JACOB B. ADLER

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EDUCATION

Arizona State University *Aug 2013 - Aug 2019*
Geological Sciences, Ph.D.

University of California, Los Angeles *Sep 2008 - Mar 2013*
Geophysics and Space Physics, B.S.

SUMMARY

Ph.D. in geological sciences with 10+ years experience in both geospatial (mapping/GIS) and image (remote sensing/in situ) analysis. I specialize in geospatial tool development, data visualization, near-IR and thermal spectroscopy, digital elevation model (DEM) creation, drone data, in-situ field data collection, and human and robotic surface mission operations.

EXPERIENCE

Arizona State University Tempe, AZ
Assistant Research Professor *starting Aug 2022*

Georgia Tech Atlanta, GA
Postdoctoral Fellow *Apr 2021 - present*

Johns Hopkins University Baltimore, MD
Visiting Scientist *Aug 2020 - present*

Johns Hopkins University Baltimore, MD
Postdoctoral Fellow *Sep 2019 - Aug 2020*

ADDITIONAL ROLES

Mars 2020 Rover, Mastcam-Z Science Team. Developed landing site evaluation factors, community assessment, notional traverse planning (2015 - 2019)

Mars Odyssey, THEMIS Science Team. Thermal infrared analysis of Hypanis deposit, Chryse escarpment, and Xanthe Terra (2018 - 2019)

Mars Reconnaissance Orbiter, CTX Science Team. Albedo and visible analysis of Hypanis deposit, Chryse escarpment, and Xanthe Terra (2018 - 2019)

Mars Science Laboratory (MSL), Mastcam Multispectral Analyst. Analyzed new multispectral sequences, presented to science team, multispectral calibration (2017 - 2018)

Mars Exploration Rover (MER), Pancam Payload Downlink Lead. Assessed camera health, created science products, SOWG planning, science team (2015 - 2018)

OSIRIS-REx, Unfunded Collaborator on Selected Participating Scientist Proposal. Methods proposed for 3D thermal modeling of Asteroid Bennu for Participating Scientist M. Siegler (2018)

Mars Landing Site Resource and Science Consultant. For NASA and Commercial space industry purposes (2015 - 2019)

Lunar Reconnaissance Orbiter Camera (LROC) Science Team. Analyzed distribution of impact melt from Tycho crater (2014 - 2015)

Lunar Reconnaissance Orbiter Diviner Lunar Radiometer Experiment (DLRE) Science Team. Created team DEM products, researched airless body dynamics (2011 - 2013)

PUBLICATIONS

Peer-Reviewed Articles

1. **Guiding Field Exploration with Outlier Detection.**
   Hannah Kerner and Jacob Adler. *The International Geoscience and Remote Sensing Symposium*, 2022, accepted.

2. **Regional Geology of the Hypanis Valles System, Mars.**
   Jacob Adler, Jim Bell, Nick Warner, Eldar Noe Dobrea, Tanya Harrison. *Journal of Geophysical Research: Planets*, 127, 3, 2022, doi: 10.1029/2021JE006994.

3. **Landing on Mars: A Cross-institutional Research-based Seminar Series.**
   Kjartan Kinch, Jan Solberg, Briony Horgan, Jacob Adler, Alex Hayes, Joel Hurowitz, and Melissa Rice. *International Journal of Teaching and Learning in Higher Education*, 33(3), 2021, accepted.

4. **Photogeologic Map of the Perseverance Field Site in Jezero Crater Constructed by the Mars 2020 Science Team.**
   Kathryn Stack including Jacob Adler, et al. *Space Science Reviews*, 216, 127, 2020.

5. **Hypotheses for the Origin of the Hypanis Fan-Shaped Deposit at the Edge of the Chryse Escarpment, Mars: Is it a Delta?**
   Jacob Adler, Jim Bell, Peter Fawdon, Joel Davis, Nick Warner, Elliot Sefton-Nash, and Tanya Harrison. *Icarus*, 319, p885-908, 2019.

6. **The Hypanis Valles Delta: The last high stand of a sea on early Mars?**
   Peter Fawdon, Sanjeev Gupta, Joel Davis, Nick Warner, Jacob Adler, Matt Balme, Jim Bell, Peter Grindrod, Elliot Sefton-Nash. *Earth and Planetary Science Letters*, 500, p225-241, 2018.

Peer-Reviewed Articles in Preparation

7. **K-means cluster mapping of the Cucomungo alluvial fan from orbit: Implications for automated mapping of fans on Mars**
   Jacob Adler and Frances Rivera-Hernández. 2022, in preparation.

8. **Effect of basin boundary conditions on formation of fan-shaped sedimentary deposits at Hypanis Valles, Mars**
   Ajay Limaye, Jacob Adler, Andrew Moodie, Alan Howard, and Kelin Whipple. *Geophysical Research Letters*, 2022, in preparation.

Datasets

9. **Digital elevation model mosaic of the Hypanis region, Mars**
   Jacob Adler (2022, April). [Data set]. Zenodo. https://doi.org/10.5281/zenodo.5935860

10. **Map Shapefiles of Regional Geology of the Hypanis Valles System, Mars**
    Jacob Adler, James Bell, Nicholas Warner, Eldar Noe Dobrea, and Tanya Harrison. (2021). [Data set]. Zenodo. https://doi.org/10.5281/zenodo.5574702

Abstracts and Posters

11. **Modeling the bahavior of mudflows on Mars.**
    Abigail Russ, Jacob Adler, and Frances Rivera-Hernández. Explorigins Colloquium, Atlanta, GA, 2022.

12. **Unsupervised Cluster Mapping of the Cucomungo Alluvial Fan, and Implications for Mapping Fans on Mars.**
    Jacob Adler, Frances Rivera-Hernández, Marisa Palucis, and Mark Salvatore. American Geophysical Union (AGU) Fall Meeting, New Orleans, LA, 2021.

13. **Evaluating a Potential Volcano on the Rim of Jezero Crater, Mars.**
    Sara Cuevas-Quiñones, James Wray, Frances Rivera-Hernández, Jacob Adler. The Geological Society of America (GSA Connects), 2021.

14. **Numerical Modelling of Fan-shaped Fluvial Deposits in Low-latitude Regions of Mars and their Relationship to Basin Boundary Conditions.**

Ajay Limaye, Jacob Adler, and Kelin Whipple. American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, 2019.

15. **Tycho Ejecta Deposits Near the Ballistic Antipode: New Modeling Methods.**
Jacob Adler, Erik Asphaug, Mark Robinson, Andy Winhold, Tom Davison, and Natalia Artemieva. Lunar and Planetary Science Conference, The Woodlands, TX, 2019.

16. **Geomorphic Map of the Catchment of Hypanis and Nanedi Valles, Mars.**
Jacob Adler, Jim Bell, Nick Warner, and Eldar Noe Dobrea. American Geophysical Union (AGU) Fall Meeting, Washington D.C., 2018.

17. **Testing Formation Hypotheses for the Hypanis Deposit at the Edge of the Chryse Basin, Mars: Is it a Delta?**
Jacob Adler and Jim Bell. Asia Oceania Geosciences Society (AOGS) Annual Meeting, Honolulu, HI, 2018.

18. **Hypanis Valles Delta: The Last High-Stand of a Sea on Early Mars.**
Peter Fawdon, Sanjeev Gupta, Joel Davis, Elliot Sefton-Nash, Jacob Adler, Jim Bell, Matt Balme, and Peter Grindrod. Lunar and Planetary Science Conference, The Woodlands, TX, 2018.

19. **Regional Stratigraphy from Stereo Imaging near the Hypanis Fan Deposit: Marking the Extent of the Largest Delta on Mars?**
Jacob Adler, Tanya Harrison, Jim Bell, and David Mayer. American Geophysical Union (AGU) Fall Meeting, New Orleans, LA, 2017.

20. **Fluvial Stratigraphy and Regional Volcanism at Hypanis Delta, Mars.**
Jacob Adler, Jim Bell, and Tanya Harrison. Lunar and Planetary Science Conference, The Woodlands, TX, 2017.

21. **Geologic Stratigraphy, Delta Morphology, and Regional History of Hypanis Delta, Mars.**
Jacob Adler, Jim Bell, Nick Warner, Peter Fawdon, Sanjeev Gupta, Elliot Sefton-Nash, Peter Grindrod, and Joel Davis. American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, 2016.

22. **SHARAD Radargram Analysis Tool Development in JMARS.**
Jacob Adler, Saadat Anwar, Scott Dickenshied, and Shay Carter. Sixth International Conference on Mars Polar Science and Exploration, Reykjavik, Iceland, 2016.

23. **JMARS Software Development for NASA's 2035 Human Landing Site Assessment.**
Jacob Adler, Jonathon Hill, Julie Mitchell, Phil Christensen, Saadat Anwar, Scott Dickenshied, and Shay Carter. Lunar and Planetary Science Conference, The Woodlands, TX, 2016.

24. **The Hypanis Fluvial-Deltaic-Lacustrine System in Xanthe Terra: A Candidate Exploration Zone for the First Human Landing on Mars.**
Sanjeev Gupta, Elliot Sefton-Nash, Jacob Adler, Melissa Rice, Peter Fawdon, Nick Warner, Peter Grindrod, Joel Davis, Matt Balme, Jim Bell, Chad Stetson, and Jim Richard. First Landing Site/Exploration Zone Workshop for Human Missions to the Surface of Mars, Houston, TX, 2015.

25. **Stratigraphic Analysis of Phyllosilicate and Hydrated Sulfate Deposits Across the Margaritifer-Meridiani Boundary.**
Jacob Adler and Jim Bell. American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, 2014.

26. **Mineralogic Stratigraphy and Depositional Environment in Miyamoto Crater, Mars.**
Jacob Adler and Jim Bell. The Eighth International Conference on Mars (Mars 8), Pasadena, CA, 2014.

27. **Computing the Diurnal Yarkovsky Drift Rate for a Shape Model.**
Jacob Adler, David Paige, and Hilke Schlichting. Lunar and Planetary Science Conference, The Woodlands, TX, 2013.

28. **A New Approach for Computing Yarkovsky Forces on Asteroids.**
Jacob Adler and David Paige. Division of Planetary Sciences (DPS) of the American Astronomical Society Annual Meeting, Reno, NV, 2012.

Dissertation, Books, and Book Chapters

29. **The Geologic History of the Hypanis Deposit, Mars; and Ballistic Modeling of Lunar Impact Ejecta.**
Jacob Adler. Ph.D. Dissertation in Geological Sciences, Arizona State University, 2019.

TECHNICAL PRESENTATIONS AND PUBLIC TALKS

1. "Unsupervised Cluster Mapping of the Cucomungo Alluvial Fan, and Implications for Mapping Fans on Mars" Presentation at American Geophysical Union (AGU) Fall Meeting, New Orleans, LA, 2021.
2. "Deltas on Mars: Jezero and Hypanis" Presentation at Georgia Tech, Planetary Science & Astrobiology Seminar, Atlanta, GA, 2021.
3. "Remote Sensing of the Hypanis Deposit, Mars" Presentation at Areté Associates, Northridge, CA, 2020.
4. "Hypervelocity Impact Simulations and Experiments" Presentation at Hopkins Extreme Materials Institute, Baltimore, MD, 2019.
5. "New Insights into the History of Water on Mars" Public Dissertation Talk at The School of Earth and Space Exploration, Tempe, AZ, 2019.
6. "Using Thermal Inertia to Investigate the Hypanis Deposit along the Chryse Escarpment Mars." Presentation at The Thermal Emission Imaging System (THEMIS) Science Team Meeting, Tempe, AZ, 2018.
7. "Human Landing Site Selection Software Demonstration." Presentation at Planetary Geologic Mappers Meeting, Flagstaff, AZ, 2016.
8. "Geologic Stratigraphy, Delta Morphology, and Regional History of Hypanis Delta, Mars." Presentation at American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, 2016.
9. "JMARS 2035 for Human Missions to Mars." Presentation at NASA booth, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, 2016.
10. "JMARS 2035 Software Demonstration." Presentation at Space Resources Roundtable/Planetary & Terrestrial Mining Sciences Symposium, Golden, CO, 2016.
11. "The Hypanis Fluvial-Deltaic-Lacustrine System in Xanthe Terra: A Candidate Exploration Zone for the First Human Landing on Mars." Presentation at NASA's First Landing Site/Exploration Zone Workshop for Human Missions to the Surface of Mars, Houston, TX, 2015.
12. "Visible/Near-IR Spectroscopy and Planetary Applications." Presentation at The School of Earth and Space Exploration Graduate and Faculty Lecture, Tempe, AZ, 2015.
13. "Lunar Antipodal Melt Deposits from Tycho Crater Ejecta." Presentation at The Lunar Reconnaissance Orbiter Camera (LROC) Science Team Meeting, Tempe, AZ, 2014.

SKILLS AND PROFESSIONAL DEVELOPMENT

Remote Sensing

- Analysis of Mars satellite data including THEMIS, CTX, CRISM, HiRISE, MOLA, HRSC, SHARAD, MARCI
- Analysis of Mars rover data including Mastcam, Pancam, MAHLI
- Analysis of Lunar satellite data including LROC, LOLA, GRAIL
- Successfully targeted/acquired new HiRISE, CTX stereopair images and CRISM observations
- Analysis of Earth observation data including ASTER, TIMS, TM, Landsat, PlanetScope

Software

- UNIX
- ArcGIS, QGIS, JMARS
- JMARS tutorial videos, QuickTime, Google Earth

- IDL/Envi spectral processing software
- GDAL
- CRISM Analysis Toolkit (CAT), Adobe Photoshop
- Davinci image processing software (DV)
- Microsoft Excel, PowerPoint, Word
- Mac, Linux, and Microsoft Operating Systems
- Programming languages: C, C++, IDL, MATLAB, Fortran 77/95, Python, MySQL
- Jupyter Notebook, scikit-learn, numpy, pandas, matplotlib

Field Work

- Co-Led multiday field campaign at Cucomungo Canyon alluvial fan, Eureka Valley, CA (Death Valley National Park) including visible, thermal, multisprectral, and geomorphic analysis.
- Collected field samples of debris flow fans (Bishop, CA and Independence, CA) including RTK GPS use.
- DJI Phantom 4 drone mosaic data collection of Harvard Hills field camp site (Barstow, CA).
- Led remote sensing and ArcGIS project components of Federal Hill, MD investigation. Used gravimeter, seismometer, magnetometer, and ground penetrating radar to map buried fort and underground tunnels.
- Led airborne thermal infrared and orbital remote sensing analysis of Death Valley, CA.
- Collected field samples for NSF study "Noble Gases, Lower Mantle Structures, and the Origin of Ocean Island Basalts" (Oahu, HI)
- 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.
- Participated in Drone/sUAS Structure from Motion Workshop (ASU: April, 2019)

Lab

- Vis-NIR reflectance spectroscopy
- Laser ablation and solution intake Mass Spectrometer (Neptune, ICPMS)
- Telescopic research imaging

Software Development

- Managed production of JMARS 2035 software, created free tools and science data sets for NASA's human landing site proposers and public
- Created ellipse evaluation tools for NASA's Mars 2020 Rover landing site selection
- Science collaborator for SHARAD software development in JMARS

GRANTS AND AWARDS

Awarded: NASA Data Visualization Award and Travel Grant, Years: 2018

Awarded: NASA OSIRIS-REx Participating Scientist (Siegler), "3D Thermal Modeling of Asteroid Bennu", Role: unfunded collaborator, Years: 2017

Awarded: NASA Mars Program Office Travel Grant, International Conference on Mars Polar Science and Exploration, Iceland, Years: 2016

Awarded: ASU School of Earth and Space Exploration, Planetary Geology Research Grant, Years: 2015

Awarded: ASU Graduate and Professional Student Association Travel Grant, Years: 2014, 2016, 2016, 2017, 2018)

TEACHING EXPERIENCE

Courses

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

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

Students Advised

Graduate:
Sharissa Thompson (GT) 2021
Adam Martin (UMD) 2021
Undergraduate:
Abigail Russ (GT) 2021
Sara Cuevas-Quiñones (GT) 2021
Andrew Winhold (ASU) 2016
High School:
Aaron Villahermosa (JHU) 2019

Teaching Interests

Remote Sensing
Geology
Planetary Geomorphology
Planetary Field Camp
Geology of Mars
Astronomy
Astrophysics Lab

SERVICE

Professional and Research Service

- Reviewer, Journal of Geophysical Research: Planets (2021, 2022)
- Volunteer Contributor, NASA Mars 2020 rover participating scientist proposal (P.I. Lewis) (2020)
- Session Chair, "Sedimentary Volcanism, Diapirism, and Liquefaction in the Solar System" (P43F) session, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA (2019)
- Volunteer Contributor, Mars 2020 Rover Landing Site Workshops. Developed site evaluation rubric with others. Developed the online voting system. Compiled results (2015, 2017, 2018)
- NASA Proposal Review Panelist (2020, 2021)
- NASA Proposal Review Executive Secretary (2018, 2019)
- NASA Group Achievement Award, Diviner Team (2013, 2014)

Outreach

- **Tutor**, Prison Cells to PhD (P2P). I volunteer as a science tutor to formerly incarcerated individuals who enroll in continuing education (GED - Doctorate), Baltimore, MD (2020 - present)

- **Committee Member**, Equity, Diversity, and Inclusion (EDI) initiatives at JHU Earth and Planetary Science department. I served on three department committees: Postdoc Mentorship, Cultural Events, and Prison Education (2019 - 2020)
- **Mentor**, Big Brothers Big Sisters of Arizona. I served as a friend and mentor to a "little brother", and plan outings each month (2017 - 2019)
- **Instructor**, ASU Prison Education Programming. I volunteered as an instructor for an Earth and Space Exploration class at the adult Eyman Prison in Florence, AZ. Developed syllabus and lessons (2018 - 2019)
- **Committee Member**, ASU Earth Space Open House Committee. Served on committee as logistics manager (2016 - 2017)
- **Manager**, Telescope Manager for ASU Earth Space Open House. Taught astronomy and gave sky shows to the public (2013 - 2015)
- **President**, UCLA Undergraduate Astronomical Society. Taught astronomy to local kids and adults. Organized meetings, field trips, invited lectures, and outreach events (2012)
- **Volunteer**, UCLA Astronomy Live. Public outreach events for kids and adults. Organized Venus transit and solar eclipse viewing events (2012)
- **Coach**, Adult/youth ultimate frisbee teams. Taught strategy, sportsmanship, staying healthy. Volunteer as a coach for local teams and as an invited ambassador to high school students (2012 - present)