

# Jacob B. Adler

## Curriculum Vitae

School of Earth and Space Exploration  
Arizona State University, Tempe, AZ

Jacob.B.Adler@asu.edu  
www.adlerlab.org

### EDUCATION

Ph.D. School of Earth and Space Exploration, Arizona State University, 2019  
B.S. Earth and Planetary Science Department, University of California, Los Angeles, 2013

### PROFESSIONAL APPOINTMENTS/EMPLOYMENT

Assistant Research Professor School of Earth and Space Exploration Arizona State University	2024-Present Tempe, AZ
Assistant Research Professor School of Computing and Augmented Intelligence Arizona State University	2022-2024 Tempe, AZ
Postdoctoral Fellow Earth and Atmospheric Sciences Department Georgia Institute of Technology	2021-2022 Atlanta, GA
Postdoctoral Fellow Earth and Planetary Science Department Johns Hopkins University	2019-2021 Baltimore, MD

### PLANETARY MISSION/INSTRUMENT ROLES

Mars 2020 Rover, Mastcam-Z Science Team.	(2015 - 2019)
Mars Odyssey, THEMIS Science Team.	(2018 - 2019)
Mars Reconnaissance Orbiter, CTX Science Team.	(2018 - 2019)
Mars Science Laboratory (MSL), Mastcam Multispectral Analyst.	(2017 - 2018)
Mars Exploration Rover (MER), Pancam Payload Downlink Lead.	(2015 - 2018)
OSIRIS-REx, Collaborator on Participating Scientist Proposal.	(2018 - 2018)
Mars Landing Site Resource and Science Consultant.	(2015 - 2019)
Lunar Reconnaissance Orbiter Camera (LROC) Science Team.	(2014 - 2015)
LRO Diviner Lunar Radiometer Experiment (DLRE) Science Team.	(2011 - 2013)

### SELECTED GRANTS

2024 “Lunar Datasets and Tools in JMARS” (PI), NASA PDART  
2024 “Enabling Next-Generation Data Science in Planetary Research with Machine Learning Dataset Creation Tools in JMARS” (Co-I), NASA PDART  
2023 “Laboratory Analog Mudflow Experiments: Insights into Mars Rheology and Morphology” (PI), NASA SSW  
2023 “Mapping surface geology with drone imagery and machine learning: a case study in the

## PUBLICATIONS

### Peer-Reviewed Journal Articles

1. Purohit, M. **Adler, J.**, and Kerner, H. (2023). ConeQuest: A Benchmark for Cone Segmentation on Mars. *Winter Conference on Applications of Computer Vision, 2024*, (pp. 6026-6035), [https://openaccess.thecvf.com/content/WACV2024/papers/Purohit\\_ConeQuest\\_A\\_Benchmark\\_for\\_Cone\\_Segmentation\\_on\\_Mars\\_WACV\\_2024\\_paper.pdf](https://openaccess.thecvf.com/content/WACV2024/papers/Purohit_ConeQuest_A_Benchmark_for_Cone_Segmentation_on_Mars_WACV_2024_paper.pdf).
2. Malvi, S., Shah, H., Chandarana, N., Purohit, M. **Adler, J.**, and Kerner, H. (2023). Automated Multi-class Crater Segmentation in Mars Orbital Images. *6th International ACM SIGSPATIAL Workshop on AI for Geographic Knowledge Discovery (GeoAI '23)*. (pp. 110-120), <https://doi.org/10.1145/3615886.3627748>
3. Limaye, A., **Adler, J.**, Moodie, A., Whipple, K., and Howard, A. (2023). Effect of Standing Water on Formation of Fan-Shaped Sedimentary Deposits at Hypanis Valles, Mars. *Geophysical Research Letters*, <https://doi.org/10.1029/2022GL102367>.
4. **Adler, J. B.**, Bell, J. F., Warner, N. H., Dobreá, E. N., and Harrison, T. N. (2022). Regional Geology of the Hypanis Valles System, Mars. *Journal of Geophysical Research: Planets*, *127*(3), <https://doi.org/10.1029/2021JE006994>.
5. Kinch, K., Sølberg, J., Horgan, B., **Adler, J.**, Hayes, A., Hurowitz, J., and Rice, M. (2022). Landing on Mars: A Cross-Institutional Research-Based Seminar Series. *International Journal of Teaching and Learning in Higher Education*, *33*(3), 328-360, <https://www.iset1.org/ijtlhe/pdf/IJTLHE4063.pdf>.
6. Kerner, H. R. and **Adler, J. B.** (2022). Guiding Field Exploration on Earth and Mars with Outlier Detection. In *Proceedings of the International Geoscience and Remote Sensing Symposium (IGARSS)*, <https://doi.org/10.1109/IGARSS46834.2022.9884366>.
7. Stack, K. M., Williams, N. R., Calef, F., Sun, V. Z., Williford, K. H., Farley, K. A., including **Adler, J. B.**, et al. (2020). Photogeologic map of the perseverance rover field site in Jezero Crater constructed by the Mars 2020 Science Team. *Space Science Reviews*, *216*(8), 1-47. <https://doi.org/10.1007/s11214-020-00739-x>.
8. **Adler, J. B.**, Bell III, J. F., Fawdon, P., Davis, J., Warner, N. H., Sefton-Nash, E., and Harrison, T. N. (2019). Hypotheses for the origin of the Hypanis fan-shaped deposit at the edge of the Chryse escarpment, Mars: is it a delta?. *Icarus*, *319*, 885-908. <https://doi.org/10.1016/j.icarus.2018.05.021>
9. Fawdon, P., Gupta, S., Davis, J. M., Warner, N. H., **Adler, J. B.**, Balme, M. R., Bell, J. F., Grindrod, P. M., and Sefton-Nash, E. (2018). The Hypanis Valles delta: The last highstand of a sea on early Mars?. *Earth and Planetary Science Letters*, *500*, 225-241. <https://doi.org/10.1016/j.epsl.2018.07.040>

### Published Datasets

10. **Adler, J. B.** (2023). Cucomungo Datasets. [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.7809574>
11. **Adler, J. B.** (2022). Digital elevation model mosaic of the Hypanis region, Mars. [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.5935860>

12. **Adler, J. B.**, Bell, J. F., Warner, N. H., Dobreá, E. N., and Harrison, T. N. (2021). Map Shapefiles of Regional Geology of the Hypanis Valles Region, Mars. [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.5574702>

### Conference Abstracts and Presentations

13. Trussell, A., **Adler, J.**, Bell, J. (2023). Mineralogical Investigation of Potentially Erosional Landforms in Southern Chryse Planitia, Mars. In *AGU Fall Meeting Abstracts (Vol. 2023, P53C-2771)*. San Francisco, CA.
14. **Adler, J.**, Kerner, H. (2023). Planet-scale Machine Learning Requires Rethinking Community Practices. In *AGU Fall Meeting Abstracts (Vol. 2023, P54A-01)*. San Francisco, CA.
15. **Adler, J.** (2023). Laboratory Analog Experiments to Investigate Mars Sediment Flows. In *FAIRPLAY Workshop Abstracts (p. 19)*. Noordwijk, The Netherlands.
16. **Adler, J.**, Rivera-Hernández, F., Thompson, S., Brož, P., Sylvest, M. E., Patel, M. (2022). Mars Laboratory Analog Sediment Flows: Investigating the Effects of Composition. In *AGU Fall Meeting Abstracts (Vol. 2022, pp. EP32D-1333)*. Chicago, IL.
17. Thompson, S., Rivera-Hernández, F., **Adler, J.**, Brož, P., Sylvest, M. E., Patel, M. (2022). Mars Laboratory Analog Sediment Flows: Investigating the Effects of Pressure and Water-rock Ratio. In *AGU Fall Meeting Abstracts (Vol. 2022, pp. EP26A-08)*. Chicago, IL.
18. Russ, A., **Adler, J.**, and Rivera-Hernández, F. (2022). Modeling the behavior of mudflows on Mars. In *Explorigins Colloquium*. Atlanta, GA.
19. **Adler, J.**, Rivera-Hernández, F., Palucis, M., and Salvatore, M. (2021). Unsupervised Cluster Mapping of the Cucomungo Alluvial Fan, and Implications for Mapping Fans on Mars. In *AGU Fall Meeting Abstracts (Vol. 2021, pp. EP22B-06)*. New Orleans, LA.
20. Cuevas-Quiñones, S., Wray, J., Rivera-Hernández, F., and **Adler, J.** (2021). Evaluating a Potential Volcano on the Rim of Jezero Crater, Mars. In *The Geological Society of America (GSA Connects), Vol 53, No. 6, 240-9*. Portland, OR.
21. Limaye, A. B., **Adler, J.**, and Whipple, K. X. (2019). Numerical modelling of fan-shaped fluvial deposits in low-latitude regions of Mars and their relationship to basin boundary conditions. In *AGU Fall Meeting Abstracts (Vol. 2019, pp. EP24A-02)*. San Francisco, CA.
22. **Adler, J. B.**, Asphaug, E., Robinson, M. S., Winhold, A., Davison, T. M., and Artemieva, N. (2019). Tycho Ejecta Deposits Near the Ballistic Antipode: New Modeling Methods. In *50th Annual Lunar and Planetary Science Conference (No. 2132, p. 2201)*. The Woodlands, TX.
23. **Adler, J.**, Bell III, J. F., Warner, N. H., and Noe Dobreá, E. Z. (2018). Geomorphic Map of the Catchment of Hypanis and Nanedi Valles, Mars. In *AGU Fall Meeting Abstracts (Vol. 2018, pp. P31I-3822)*. Washington D.C.
24. **Adler, J.**, and Bell, J. (2018). Testing Formation Hypotheses for the Hypanis Deposit at the Edge of the Chryse Basin, Mars: Is it a Delta? In *Asia Oceania Geosciences Society (AOGS) Annual Meeting, PS09-04-A040*. Honolulu, HI.
25. Fawdon, P., Gupta, S., Davis, Sefton-Nash, E., **Adler, J. B.**, Bell, J. F., Balme, M. R., and Grindrod, P. M. (2018). Hypanis Valles Delta: The Last High-Stand of a Sea on Early Mars. In *49th Annual Lunar and Planetary Science Conference (p. 2839)*. The Woodlands, TX.

26. **Adler, J.**, Harrison, T. N., Bell III, J. F., and Mayer, D. P. (2017). Regional Stratigraphy from Stereo Imaging near the Hypanis Fan Deposit: Marking the Extent of the Largest Delta on Mars?. In *AGU Fall Meeting Abstracts (Vol. 2017, pp. P33C-2888)*. New Orleans, LA.
27. **Adler, J. B.**, Bell, J. F., and Harrison, T. N. (2017). Fluvial Stratigraphy and Regional Volcanism at Hypanis Delta, Mars. In *48th Annual Lunar and Planetary Science Conference (No. 1964, p. 1648)*. The Woodlands, TX.
28. **Adler, J.**, Bell III, J.F., Warner, N.H., Fawdon, P., Gupta, S., Sefton-Nash, E., Grindrod, P.M. and Davis, J. (2016). Geologic Stratigraphy, Delta Morphology, and Regional History of Hypanis Delta, Mars. In *AGU Fall Meeting Abstracts (pp. P11E-03)*. San Francisco, CA.
29. **Adler, J. B.**, Anwar, S., Dickenshied, S., and Carter, S. (2016). SHARAD Radargram Analysis Tool Development in JMARS. In *Sixth International Conference on Mars Polar Science and Exploration (Vol. 1926, p. 6091)*. Reykjavik, Iceland.
30. **Adler, J. B.**, Hill, J. R., Mitchell, J. L., Christensen, P. R., Anwar, S., Dickenshied, S., and Carter, S. (2016). JMARS Software Development For NASA's 2035 Human Landing Site Assessment. In *47th Lunar and Planetary Science Conference, abstract (Vol. 2981)*. The Woodlands, TX.
31. Gupta, S., Sefton-Nash, E., **Adler, J.**, Rice, M., Fawdon, P., Warner, N., Grindrod, P., Davis, J., Balme, M., Bell, J.F., Stetson, C., and Richard, J. (2015). The Hypanis Fluvial-Deltaic-Lacustrine System in Xanthe Terra: A Candidate Exploration Zone for the First Human Landing on Mars. In *First Landing Site/Exploration Zone Workshop for Human Missions to the Surface of Mars (Vol. 1879, p. 1051)*. Houston, TX.
32. **Adler, J.**, and Bell III, J. F. (2014). Stratigraphic Analysis of Phyllosilicate and Hydrated Sulfate Deposits Across the Margaritifer-Meridiani Boundary. In *AGU Fall Meeting Abstracts (Vol. 2014, pp. P41A-3889)*. San Francisco, CA.
33. **Adler, J. B.**, and Bell, J. F. (2014). Mineralogic Stratigraphy and Depositional Environment in Miyamoto Crater, Mars. In *Eighth International Conference on Mars (Vol. 1791, p. 1035)*. Pasadena, CA.
34. **Adler, J. B.**, Paige, D. A., and Schlichting, H. E. (2013). Computing the Diurnal Yarkovsky Drift Rate for a Shape Model. In *44th Annual Lunar and Planetary Science Conference (No. 1719, p. 2527)*. The Woodlands, TX.
35. **Adler, J.**, and Paige, D. (2012). A New Approach for Computing Yarkovsky Forces on Asteroids. In *AAS/Division for Planetary Sciences (DPS) Meeting Abstracts #44 (Vol. 44, pp. 111-04)*. Reno, NV.

### Other Publications

36. **Adler, J. B.** (2019). The Geologic History of the Hypanis Deposit, Mars; and Ballistic Modeling of Lunar Impact Ejecta. Ph.D. Dissertation, Arizona State University.

### TECHNICAL PRESENTATIONS AND PUBLIC TALKS

- 2023 "Planet-scale Machine Learning Requires Rethinking Community Practices." American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.
- 2023 "Laboratory Analog Experiments to Investigate Mars Sediment Flows." FAIRPLAY Workshop, Remote Talk.

- 2022 “Mars Laboratory Analog Sediment Flows.” Flash Talk, American Geophysical Union (AGU) Fall Meeting, Chicago, IL.
- 2022 “Sedimentary Environments Throughout the Solar System.” Department of Geology, Occidental College, CA.
- 2021 “Unsupervised Cluster Mapping of the Cucomungo Alluvial Fan, and Implications for Mapping Fans on Mars.” American Geophysical Union (AGU) Fall Meeting, New Orleans, LA.
- 2021 “Deltas on Mars: Jezero and Hypanis.” Georgia Tech, Planetary Science & Astrobiology Seminar, Atlanta, GA.
- 2020 “Remote Sensing of the Hypanis Deposit, Mars.” Areté Associates, Northridge, CA.
- 2019 “Hypervelocity Impact Simulations and Experiments.” Hopkins Extreme Materials Institute, Baltimore, MD.
- 2019 “New Insights into the History of Water on Mars.” The School of Earth and Space Exploration, Tempe, AZ.
- 2018 “Using Thermal Inertia to Investigate the Hypanis Deposit along the Chryse Escarpment.” Thermal Emission Imaging System (THEMIS) Science Team Meeting, Tempe, AZ.
- 2016 “Human Landing Site Selection Software Demonstration.” Planetary Geologic Mappers Meeting, Flagstaff, AZ.
- 2016 “Geologic Stratigraphy, Delta Morphology, and Regional History of Hypanis Delta, Mars.” American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.
- 2016 “JMARS 2035 for Human Missions to Mars.” NASA booth, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.
- 2016 “JMARS 2035 Software Demonstration.” Space Resources Roundtable/Planetary & Terrestrial Mining Sciences Symposium, Golden, CO.
- 2015 “The Hypanis Fluvial-Deltaic-Lacustrine System in Xanthe Terra: Candidate Exploration Zone for the First Human Landing on Mars.” NASA’s First Landing Site/Exploration Zone Workshop for Human Missions to the Surface of Mars, Houston, TX.
- 2015 “Visible/Near-IR Spectroscopy and Planetary Applications.” The School of Earth and Space Exploration Graduate and Faculty Lecture, Tempe, AZ.
- 2014 “Lunar Antipodal Melt Deposits from Tycho Crater Ejecta.” Lunar Reconnaissance Orbiter Camera (LROC) Science Team Meeting, Tempe, AZ.

## **PROFESSIONAL DEVELOPMENT**

### **Field and Lab Research**

- 2024 Led sediment flow experiments at the Mars Chamber Facility, Open University, Milton Keynes, UK.
- 2023 Co-Led field campaign in Big Maria Mountains (CA) with USGS and Georgia Tech students/collaborators. Data collection with DJI Mavic 3E and 3T drones for visible/SFM mapping and day and night thermal surveys.
- 2022 Co-organized and conducted sediment flow experiments at the Mars Chamber Facility, Open University, Milton Keynes, UK.
- 2021 Co-Led field campaign at Cucomungo Canyon alluvial fan, Eureka Valley, CA (Death Valley). Conducted visible, thermal, multispectral, and geomorphic analysis.
- 2021 Collected field samples of debris flow fans (Bishop, CA and Independence, CA) including RTK GPS use.
- 2021 DJI Phantom 4 drone mosaic data collection of Harvard Hills field camp site (Barstow, CA).

- 2019 Participated in Drone/sUAS Structure from Motion Workshop (ASU).
- 2019 Led remote sensing - ArcGIS project components of Federal Hill, MD investigation. Used gravimeter, seismometer, magnetometer, and ground penetrating radar to map buried fort and underground tunnels.
- 2016 Led airborne thermal infrared and orbital remote sensing analysis of Death Valley, CA.
- 2015 Collected field samples for NSF study “Noble Gases, Lower Mantle Structures, and the Origin of Ocean Island Basalts” (Oahu, HI).
- 2012 Participated in Earth and planetary field exercises in AZ, CA, HI, UT, WA, Mexico, and Iceland. Includes locations such as Flagstaff, Phoenix, Canyonlands, Grand Canyon, Death Valley, Santa Monica Mountains, Santa Cruz Island, Hawaii, Oahu’s Ka Iwi coast, Pinacate volcanic field, west Iceland, north Iceland.

**Software Development**

- 2022- Science advisor for JMARS, planetary GIS development
- 2015-2016 Managed production of JMARS 2035 software, created tools and science data sets for NASA’s human landing site plans
- 2015-2016 Created ellipse evaluation tools for NASA’s Mars 2020 Rover landing site selection
- 2016 Science collaborator for JMARS, SHARAD analysis

**HONORS AND AWARDS**

- 2018 NASA Data Visualization Award and Grant
- 2017 NASA OSIRIS-REx Participating Scientist (Siegler), “3D Thermal Modeling of Asteroid Bennu”, Role: collaborator
- 2016 NASA Mars Program Office Travel Grant, International Conference on Mars Polar Science and Exploration, Iceland
- 2015 ASU School of Earth and Space Exploration, Planetary Geology Research Grant
- 2014 NASA Group Achievement Award, Diviner Science Team
- 2013 NASA Group Achievement Award, Diviner Science Team

**TEACHING EXPERIENCE**

**Courses Taught**

- GLG 598 (ASU) – Planetary Seminar Field Trip. 10 graduate students. 2016
- GLG 598 (ASU) – Mars Landing Site Seminar. 6 graduate students. 2016
- GLG 103 (ASU) – Introduction to Geology Lab. 3 sections, 90 undergraduate students. 2014
- GLG 103 (ASU) – Introduction to Geology Lab. 3 sections, 90 undergraduate students. 2013

**Guest Lectures**

- CSE 598 (ASU) - Machine Learning for Remote Sensing. “Planetary Remote Sensing.” 2024
- SES 121 (ASU) - Earth, Solar System, and Universe. “The Geology of Mars.” 2023
- GLG 406/598 (ASU) - Geology of Mars. “Deltas and Alluvial Fans on Mars.” 2023
- SES 121 (ASU) - Earth, Solar System, and Universe. “The Geology of Mars.” 2022
- SES 502 (ASU) - Faculty Research Seminar. “Planetary Surface Processes.” 2022
- GEO 295 (Oxy) - Topics in Geology. “Recharging Martian Oceans and Lakes.” 2022
- EAS 6380 (GT) - Remote Sensing. “Earth and Mars in VIS-NIR.” 2021
- GLG 406/598 (ASU) - Geology of Mars. “Deltas on Mars: Jezero and Hypanis.” 2021
- GLG 406/598 (ASU) - Geology of Mars. “Mars 2020 Sample Return: Fluvial and Igneous Rocks.” 2019

## SERVICE

### Reviewing

#### *Journals*

Planetary and Space Science; Planetary Science Journal; The Sedimentary Record; Icarus; Journal of Geophysical Research: Planets; Geophysical Research Letters

#### *Panels*

2023 NASA ROSES Proposal Panelist  
2021 NASA ROSES Proposal Panelist  
2020 NASA ROSES Proposal Panelist  
2019 NASA ROSES Proposal Executive Secretary  
2018 NASA ROSES Proposal Executive Secretary

### Organizations and Committees

#### *Internal*

2019-2020 Member, Equity, Diversity, and Inclusion (EDI) initiatives  
Earth and Planetary Sciences, Johns Hopkins University  
2018-2019 Curriculum Development, Prison Education Programming  
School of Earth and Space Exploration, Arizona State University  
2016-2017 Logistics Manager, Earth and Space Open House  
School of Earth and Space Exploration, Arizona State University  
2013-2015 Telescope Manager, Earth and Space Open House  
School of Earth and Space Exploration, Arizona State University  
2012 President, Undergraduate Astronomical Society  
University of California Los Angeles.  
2012 Member, Telescopes Shows, UCLA Astronomy Live  
University of California Los Angeles

#### *External*

2019 Session chair, American Geophysical Union (AGU) Fall Meeting  
Sedimentary Volcanism Throughout the Solar System  
2015-2018 Contributor, Mars 2020 Rover Landing Site Workshops, Rubric and Voting  
NASA JPL, Pasadena CA

### Advising and Mentoring

*Research Advising and Mentorship, -c = current*

#### PhD Advising

2022-c Mirali Purohit (ASU CS, PhD)  
2022-c Allyson Trussell (ASU SESE, PhD)  
2021-c Sharissa Thompson (GT EAS, PhD)

#### MS Advising

2023-c Kunal Kasodekar (ASU CS, MS)  
2023 Niketan Chandarana (ASU CS, MS)  
2023 Hitansh Shah (ASU CS, MS)  
2023 Shrey Malvi (ASU CS, MS)  
2022 Sai Kudhroli (ASU CS, Masters)

2022 Sumedh Joshi (ASU CS, Masters)  
2022 Dhyey Pandya (ASU CS, Masters)  
2021 Adam Martin (UMD Geographical Sciences, MS Thesis)

#### Undergraduate Advising

2023-c Rini Jain (ASU CS, Undergraduate Research, Barrett Honors Thesis)  
2023-c Anant Rastogi (ASU CS, Undergraduate Research, Barrett Honors Thesis)  
2022 Alexis Jansen (ASU SESE, Undergraduate Research)  
2022 Christina Singh (GT, Summer REU)  
2021 Abigail Russ (GT Physics, Undergraduate Research)  
2021 Sara Cuevas-Quiñones (GT Undergraduate Research)  
2016 Andrew Winhold (ASU, Undergraduate Research)

#### High School Advising

2019 Aaron Villahermosa (JHU, High School Research)

#### Outreach

2020-2021 Tutor, Prison Cells to PhD (P2P)  
Baltimore MD  
2018-2019 Instructor, Prison Education Program  
Phoenix, AZ  
2017-2019 Mentor, Big Brothers Big Sisters of Arizona  
BBBSAZ, Phoenix Arizona  
2012- Coach, Adult/youth ultimate frisbee teams  
UCLA Ultimate / Phoenix Arizona / Valley of the Sun (VOTS) Ultimate

#### Professional Membership

Member, International Association for Mathematical Geosciences (IAMG)  
Member, American Geophysical Union (AGU)  
Member, Universities Space Research Association (USRA)  
Member, The Mars Society