

Caleb Strom

EDUCATION

Doctor of Philosophy in Aerospace sciences Dec. 2024

University of North Dakota (UND), Grand Forks, ND

Dissertation title: Causes of the Morphological Distinctiveness of Ahuna Mons and Differences in Cryovolcanic Styles on Ceres and the Inner Uranian Satellites Miranda and Ariel

Master of Science in Geological Sciences May 2019

California State Polytechnic University-Pomona (CPP), Pomona, CA

Bachelor of Science in Earth Science June 2016

University of California-San Diego (UCSD), La Jolla, CA

PUBLICATIONS

Strom, C., Nordheim, T. A., Patthoff, D. A., & Fieber-Beyer, S. K. (2026). Constraining ocean and ice shell thickness on Ariel from surface geologic structures and stress mapping. *Icarus*, 116822.

Strom, C. A., Nordheim, T. A., Patthoff, D. A., Fieber-Beyer S. K. (2024). Constraining ocean and ice shell thickness on Miranda from surface geological structures and stress modeling. *Planetary Science Journal*, 5(10), 226.

Phelan, N., Day, J. M., Dhaliwal, J. K., Liu, Y., Corder, C. A., **Strom, C.**, ... & Moynier, F. (2022). A 187Re-187Os, 87Rb-87Sr, highly siderophile and incompatible trace element study of some carbonaceous, ordinary and enstatite chondrite meteorites. *Geochimica et Cosmochimica Acta*, 318, 19-54.

EXPERIENCE

NASA Postdoctoral Fellow at Jet Propulsion Laboratory September 2026-Present

- Using GIS and Voyager 2 data to construct geologic maps of the Neptune's moon Triton
- Using Python-based numerical models to create tidal stress models to test hypotheses related to the formation of structural features on icy moons.

Co-Founder of Other Minds Lab August 2026-Present

Other Minds Lab, San Francisco, CA

- Scientific advisor for diverse intelligences lab using the tools of planetary science to detect technosignatures

Independent Researcher in Planetary Surface Anomaly Detection January-August 2026

Xenarch Labs, San Francisco, CA

- Designed and trained a convolutional VAE in PyTorch on a curated dataset of natural planetary geology; model flags statistically anomalous surface features for human review, including data preprocessing (GDAL), model training, anomaly scoring, and a web dashboard UI; deployed on AWS
- Developed for extraterrestrial technology detection and resource detection; applicable to resource exploration, planetary science, and geospatial change detection

LLM Geospatial Training Data Curator & Prize winner 28 Mar 2026

Multimodal Frontier Hackathon, San Francisco, CA

- Curated and structured geospatial datasets to improve LLM deep research performance; built assistant UI that won the hackathon UI prize

Medical Trial Patient-Matching VAE & Aerospike Prize Winner 27 March 2026

Deep Agents Hackathon, San Francisco, CA

- Built VAE-based recommendation model to match patients with eligible clinical trials from structured intake data; won technical implementation prize

Research Scientist Intern June 2022-April 2024

Jet Propulsion Laboratory (JPL), Pasadena, CA

- Used Python-based geophysical modeling pipeline to map ~100 tectonic surface features (ridges and canyons) on Uranian moons from Voyager 2 imagery; model validated against observed feature distributions, identifying plausible ocean and ice-shell formation mechanisms; findings published in two peer-reviewed journals (*Icarus* 2026, *PSJ* 2024)

- Collaborated with senior research scientists and engineers in a multidisciplinary team environment, delivering results on NASA project timelines

North Dakota Space Grant Fellow Sept.-Dec. 2024

Department of Space Studies, UND, Grand Forks, ND

- Built ArcGIS Pro and Python pipeline to process and clean geospatial datasets; produced distribution maps of 22 cryovolcanic domes on dwarf planet Ceres from orbital imager
- Performed statistical correlation analysis on dome age and viscosity data, finding evidence for heterogeneous ice content; results presented at 2024 GSA conference

Graduate Research Assistant Sept. 2019-May 2022

Department of Space Studies, UND, Grand Forks, ND

- Operated the SpeX spectrograph on NASA's Infrared Telescope Facility (IRTF) to collect NIR spectroscopy data on 12 asteroids; applied spectral analysis pipeline to classify asteroid compositions
- Processed and analyzed multi-instrument spectral datasets using Python; results presented at 2022 scientific conference

Graduate student researcher May 2017-May 2019

Department of Geological Science, CPP, Pomona, CA

- Built ArcGIS-based geospatial model comparing rock glacier distributions in the Sierra Nevada and Mars; ingested and co-registered altimetry data (MOLA/Mars Global Surveyor) with satellite imagery
- Identified statistically significant correlation between headwall steepness and rock glacier runout length; presented findings at the Lunar and Planetary Science Conference (2018)

PROFESSIONAL ACTIVITIES

NAU Planetary Geologic Mapping Workshop 23 June-1 July 2022

Flagstaff, AZ

- Worked with 12 other graduate students to create individual GIS-based maps of volcanic terrain near Flagstaff, AZ based on imagery data.

JPL Planetary Science Summer school 11 May-4 Aug. 2023

Pasadena, CA

- Worked with engineering team on mission proposal as science team lead to select instruments for collecting geologic imagery and spectroscopy data and guided team to consensus on instruments proven to be effective on previous missions
- Co-drafted geology science goals section for mission proposal in under 10 weeks and made the scientific case based on literature review and documentation of key instruments.

Cyber-Archaeology Field School 1-11 Aug. 2015

Delphi, Greece

- Acquired expertise in geophysical remote sensing methods (magnetometry and ground penetrating radar), applicable to geophysical remote sensing

SKILLS

ML & Data Science: PyTorch, Convolutional VAE, Unsupervised anomaly detection, CNNs, DBSCAN, scikit-learn, NumPy, SciPy, Multi-metric scoring pipelines, Cross-platform model validation

Geospatial & Remote Sensing: ArcGIS Pro, GDAL, Satellite imagery / raster analysis, Planetary geologic mapping, Remote sensing (visible, NIR), GIS data processing

Engineering & DevOps: Python, Git/GitHub, Docker, Linux/Bash, SQL (basic), AWS (EC2/S3), Jupyter

Scientific Computing: Numerical geophysical modeling, Tidal stress modeling, NIR spectroscopy, Statistical model fitting (chi-squared, null hypothesis testing)

EXTRACURRICULAR AND VOLUNTEER EXPERIENCE

Aerospace Community Day 2022, 2025

- Learned science communication skills by presenting on Space Studies department meteorite collection and contents of spacesuit lab to visitors at the University of North Dakota

Dakota Space Society at the University of North Dakota 2020-2024

- Established organizational norms as society president, including regular meeting times, events, and times to welcome new members
- Organized and delegated teams for events, including a trip to view the 2024 solar eclipse

