Leah E. Sacks

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Citizenship: United States of America

Summary Statement: Post-doctoral level geology and planetary science researcher with good communication skills at the Jet Propulsion Laboratory/California Institute of Technology with a focus on mission science, outer solar system geology, image processing, and change detection.

Education

PhD - Geology (Planetary Science) | 2025 | Western University, London, ON, CAN
Faculty advisor: Catherine Neish
Thesis Title: *Surface Processes on the Mid-Sized Moons of Saturn*

MSc. - Geology (Planetary Science) | 2021 | Western University, London, ON, CAN
Faculty advisors: Gordon Osinski and Livio Tornabene
Thesis title: *Hargraves Crater Ejecta and Implications for Impact Ejecta Processes*

BA - Geology | *cum laude* | 2017 | Carleton College, Northfield, MN
Senior Thesis Advisors: Cameron Davidson, Lauren Edgar, Christopher Edwards, Ryan Anderson
Senior Thesis Title: *Grain-Scale Methods and Paleoenvironmental Analysis of the Stimson Formation, Gale Crater, Mars*

Research Experience

NASA Jet Propulsion Laboratory Postdoctoral Research Fellow **May 2025 - Present**
Planetary Geology Group (322C)

- Explores Europa geology through change detection, image calibration, and mapping
- Produces data products from Galileo SSI, Juno JunoCam, and Voyager SSI images at scientific research quality levels
- Presents talks and posters at conferences to communicate science and spark discussion

Graduate Researcher – University of Western Ontario **September 2018 – March 2025**
Faculty advisors: Catherine Neish, Livio Tornabene, Gordon Osinski – 40 hrs/week

- Investigated canyon formation, surface features, and ice tectonics on Saturn's icy moon Tethys using image processing, mapping, and spatial statistics
- Explored impact ejecta processes on Mars using mapping, spatial data analysis, and comparative analog studies
- Assessed, selected, processed, and analyzed data from the Cassini Imaging Science Subsystem (ISS) and the Mars Reconnaissance Orbiter (MRO) High Resolution Imaging Science Experiment (HiRISE) and Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) instruments
- Produced 1 first author paper and 9 first author abstracts, co-author on 2 other papers and 5+ abstracts

Jet Propulsion Laboratory/California Institute of Technology **June 2023 – August 2023**
Mentors: Cynthia Phillips and Alex Patthoff, Summer Intern in Group 394D – 40 hrs/week

- Analyzed pairs of images for small scale surface changes over time to place limits surface processes on Enceladus
- Surveyed 5000 Cassini images for overlapping image pairs from different mission periods
- Processed 20 images by ingesting, calibrating, aligning, and co-registering them using ISIS3 and bash scripting

USGS Astrogeology Science Center, Flagstaff, AZ **June 2016 – August 2016**
Mentors: Lauren Edgar, Christopher Edwards, Ryan Anderson, Research Experience for Undergraduates (REU)

- Measured grain scale data from Mars Science Laboratory images of study rocks in Marias Pass
- Interpreted grain scale results in the context of team and published interpretations
- Exposed quantitative effects of the dust removal tool on grain-size analysis
- Assessed grain-scale data collection methods

Mission Experience

Europa Clipper Postdoctoral Affiliate **December 2025 - Present**
Project Science

- Supports the Project Scientist and Project Staff Scientists
- Compiles reports and information from team members
- Participates in multiple bi-weekly meetings regarding mission science and the Geology Thematic Working Group

Western University Skylark CubeSat Systems Team Lead **October 2023 – April 2025**
PI: Jayshri Sabarinathan, Western University – 1 hr/week

- Facilitated development of Mission and Systems level requirements
- Managed data/link and power budgets for the Skylark CubeSat
- Ensured physical and electrical compatibility of the CubeSat through Preliminary Design and Critical Design Reviews.

HiRISE Science and Operations Planning Volunteer **September 2018 – April 2025**
PI: Alfred McEwen (UA, LPL), Co-I Livio Tornabene – 80 hours + 0.5 hr/week

- Planned HiRISE cycle 339 as an operations volunteer with Livio Tornabene in October 2019
- Evaluated viability and priority of potential HiRISE targets in bi-weekly meetings
- Surveyed Mars for viable, valuable future targets integral to research work with Livio Tornabene

CanMoon Lunar Analog Mission **May 2019-August 2019**
Instrument Lead and Remote Sensing Team
Co-PIs: Dr. Gordon Osinski and Dr. Ed Cloutis, Western University – 80 hrs + 1hr/week

- Analyzed and investigated Landsat 9 and ASTER datasets ahead of the mission as part of the remote sensing team, using ENVI and ArcGIS
- Prepared and presented final datasets at landing site workshop, guiding participants in site selection
- Targeted the Vis-NIR ASD instrument for the field team to collect as part of the mission science team
- Processed and interpreted real time spectral data within visible and near infrared wavelengths in ENVI

Publications

- **Sacks LE**, Leonard EJ, Phillips CB, Lesage E. 2026. Constraining Europa's Surface Age with Change Detection. *Manuscript in Prep.*

- **Sacks LE,** Phillips CB, Patthoff DA, Bland MT, Hoppa GV, Neish CD, Leonard EJ. 2026. The First Evidence of Surface Change on Enceladus. *Manuscript in Prep.*

- **Sacks LE**, Tornabene LL, Osinski GR, Sopoco RM. 2022. Hargraves Crater Ejecta and Implications for Impact Ejecta Processes. Icarus. 375:114854.

- Edwards CS, Piqueux S, Hamilton VE, Fergason RL, Herkenhoff KE, Vasavada AR, Bennett KA, **Sacks LE**, Lewis K, Smith MD. 2018. The thermophysical properties of the Bagnold Dunes, Mars: Ground‐truthing orbital data. Journal of Geophysical Research: Planets.123(5):1307-26.

First Author Abstracts and Presentations

- **Sacks LE,** Leonard EJ, Phillips CB, Lesage E, Dejoie A. 2025. Understanding and Maximizing Utility of JunoCam Images at Europa. AGU Fall Meeting Abstracts. ***Withdrawn due to travel restrictions.***

- **Sacks LE,** Leonard EJ, Phillips CB, Lesage E, Dejoie A. 2025. Change Detection at Europa with Galileo SSI and JunoCam. Geological Society of America Abstracts.

- **Sacks LE,** Phillips CB, Patthoff DA, Bland, M, Hoppa G, Neish CD, Leonard EJ. 2025. Continued Exploration of Surface Changes at Enceladus During the Cassini Mission. Geological Society of America Abstracts.

- **Sacks LE,** Phillips CB, Patthoff DA, Bland, M, Hoppa G, Neish CD. 2024. Reflectance Changes Over Time on Saturnian Moons. Geological Society of America Abstracts. 56:405155. ***Invited Talk***

- **Sacks LE**, Phillips C, Patthoff A, Bland M, Hoppa G, Neish C. 2023. Change Detection on Enceladus. AAS/Division for Planetary Sciences Meeting Abstracts# 55 8:303-05.

- **Sacks LE**, Neish CD, Rhoden AR, and Ferguson SN. 2022. The Relationship Between Fractures and Impact Craters on Tethys. AGU Fall Meeting Abstracts*,* abstract P55G-1665.

- **Sacks LE**, Tornabene LL, Viviano CE, Voigt JR, Bishop JL, Lane MD, Loizeau D, Tirsch D. 2022. Evidence for Widespread Shallow Chlorite in Tyrrhena Terra, Mars. 53rd Lunar and Planetary Science Conference 2678:2820.

- **Sacks LE**, Neish CD, Rhoden AR. 2021. Canyon Formation on Charon and Tethys. AAS/Division for Planetary Sciences Meeting Abstracts#53 7: 106-05.

- **Sacks LE**, Tornabene LL, Osinski GR, McEwen AS, Sopoco RM. 2020. HiRISE Band Ratios and CRISM Spectral Results at Hargraves Crater. 51st Annual Lunar and Planetary Science Conference 2326:3014.

- **Sacks LE**, Tornabene LL, Osinski GR, Sopoco R, McEwen AS. 2019. Hargraves-Type Ejecta on Mars: Implications for Impact Ejecta Processes. 50th Annual Lunar and Planetary Science Conference. 2132: 2904.

- **Sacks LE**, Edgar LA, Edwards CS, Anderson RB. 2017. Grain Scale Analyses of the Murray and Stimson Formations Using Data from the Mars Science Laboratory Mars Hand Lens Imager and the ChemCam Remote Micro Imager. 48th Lunar and Planetary Science Conference. Abstract 2595

- **Sacks LE**, Edgar LA, Edwards CS, Anderson RB. 2016. Grain-Scale Analyses of Curiosity Data at Marias Pass, Gale Crater, Mars: Methods Comparison and Depositional Interpretation. AGU Fall Meeting Abstracts. Abstract P23B-2166.

Computer and Dataset Skills

- Proficient with: ArcGIS, ENVI Spectral analysis, ISIS3 image processing software, JMARS, Java and Python programming languages, bash scripting, Microsoft Office Suite, Adobe Illustrator, ImageJ

- Proficiency with: Galileo SSI (Solid State Imager), Juno JunoCam, Voyager SSI, Cassini ISS (Imaging Science Subsystem), HiRISE (High Resolution Imaging Science Experiment), CRISM (Compact Reconnaissance Imaging Spectrometer for Mars), CTX (Context Camera), ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer), Landsat 8, and ASD Vis-NIR spectral datasets

Community Service

- Session Chair: Geological Society of America (2025)
- Planetary Science Graduate Student Council Earth Science Representative (2021-22) and Secretary (2019-20)
- Graduate Geoscience Society Vice President (2021-22)
- Division for Planetary Sciences Local Organizing Committee (2022)
- Institute Director Search Committee (2021)

Mentorship:

- Graduate Sisters in Science (Women in Science) at Western University (3 undergraduate mentees – 2022-2025)
- Talaria (Women in STEM) via remote virtual mentorship (1 high school mentee – 2021)

Teaching Experience:

- Teaching assistantships in several courses, including Introduction to Geology, Tectonics, Life on Earth, Integrated Science, and a Planetary Surface Processes Field School

Other Interests:

- Crochet, Intramural Softball, Archery, Reading, Dance