

# Thomas Subak

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## Education

**Northwestern University**, Evanston, IL

Doctor of Philosophy

Department of Earth and Planetary Sciences, Advisor: Elvira Mulyukova

GPA: 3.87/4.00

**Colgate University**, Hamilton, NY

Bachelor of Arts, May 2023, *summa cum laude*

Major: Astrogeophysics (with honors); Minor: Mathematics

GPA: 3.64/4.00 Major GPA: 3.74/4.00

Dean's Award for Academic Excellence (3), with Distinction (3)

**National University of Singapore Approved Exchange Program**, Spring 2022

Independent semester of study at the National University of Singapore with coursework in physics and mathematics.

## Research Experience

**Senior Undergraduate Thesis**, Spring 2023

Colgate University, Department of Earth and Environmental Geosciences

*Volumetric Analysis of Martian Chaos Terrain*, Advisor: Joe Levy

Continuation of Mars focused summer research project. Used ArcGIS to map surface features and interpolate volume data of Martian chaos. Analyzed and visualized the data using R in conjunction with literature to investigate formation processes.

**Research Assistant**, Summer 2022

Colgate University, Department of Earth and Environmental Geosciences

*Water Tracks in McMurdo Dry Valleys/Martian Chaos Mapping*, Advisor: Joe Levy

Studied Antarctic dirt samples to better understand meltwater processes relating to water tracks. Filtered, diluted, and tested samples before using Ion Chromatography to test the effect of cation exchange on the brine. Used R to examine the relationship between organic matter, soluble salt data collected from IC and ICP-Mass Spectrometer, and electrical conductivity. Used ArcGIS to map chaos features on Mars. Analyzed datasets with R for the objective of determining the formation process.

**UROPS Student Researcher**, Spring 2022

National University of Singapore, Centre for Quantum Technologies, Quantum Optics Group

*Seismic Sensing with Deployed Optical Fibers*, Advisor: Christian Kurtsiefer

Designed and constructed a simple Michelson interferometer to better understand how interferometry could improve oceanic seismometry. Background lit review of approximately thirty textbooks and

articles to better understand optical concepts and practical applications. Weekly journal club with group to discuss modern optical concepts in-depth and strategize group project direction.

***Research Assistant***, Summer 2020

Colgate University, Department of Earth and Environmental Geosciences

*Seismicity in Alaskan Subduction Zones*, Advisor: Aubreya Adams

Analyzed geophysical data using MATLAB to map large scale earthquakes and study their relationship to subduction zones. Read papers and proposals for an exploration of academic research processes.

## Teaching Experience

***Teaching Assistant (Phys 111)***, Fall 2021

Colgate University, Department of Physics and Astronomy

Administered group peer tutoring sessions of 10 students once a week. Emphasized collaborative learning through problem sets for greater understanding of course material.

***Mathematics Tutor***, Fall 2021, Fall 2022

Colgate University, The Center for Learning, Teaching, and Research

Assisted students individually with coursework from calculus, linear algebra, and number theory.

## Science Outreach and Engagement

***Student Ambassador***, Spring 2021-Fall 2023

American Physical Society

Connect directly with campus students to spread information about APS and opportunities it provides. Strategize with team on how to promote opportunities to pursue diversity, equity, and inclusion goals.

***Co-Founder and Co-President***, Fall 2021-Spring 2023

Colgate University, Colgate Student Society for Atomic, Molecular, and Optical Physics

Plan organization and meetings with the goals of educating and spreading enthusiasm about Atomic, Molecular, and Optical Physics to students of both scientific and non-scientific academic backgrounds.

## Technical Skills

***Programming Languages:*** Advanced proficiency in Matlab, proficient in R and some proficiency in Python (with Machine Learning experience in Python).

***Software:*** Proficient in LaTeX, ArcGIS, and Microsoft Office.

***Laboratory:*** Experience with diamond anvil cells, raman spectroscopy, X-Ray diffraction, EDM drilling of gaskets, thin-section polishing, and sample analysis through mass spectrometry.

## Publications

I.C. King, J.T.E. Johnson, L. Kuang, S. Naylor, **T. Subak**, A.M. Koleszar, J.S. Levy; Brine formation in cold desert, shallow groundwater systems: Antarctic Ca-Cl brine chemistry controlled by cation exchange, microclimate, and organic matter. *GSA Bulletin* 2024; doi: <https://doi.org/10.1130/B37251.1>