

Wesley S. Tucker

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Lunar and Planetary Laboratory | Kuiper Space Sciences Building
The University of Arizona

EDUCATION

Ph.D. Earth and Environmental Sciences | Planetary Geoscience Sept. 2023
University of Illinois Chicago Chicago, IL
Dissertation: *Hot and Cold Topography: Volcanic Processes on Venus and Airy Isostasy in Icy Shells of Ocean Worlds*
GPA: 4.0 | Advisor: Andrew Dombard, Ph.D.

B.Sc. Geology | Minor: Astronomy 2017
College of Charleston Charleston, SC
Summa Cum Laude

EMPLOYMENT

Postdoctoral Research Associate May 2024 – Present
Lunar and Planetary Laboratory, The University of Arizona

Visiting Lecturer Jan – May, 2024
University of Illinois Chicago
Earth and Environmental Sciences 111 – Earth, Energy, and the Environment

PUBLICATIONS

Tucker, W. S. & Dombard, A. J. (2024). Spherical-Harmonic Distribution Analysis of Coronae in Relation to Volcanic Features on Venus. *Journal of Geophysical Research: Planets*. 129, e2023JE008219. <https://doi.org/10.1029/2023JE008219>

Tucker, W. S. & Dombard, A. J. (2023). On the More Complex Wavelength Dependency of Airy Isostasy in Icy Shells of Ocean Worlds. *Geophysical Research Letter*, 50, e2023GL106046. <https://doi.org/10.1029/2023GL106046>

Tucker, W. S. & Dombard A. J. (2023). Evidence of Topographic Change Recorded by Lava Flows at Atete and Aruru Coronae on Venus. *Journal of Geophysical Research: Planets*. 128, e2023JE007991. <https://doi.org/10.1029/2023JE007971>

Dombard, A. J., **Tucker W. S.**, Joniak, R., Plotnick, R. E. (2022). **Spherical multi-lacunarity reveals possible equatorial-polar differences in crater densities on the dwarf planet Ceres.** *Icarus*. 384. 115076. <https://doi.org/10.1016/j.icarus.2022.115076>

Pasterski, M. J., ..., **Tucker, W. S.**, et al. (2020). **Aquatic landscape change, extirpations, and introductions in the Chicago Region.** *Urban Ecosystems*. 23, 1277-1288. <https://doi.org/10.1007/s11252-020-01001-6>

Tucker, W. S. & Dombard, A. J. **Spherical-harmonic distribution analysis of coronae in relation to volcanic features on Venus.** *In preparation*.

PRESENTATIONS

Tucker W. S., & Dombard, A. J., (2023). **Topographic Support in Icy Shells of Ocean Worlds: Investigating Wavelength Dependence of Airy Isostasy.** *54th Lunar and Planetary Science Conference*. Abstract 1262. ([Link to poster](#))

Tucker W. S., & Dombard, A. J. (2022). **Topographic Change at Coronae on Venus Recorded by Lava Flows.** *53rd Lunar and Planetary Science Conference*. Abstract 1445. (Oral Presentation).

Tucker, W. S., & Dombard, A. J. (2020). **Topographic Change Recorded by Lava Flows at Coronae on Venus: Evidence of Evolutionary Complexity.** *51st Lunar and Planetary Science Conference*. Abstract 2040. (Conference canceled).

Chadwick, J., **Tucker, W. S. (presenter)**, Fink, S., Waring, B. & McGovern, P. (2017). **Misalignment of Lava Flows from Topographic Slope Reveals Amazonian Uplift of Arsia Mons, Mars.** *48th Lunar and Planetary Science Conference*. Abstract 2713.

Tucker, W. S. & Sautter, L. (2017). **Campeche Escarpment Submarine Canyon Geomorphic Characterization.** *U.S. Hydrographic Conference*.

RESEARCH EXPERIENCE

- **Topographic support in icy shells of ocean worlds**
 - Simulated the evolution of topography on the surface and at the base of the ice shell using finite element analysis. Systematically tested the plausibility of Airy isostasy as a mechanism for topographic support, from local to hemispherical wavelengths, under varied surface and subsurface thermal conditions.
- **Spherical harmonic analysis of Venusian volcanic features**
 - Analyzed corona and volcano datasets and subsets using geospatial statistics and spherical-harmonic distribution to assess their relationship to continuous data (e.g., gravity

- and topography). Applied geospatial relationships to potential subsurface global heat and mantle flows.
- **Evolution of coronae on Venus through analysis of volcanic flows**
 - Mapped digitate and lobate lava flows associated with volcano-tectonic features and analyzed their topography using Magellan synthetic aperture radar and altimetry data in GIS software. Formulated a technique to compare the orientation of linear surface features to regional slope direction.
 - **Spatial analysis of crater densities on Ceres**
 - Applied kernel density, lacunarity (a statistical technique that assesses 'gappiness' of mapped data at several spatial scales), and crater count statistics to explore the apparent variation in the crater distribution of the equatorial and polar regions on Ceres.
 - **Lithospheric flexure associated with volcanic flows at Arsia Mons, Mars**
 - Performed mapping and geospatial analysis of long lava flows in the plains surrounding Arsia Mons using Mars Reconnaissance Orbiter Context Camera (CTX) images. Identified directional divergence from azimuthal orientation of lava flows versus downhill direction. Applied crater statistics to constrain the age of deformation associated with the reorientation of the lava fields adjacent to Arsia Mons.
 - **Characterization of submarine canyons in the Gulf of Mexico**
 - Developed quantitative indices for morphologic characteristics of submarine canyons from high-resolution, multibeam sonar bathymetric data derived from multibeam sonar for a detailed analysis of formation mechanisms.

TEACHING EXPERIENCE

- 2017 – 2023 **Teaching Assistant/Lab Instructor**
University of Illinois Chicago
EAES 101 – Global Environmental Change, EAES 111 – Earth, Energy and the Environment, EAES 200 – Field Work in Missouri, EAES 350 – Sedimentary Environments, EAES 470 – Geomorphology
- 2017 – 2023 **Guest Lecturer**
University of Illinois Chicago
Delivered lectures in Earth and Environmental Science, catering to both introductory (> 150 students) and advance levels (~ 30 students), encompassing a range of geoscience topics.
- 2015 – 2017 **Teaching Assistant**
College of Charleston
GEOL 105 – Earth History, GEOL 257 – Marine Geology, GEOL 272 – Stratigraphy and Sedimentation

PROFESSIONAL EXPERIENCE

- 2022 **Graduate Assistant**
University of Illinois Chicago
Effectuated an organized catalog and classification system for the Department of Earth and Environmental Sciences' mineral and rock collection.
- 2019 **Graduate Assistant**
University of Illinois Chicago
Initiated, designed, and administered a website for the UIC Geopaths program to facilitate the introduction of geoscience disciplines to urban students. Advised undergraduate students on their role as mentors to local high school and community college students, thereby expanding the program's reach. Orchestrated and edited video interviews with Earth and Environmental Sciences alumni to provide career insights to prospective students.
- 2015 – 2017 **Museum Docent**
Mace Brown Museum of Natural History, College of Charleston
Conceptualized and implemented educational guided tours on a spectrum of natural history disciplines such as paleontology, geology, and biology, catering to a diverse audience comprising museum visitors and primary school classes.

SKILLS

Geographic Information Systems and Remote Sensing Software

ESRI ArcGIS, ERDAS Imagine, ENVI

Finite Element Analysis

Hexagon Marc/Mentat Nonlinear FEA Solver

Coding Languages

Python, R, Fortran

Microsoft Office Suite and Adobe CC Suite

Illustrator, Photoshop, InDesign, Premiere

AWARDS & HONORS

- 2023, 2022, 2020 **LAS Travel Award** – *University of Illinois Chicago*
- 2019, 2018 **Graduate Research Fellowship** – *Space Grant Consortium*
- 2018 **National Association of Geoscience Teachers Outstanding TA Award**– *University of Illinois Chicago*
- 2017 **BEAMS Research Program Award** – *College of Charleston*
- 2017 **Departmental Honors in Geology and Environmental Geosciences** – *College of Charleston*

- 2017 **Outstanding Student Award in Geology and Environmental Geosciences –**
College of Charleston
- 2016 **Royal A. Hartenberger Award in Geology –** *College of Charleston*
- 2014 – 2017 **Presidential Honors: Highly Distinguished –** *College of Charleston*

OUTREACH & SERVICE

Undergraduate Research Mentor

Modelling topographic support of Picard Mons, Pluto

Executive Secretary, Leveler

Science Review Panels for NASA Mission Data Analysis Proposals and Mission Proposals.

Planetary Geology Teaching Day

Chicago Montessori School

Interview a Grad Student

Terra Society, EAES, University of Illinois Chicago

Astronomy Dat at Charleston Riverdogs

Astronomers without Borders

Geology Day!

College of Charleston, Department of Geology and Environmental Geosciences

MEMBERSHIPS & AFFILIATIONS

American Geophysical Union

Geological Society of America

National Earth Science Honor Society