh and **A.M. Morgan** (eds.) *Erosion, Deposition, and Weathering Across the Solar System*. Elsevier.

Published:

- [1] M.C. Palucis[†] and **A.M. Morgan[†]** (2020). Extraterrestrial Fluvial Environments. In: J.F. Shroder (Ed.) *Treatise on Geomorphology, 2nd Edition*. Wiley. DOI: 10.1016/B978-0-12-818234-5.00006-7

SERVICE AND OUTREACH

2021 – Present Editor, [Planetary Exploration Newsletter](#) (PEN)

Peer review: *Earth and Planetary Science Letters, Earth Surface Dynamics, Geomorphology, Geophysical Research Letters, Earth and Planetary Science Letters, Geosciences, Icarus, Journal of Geophysical Research: Planets, and Nature Communications, Remote Sensing*

Grant review (Not all panels are listed due to confidentiality)

Group Chief	Future Investigators in NASA Earth and Space Science and Technology (NASA)
Executive Secretary	Lunar Data Analysis Program (NASA)
Panelist	Cassini Data Analysis Program (NASA)
	New Frontiers Data Analysis Program (NASA)
	Planetary Data Archiving, Restoration, and Tools (NASA)
	Solar System Workings (NASA)
External reviewer	Geomorphology & Land-use Dynamics (NSF)

Meeting organization

Program Committee, Geological Society of America Connects (Annual Meeting), 2014
 Program Committee, Lunar and Planetary Science Conference, 2018 – 2021, 2025
 Session Chair, AGU Fall Meeting – Planetary Sediment Transport, 2016 – 2023
 Session Chair, various sessions at LPSC, 2016 – present
 AGU OSPA & LPSC Dwornik Award judge, 2017 – 2022

Scientific society leadership

Executive board member, Geological Society of America Planetary Geology Division, 2024 – Present
Member-at-Large (Quaternary Geology & Geomorphology), Geological Society of America Grants Committee, 2023 – Present
Graduate Student Representative to AGU Planetary Science Section, 2015 – 2017

Outreach

Participating Scientist, Scientist in Every Florida School, 2021 – 2024
Participating Scientist and Activity Leader, University of Florida Natural Resources Diversity Initiative Afterschool Science Clubs, 2021 – 2024
Various public outreach activities at the National Air and Space Museum, 2015 – 2020

INVITED TALKS

- February 17, 2025: Department of Geological Sciences, California State University Fullerton, Fullerton, CA
- May 4, 2023: Department of Earth Science, Dartmouth College, Hanover, NH
- June 28, 2022: Florida Space Institute, University of Central Florida, Orlando, FL
- January 14, 2021: Department of Geological Sciences, University of Florida, Gainesville, FL
- March 11, 2020: Geological Society of Washington, Cosmos Club, Washington, DC
- November 13, 2019: Solar System Exploration Division, NASA Goddard Space Flight Center, MD
- October 30, 2019: Department of Mineral Sciences, National Museum of Natural History, Smithsonian Institution, Washington, DC
- July 19, 2019: Apollo 50 Festival, National Mall, Washington, DC
- October 18, 2018: Department of Earth and Environmental Sciences, Macquarie University, Sydney, Australia

CONFERENCE PRESENTATIONS

Only first authored or student-authored presentations are listed. *Indicates student mentee

K.A. Lutz*, A.M. Morgan, M.C. Palucis (2025). Alluvial Fan Catchment Morphology of Martian Fans as Compared to Terrestrial Fans of Various Climates, presented at the Lunar and Planetary Science Conference, The Woodlands, TX, March 10-14.
E.R. Rogers* M.C. Palucis, A.M. Morgan, R.A. Craddock (2025). Climatic Implications of Rounded Basaltic Clasts on Mars from Terrestrial Field Analogs, presented at the Lunar and Planetary Science Conference, The Woodlands, TX, March 10-14.
A.M. Morgan, K.A. Pearson, E.Z. Noe Dobrea, A. Altinok (2025). Recent Climatic Changes on Mars Recorded in Brain Coral Terrains, presented at the Lunar and Planetary Science Conference, The Woodlands, TX, March 10-14.
A.M. Morgan (2024). Did Martian Valley Networks Form Episodically Over Hundreds of Millions of Years?, presented at the AGU Annual Meeting, Washington, DC, December 9-13.
A.M. Morgan, M.C. Palucis, S.A. Wilson, R.M.E. Williams, A.D. Howard, R.A. Craddock, E. Rogers*, A. Getraer, C. Harris (2024). Linking Martian Alluvial Fan Morphology and

- Sedimentology with Formation Processes: Insights from the Atacama Desert, presented at the AGU Annual Meeting, Washington, DC, December 9-13.
- A.M. Morgan, E.Z. Noe Dobrea, K.A. Pearson, A. Altinok (2024). Crater Retention Timescales of Martian Brain Coral Terrain Records Past Climatic Change, presented at the 55th Lunar and Planetary Science Conference, The Woodlands, TX, March 11-14.
- E.R. Rogers*, M.C. Palucis, A.M. Morgan, R.A. Craddock, E. Benyshek, D.F. Richards (2023). Reconstructing Basaltic Sediment Transport on Mars Using Terrestrial Analogs, presented at the 54th Lunar and Planetary Science Conference, The Woodlands, TX, March 13-17.
- E.R. Rogers*, G.L. Ferrari, J.H. Janoviyak, R.A. Craddock, A.M. Morgan, M.C. Palucis (2023). Reconstructing Basaltic Sediment Transport Using Clast Morphometry, presented at the AGU Fall Meeting, San Francisco, CA, December 11-15.
- A.M. Morgan (2023). Maximum Bounds on the Era of Martian Valley Network Formation, presented at the Geological Society of America Connects Annual Meeting, Pittsburgh, October 15-18.
- A.M. Morgan, K.A. Pearson, E.Z. Noe Dobrea, A. Altinok (2023). Crater Retention Timescales of Martian Brain Terrain, presented at the Geological Society of America Connects Annual Meeting, Pittsburgh, October 15-18.
- A.M. Morgan (2022). Evidence for Prolonged and Episodic Fluvial Activity Recorded in Martian Valley Network Morphology, presented at the 53rd Lunar and Planetary Science Conference, The Woodlands, TX, March 7-11.
- A.M. Morgan, S.A. Wilson, A.D. Howard (2022). Geographic Distribution and Morphological Characteristics of Fan-Shaped Sedimentary Landforms on Mars, presented at the 53rd Lunar and Planetary Science Conference, The Woodlands, TX, March 7-11.
- A.M. Morgan (2021). Investigation of some valley networks and their associated drainage basins in western Terra Sabaea, presented at the AGU Fall Meeting, New Orleans, LA, December 13-17.
- A.M. Morgan, M.C. Palucis, R.M.E. Williams, D.E.J. Hopley, J.M. Moore, R.A. Craddock (2021). Mars-Analogue Alluvial Fans in the Chilean Atacama Desert, presented at the Workshop on Terrestrial Analogs for Planetary Exploration, Online, June 16–18.
- A.M. Morgan, S.C. Sanders*, R.A. Craddock (2020). Runoff Production on Early Mars, presented at the 51st Lunar and Planetary Science Conference. Canceled due to COVID-19.
- N. Law*, A.M. Morgan (2020). Multiple Episodes of Fluvial Activity in the Gale Crater Region, Mars., presented at the AGU Fall Meeting, Online, December 1-17.
- A.M. Morgan, R.A. Craddock (2019). How Accurate are Paleodischarge Estimates for Martian Rivers?, presented at the 50th Lunar and Planetary Science Conference, The Woodlands, TX, March 18-22.
- A.M. Morgan, S.A. Wilson (2019). Utilizing a global database to explore morphologic trends of martian alluvial fans, presented at the 50th Lunar and Planetary Science Conference, The Woodlands, TX, March 18-22.
- A.M. Morgan, S.A. Wilson, N. Nguyen* (2019). Late Amazonian alluvial fan formation in southern Acidalia Planitia, Mars, presented at the AGU Fall Meeting, San Francisco, CA, December 9-13.
- A.M. Morgan, S.A. Wilson, A.D. Howard, R.A. Craddock, J.A. Grant (2018). Global distribution of alluvial fans and deltas on Mars, presented at the 49th Lunar and Planetary Science Conference, The Woodlands, TX, March 19-23.
- A.M. Morgan, R.A. Craddock (2018). Morphometric analyses of every martian valley: do morphological differences reveal a heterogeneity of conditions during the time of valley network formation?, presented at the AGU Fall Meeting, Washington, DC, December 10-14.
- A.M. Morgan, S.A. Wilson, A.D. Howard (2018). Global Distribution of Alluvial Fans and Deltas on Mars, presented at the The Geological Society of America 130th Annual Meeting, Indianapolis, IN, November 4-7.

- A.M. Morgan, R.A. Craddock (2018). Utilizing Morphometric Analyses of Every Martian Valley to Assess the Heterogeneity of Conditions During the Time of Valley Network Formation (Invited), presented at the The Geological Society of America 130th Annual Meeting, Indianapolis, IN, November 4-7.
- A.M. Morgan, R.A. Craddock (2017). Mars-analog Alluvial Fans Along the Hilina Pali, Hawaii, presented at the 113th Annual Meeting of the GSA Cordilleran Section, Honolulu, HI, May 23-25.
- A.M. Morgan, A.D. Howard, J.M. Moore, R.A. Craddock (2017). Landform evolution modeling of fine-grained alluvial fan sedimentation on mars utilizing an Atacama Desert Analog, presented at the 48th Lunar and Planetary Science Conference, The Woodlands, TX, March 20-24.
- A.M. Morgan, A.D. Howard, J.M. Moore (2017). Landform evolution modeling of fine-grained sedimentation on alluvial fans on Mars and Earth, presented at the AGU Fall Meeting, New Orleans, LA, December 11-15.
- A.M. Morgan, R.A. Craddock (2016). Mars analogue alluvial fans along the Hilina Pali fault system, Island of Hawai'i, presented at the AGU Fall Meeting, San Francisco, CA, December 12-16.
- A.M. Morgan, A.D. Howard, J.M. Moore (2015). Constraints on Environmental Conditions on Mars during Periods of Alluvial Fan Formation: Results from Landform Evolution Modeling, presented at the AGU Fall Meeting, San Francisco, CA, December 14-18.
- A.M. Morgan and A.D. Howard (2014). Simulating Fine-grained Alluvial Fan Sedimentation, presented at the CSDMS 2.0: Moving Forward, Boulder, CO, March 23-25.
- A.M. Morgan, A.D. Howard, D.E.J. Hopley, Y. Matsubara, J.M. Moore, R. Parsons, R.M.E. Williams, D. Burr, A. Hayes, W. Dietrich (2013). Alluvial Fans of Northern Chile as an Analog to Mars, presented at the 44th Lunar and Planetary Science Conference, The Woodlands, TX, March 18-22.
- A.M. Morgan, A.D. Howard, J.M. Moore, R.A. Beyer (2013). Simulating Fine grained Alluvial Fan Sedimentation on Mars, presented at the AGU Fall Meeting, San Francisco, CA, December 9-13.
- A.M. Morgan, R.A. Beyer, A.D. Howard, J.M. Moore (2012). The alluvial fans of Saheki crater, presented at the 43rd Lunar and Planetary Science Conference, The Woodlands, TX, March 19-23.
- A.M. Morgan, A.D. Howard, J.M. Moore, R.A. Beyer (2012). Episode(s) of intense alluvial deposition during an era of drought on Mars: Evidence from fans at Saheki (and Gale?), presented at the AGU Fall Meeting, San Francisco, CA, December 3-7.
- A.M. Morgan, R.A. Beyer, A.D. Howard, J.M. Moore (2011). Simulating the Formation of Large Alluvial Fans on Mars, presented at the 42nd Lunar and Planetary Science Conference, The Woodlands, TX, March 7-11.

Last updated 3/28/2025