

**Alexander Michael Morgan**

Planetary Science Institute  
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**EDUCATION**

**Ph.D. in Environmental Sciences**

University of Virginia – November 2017, advisor: Professor Alan D. Howard

**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

**Research Assistant**

NASA Ames Research Center  
2010 – 2011

**TEACHING EXPERIENCE**

**University of Virginia**

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**

Grace Fanson, MIT (PhD committee member), 2025-present

Kathrine Lutz, Dartmouth College (PhD Co-advisor), 2024 – present

Emma Rogers, Dartmouth College (NASA FINESST fellow) (PhD Co-advisor), 2021 – present

Noemi Ortega-Dominguez, Dartmouth College (M.S. co-mentor), 2021 – 2024 (now at Malin Space Science Systems)

**Smithsonian Institution undergraduate 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): \$2M**

**NASA SSW Program**

*Gully Incision on Earth and Mars: Using field observations and sediment transport modeling to constrain the recent martian hydrosphere*

Co-Investigator.

2026 – 2029

**NASA PDART Program**

*Creating a Mars valley database using CTX data*

Principal Investigator.

2024 – 2027

**NASA Mars Data Analysis Program**

*Investigating controls on martian alluvial fan formation*

Principal Investigator.

2024 – 2027

**NASA Mars Data Analysis Program**

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

Co-Investigator.

2024 – 2027

**NASA Solar Systems Workings Program**

*Reconstructing basaltic sediment transport on Mars using terrestrial analogues*

Principal Investigator.

2021 – 2024

**NASA Mars Data Analysis Program**

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

Co-Investigator.

2021 – 2024

### **NASA Mars Data Analysis Program**

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

Co-Investigator.

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.

2020 – 2022

### **Smithsonian Institution Scholarly Studies Program**

*Reconstructing basaltic sediment transport on Mars using a Hawaiian Analogue*

Principal Investigator.

### **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.

2015 – 2016

## **PUBLICATIONS**

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

\*Indicates student mentees †Indicates equal author contribution

### **Journal publications**

*In review:*

K.A. Lutz\*, **A.M. Morgan**, M.C. Palucis (*in review at Icarus*). Watershed morphometry reveals an arid-to-hyper-arid climate during Mars' alluvial fan formation.

E.R. Rogers\*, **A.M. Morgan**, R.A. Craddock, M.C. Palucis (*in review at Journal for Geophysical Research: Planets*). The Influence of Climate on Basaltic Clast Morphometry as an Indicator of Martian Paleoclimate.

**A.M. Morgan**, R.M.E. Williams, M.C. Palucis, S.A. Wilson, E.R. Gehringer, A.D. Howard, R.A. Craddock (*in review at Journal for Geophysical Research: Planets*) Empirical water-volume constraints from megafan deposits in the Chilean Atacama Desert and implications for alluvial fans on Mars.

B. J. Nordin, A. Getraer, N. Peters, **A. M. Morgan**, J. S. Stroup, N. D. Brown, J. C. Fosdick, P. B. O'Sullivan, M. A. Kelly, A.J., Schaeffer, J. A. Marshall, J. V. Strauss, M. C. Palucis (*in review at Journal of Geophysical Research: Earth Surface*). Postglacial Erosional Response of a Permafrost Landscape, Aklavik Range, Arctic Canada.

J.T. Haber, R.P. Irwin III, **A.M. Morgan**, B. Horgan, S.A. Wilson (*in review at Geophysical Research Letters*). Mineralogical Evidence of Sustained Aqueous Activity in Martian Fan Deposits in Xanthe Terra.

Published:

- [23] E.R. Rogers\*, **A.M. Morgan**, M.C. Palucis (2025). Using Clast Morphometry to Reconstruct Basaltic Sediment Transport History. *Journal for Geophysical Research: Planets* 130, e2025JE009154. DOI: [10.1029/2025JE009154](https://doi.org/10.1029/2025JE009154)
- [22] **A.M. Morgan**, K.A. Pearson, E.Z Noe Dobrea, A. Altinok (2025). Crater retention timescales of martian brain coral terrain record past climatic change. *The Planetary Science Journal* 6(200). DOI:[10.3847/PSJ/adflaa](https://doi.org/10.3847/PSJ/adflaa)
- [21] 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](https://doi.org/10.1016/j.geomorph.2024.109501)
- [20] 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](https://doi.org/10.1016/j.geomorph.2024.109438)
- [19] T.A. Goudge, **A.M. Morgan**, G.S. de Quay, C.I. Fassett (2024). Spatial patterns of valley network erosion on early Mars. *Icarus* 421. DOI:[10.1016/j.icarus.2024.116224](https://doi.org/10.1016/j.icarus.2024.116224)
- [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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/10.3847/PSJ/ac25ed)
- [9] T.A. Goudge<sup>†</sup>, **A.M. Morgan**<sup>†</sup>, 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](https://doi.org/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](https://doi.org/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](https://doi.org/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. Hopley, 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<sup>†</sup> and **A.M. Morgan**<sup>†</sup> (*book under contract*). *Erosion, Deposition, and Weathering Across the Solar System*. Elsevier. ISBN: 9780443140204
- D. Domingue<sup>†</sup>, **A.M. Morgan**<sup>†</sup>, C.C. Bedford (*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<sup>†</sup> and **A.M. Morgan**<sup>†</sup> (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, Geology, Geomorphology, Geophysical Research Letters, Earth and Planetary Science Letters, Geosciences, Icarus, Journal of Geophysical Research: Planets, 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)                    |



- A.M. Morgan, A. Rudolph, S.A. Wilson, T.A. Goudge (2025) A New Global Database of Martian Valley Networks from Context Camera (CTX) Imagery, presented at the Geological Society of America Connects Meeting, San Antonio, TX, October 19-22.
- 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. Janovyak, 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. Hobley, 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 5/29/2026*