

Cailin Gallinger

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Education

Doctor of Philosophy, Geophysics <i>University of Western Ontario</i>	May 2021—Present
Master of Science, Earth Sciences <i>University of Toronto</i>	Sept. 2017—Dec. 2018
Honours Bachelor of Science, Planetary Science <i>University of Toronto</i>	Sept. 2011—Apr. 2017

Honours and Awards

Nationally/Provincially Competitive:

Queen Elizabeth II Graduate Scholarship in Science and Technology	2021, 2022, 2023
NSERC Undergraduate Summer Research Award	2013

Internal:

University of Toronto School of Graduate Studies Conference Grant	2017
University of Toronto Center for Planetary Science Undergraduate Research Award	2016

Publications

Peer-Reviewed:

Powell, T. M., Horvath, T., Lopez Robles, V., Williams, J.-P., Hayne, P. O., **Gallinger, C. L.**, Greenhagen, B. T., McDougall, D. S., and Paige, D. A. (2023). High-Resolution Nighttime Temperature and Rock Abundance Mapping of the Moon Using the Diviner Lunar Radiometer Experiment With a Model for Topographic Removal. *Journal of Geophysical Research: Planets*, 128(2), e2022JE007532.
<https://doi.org/10.1029/e2022JE007532>

Byron, B. D., Elder, C. M., Williams, J.-P., Ghent, R. R., **Gallinger, C. L.**, Hayne, P. O., and Paige, D. A. (2022). Thermophysical Properties of Lunar Irregular Mare Patches From LRO Diviner Radiometer Data. *Journal of Geophysical Research: Planets*, 127(7), e2022JE007214. <https://doi.org/10.1029/2022JE007214>

Williams, J.-P., Pathare, A. V., Costello, E. S., **Gallinger, C. L.**, Hayne, P. O., Ghent, R. R., Paige, D. A., Siegler, M. A., Russell, P. S., and Elder, C. M. (2022). The Effects of Terrain Properties Upon the Small Crater Population Distribution at Giordano Bruno: Implications for Lunar Chronology. *Journal of Geophysical Research: Planets*, 127(5), e2021JE007131. <https://doi.org/10.1029/2021JE007131>

Conference Abstracts:

Gallinger, C. L., Neish, C. D., and Tolometti, G. (2022). Re-analysis of the Surveyor 7 landing site with multi-wavelength synthetic aperture radar and thermal infrared observations. *AAS Division for Planetary Science Fall Meeting*, 54(8), abstract #316.05. **[poster]**

Williams, J.-P., **Gallinger, C. L.**, Hayne, P. O., Paige, D. A., Pathare, A. V., and Costello, E. S. (2021). The diversity of lunar ejecta materials at Giordano Bruno crater derived from LRO Diviner observations. *52nd Lunar and Planetary Science Conference*, abstract #1791. **[poster]**

Allen, C., Ghent, R. R., **Gallinger, C. L.**, and Paige, D. A. (2021). Lunar regolith evolution rates derived from thermophysical properties. *52nd Lunar and Planetary Science Conference*, abstract #2456. **[poster]**

Gallinger, C.L., and Ghent, R. R. (2020). Thermophysical characteristics and evolution of regolith on lunar impact melts. *51st Lunar and Planetary Science Conference*, abstract #1739. **[talk]**

Gallinger, C. L., and Ghent, R. R. (2018). Preliminary analysis of lunar impact melt thermal signatures. *49th Lunar and Planetary Science Conference*, abstract #2910. **[poster]**

Gallinger, C. L., and Ghent, R. R. (2016). A pyroclastic origin for cones in Isidis Planitia: 2. Estimation of runout lengths and preliminary thermal calculations. *47th Lunar and Planetary Science Conference*, abstract #2767. **[poster]**

Gallinger, C. L., and Ghent, R. R. (2015). A pyroclastic origin for cones in Isidis Planitia: 1. Physical modelling and constraints. *46th Lunar and Planetary Science Conference*, abstract #2502. **[poster]**

Gallinger, C., and Pysklywec, R. N. (2013). Mantle control of thrust fault location in the lithosphere of Io: implications for mountain formation. *American Geophysical Union Fall Meeting*. **[poster]**

Mission Involvement

Lunar Reconnaissance Orbiter:

Participated in selection of targets for special observation campaigns on the science teams of both instruments, as well as synthesizing past research and remaining open questions to write a section of the mission's 5th Extended Science Mission (ESM5) proposal

Miniature Radio Frequency (Mini-RF)

May 2021—Present

- Attending bi-weekly telecons and yearly team meetings, participating in targeting discussions, and collaborating on model development to help interpret instrument data

Diviner Lunar Radiometer Experiment (Diviner)

May 2017—Present

- Attending bi-monthly virtual team meetings, participating in target selection for special observation campaigns, developing scripts to process raw data into useful reduced products (e.g. bolometric temperature), and collaborating on model development to produce high-level derived products (e.g. rock abundance)

Research Experience

M.Sc. thesis: *Thermophysical properties and evolution of regolith on lunar impact melts*

- Mapped impact melt deposits around craters on the Moon using GIS software (ArcGIS, JMARS), collected and processed remotely-sensed raw thermal radiance data to calculate nighttime surface temperatures, and fit

these temperatures to thermal models with varying subsurface thermophysical properties, thus obtaining relationships of how these properties evolve with crater age

B.Sc. thesis: *Constraining the feasibility of a pyroclastic flow origin for enigmatic cones in Isidis Planitia, Mars*

- Simulated pyroclastic flows in MATLAB using 2D box models to estimate maximum runout lengths, modelled cooling rate and maximum size of phreatic eruptions in the resulting deposits, and analyzed orbital data to compare these models to observed geomorphological and geophysical evidence

Undergraduate summer research project: *Mantle convection and surface tectonics of Io*

- Simulated mantle convection in Jupiter's moon Io using the Dalhousie University Geodynamics Group's 2D Lagrangian-Eulerian code SOPALE, comparing the resulting modelled wavelength of surface features to the observed spacing of Io's mountains

Teaching Experience

Teaching Assistant, University of Western Ontario:

ES2232: Exploring the Planets Jan. 2023 – Apr. 2023

- Assisted students in completing labs that used specialized software, provided feedback to students on final reports about a specific spacecraft mission, edited and updated lab background and instruction documents for the course

ES1022: Earth Rocks Jan. 2022 – Apr. 2022

- Taught mineral identification, petrologic classification, introductory geologic mapping and structure using a combination of online and in-person techniques

Teaching Assistant, University of Toronto:

ESS103/ESS104: Geology in Public Issues/Controversial Topics Sept. 2017 – Dec. 2017
in Earth Science

- Guided students in planning and writing a research report into a controversial topic in earth science including a literature review, writing assistance, and final evaluation of conference-style poster presentations

ESS261: Earth Evolution Jan. 2014 – Apr. 2014

- Ran the course lab section, teaching students to identify major families of ancient organisms, associate them with particular geologic periods, and understand the relationship between organisms and their environment

Professional Service and Outreach

Guest Speaker – Astronomy in Action Space Rangers Summer Camp Jul.—Aug. 2021

- Designed a 2-hour interactive virtual presentation for children from ages 5-12, incorporating historical context and modern visualization platforms to engage campers in understanding the celestial and personal significance of the Moon

Host – Ontario Science Centre Apr. 2019—Apr. 2021

- Delivered demonstrations on fundamental scientific concepts and recent science stories, including development of virtual content for online audiences in the form of videos, live broadcasts, and educational resources for home activities

Executive Secretary – NASA Grant Proposal Review Panel

2020

- Contributed external reviews of several research proposals, in addition to organizing panelist review schedules, tracking and tallying votes on proposal merits, and following up with panelists to ensure adequate feedback for proposal authors

Presenter – Solar System Social

2018

- Gave accessible talks on personal research projects and recent advances in solar system science to mixed adult audiences

Organizer – International Observe the Moon Night

2016

- Presented a talk about Permanently Shadowed Regions (PSRs) of the Moon to a general public audience including adults and children, in addition to setting up and facilitating interactive VR experiences and telescope viewing and promoting the event on social media