

M. Colin Marvin

Earth and Planetary Surface Processes Lab, Stanford University

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EDUCATION

2021-Present Stanford University, **Doctoral Candidate**, Earth and Planetary Sciences
Stanford, CA **Advisor**, Dr. Mathieu Lapôtre
Expected Graduation: June 2026

2017-2021 Arizona State University, **Bachelor of Science (Honors)**, Geography
Tempe, AZ, May 2021 **Minor**, Mathematics
Magna Cum Laude **Certificate**, Geographic Information Science

Thesis: “Disturbance signatures and sediment characteristics in aeolian dune landscapes”

Committee: Drs. Ian Walker (Supervisor), Ron Dorn, and Mark Schmeckle

RESEARCH INTERESTS

I am interested in understanding the record of surface processes recorded at all scales, from individual grains of sand (surface textures) to dune field patterns, from deep time until present on Earth and other planetary bodies in the Solar System. Techniques to conduct my research include scanning electron microscopy (SEM), remote sensing (aerial and satellite), geographic information systems (GIS), and experiments.

AWARDS AND HONORS

2021 **Dean’s Medal** - School of Geographical Sciences and Urban Planning, Arizona State University, Spring 2021.

2017-2020 **Dean’s List Scholar** - Fall 2017, Spring 2018, Spring 2019, Spring and Fall 2020.

2019 **‘The College’ Student Leader** - Recognized as a distinguished student from the School of Geographical Sciences and Urban Planning as nominated by unit, chair, director, or faculty.

SERVICE AND COMMUNITY ENGAGEMENT

2023-Present **SESUR Mentor** – Working with Sustainability and Earth Summer Undergraduate Research (SESUR) student developing a foundation in sediment transport and geomorphology applied towards experimental sedimentology.

2022-2023 **Graduate Student Mentor** – Student mentor to first-year Geological Sciences graduate student. Providing professional and academic guidance.

2021-Present **Graduate Studies Committee** – Graduate student representative working with the Department Chair, Director of Graduate Studies, and department administrative staff to address student’s concerns regarding graduate student curriculum.

2019-Present **Member: Gamma Theta Upsilon** - National Honor Society in Geography

Peer Reviewer: *Aeolian Research, The Geographical Bulletin.*

TEACHING

2023 **GEOLSCI 120/220 – Planetary Surface Processes: Shaping the Landscape of the Solar System (TA)**, *Stanford University* – Course assistance, grading, and peer mentorship of undergrad/grad students looking to expand their knowledge of endo- and exogenous landscape-shaping processes across the Solar System.

2022 **GEOLSCI 180/280 - Magmatic and Eruptive Processes (TA)**, *Stanford University* – Field trip planning, transportation, and logistics for Fall 2022. Ensured inclusive and safe environment for undergrad/grad students on three overnight and day trips. Development of geologic maps and supplementary materials.

2018-2021 **GPH 112 - Physical Geography Lab (Peer Mentor)**, *Arizona State University* - Development of material and learning aids for in-person and online sections, in-class lecturing, support for graduate TAs, and tutoring outside of class for 9 semesters (Fall/Spring/Summer, 2018-2021).

PROFESSIONAL AND RESEARCH EXPERIENCE

2021 **Project Lead, NASA DEVELOP Program**, *Science Systems and Applications (SSAI), Pocatello, ID* – Led a team of five that collaborated with Assateague Island National Seashore and the US Army Corps of Engineers utilizing Landsat 5/7/8 and Sentinel-2 Earth observations. Created time series maps of sediment transport, habitat suitability, and habitat forecasting. Ten-week project from June to August 2021.

2021 **Intern**, *Arizona State University, Summer Undergraduate Research Internship (SURI), Tempe, AZ* – Collaborative project with the US Army Corps of Engineers and The Nature Conservancy characterizing hydrologic alterations of the Roanoke River in using statistical methods in R. Eight-week project from May to July 2021.

2021 **Team Member, NASA DEVELOP Program**, *Science Systems and Applications (SSAI), Tempe, AZ* – Providing the City of San Diego with data and toolsets to address the impacts of the urban heat island. Employing the InVEST urban cooling model and a vulnerability assessment. Deriving and processing NASA raster layers

(i.e., albedo, land surface temperature, land use) from Landsat 8 and ECOSTRESS on Google Earth Engine. Ten-week project from January to April 2021.

- 2018-2021 **Research Assistant, Arizona State University** - Processing and analyzation of UAS and terrestrial laser scanning data for the development of DEMs and DSMs, particle size distribution of sediments, and wind tunnel maintenance. Assistance on field campaigns.
- 2019-2020 **Residential Peer Mentor, Arizona State University** - Planning interactive professional and academic development events specifically tailored for on-campus, upper-division Honors residents during the 2019/20 school year.

GRANTS AND FELLOWSHIPS

- 2023 **Earth and Planetary Sciences Travel Fund** - Travel grant for attending the American Geophysical Union (AGU) Fall 2023 meeting in San Francisco (\$500).
- 2023 **NASA Travel Grant** – For attending the ‘International Conference on Aeolian Research’ workshop in Las Cruces, New Mexico (July 2023) (\$2000).
- 2023 **McGee-Levorsen Fellowship** – Research fellowship to study the impacts of fluvial transport on detrital zircons (\$2300).
- 2022 **NASA Travel Grant** - For attending the ‘Optimizing planetary in-situ surface-atmosphere interaction investigations’ workshop in Boise, Idaho (June 2022) (\$1700).
- 2022 **NCALM Seed Grant** – 40 km² high-resolution lidar mapping of the Rice Valley dune-field from the National Center for Airborne Laser Mapping.
- 2021 **Geological Sciences Travel Fund** - Travel grant for attending the American Geophysical Union (AGU) Fall 2021 meeting in New Orleans (\$500).
- 2020 **Barrett Global Explorers Grant** - Travel grant to study disturbed coastal and inland dune sediments in Arizona, California, New Mexico, and Utah. Size, shape, and microtextures analysis (\$5,000).
- 2020 **Content Curation Fellow** - Summer fellowship curating and creating geography content for digital, solar powered learning libraries for SolarSPELL (\$4,000).
- 2019 **Urban Equity Initiative Fellowship** - Calculation of decadal migration rates for active dune fields from aerial and satellite imagery in the Navajo and Hopi nations (\$2,400).

PEER-REVIEWED PUBLICATIONS

- 2023 **Marvin, M.C.***, Lapôtre, M.G.A., Gunn, A., Day, M.D., Soto, A. (2023) Dune interactions record changes in boundary conditions, *Geology*.
<https://doi.org/10.1130/G51264.1>
- 2023 Hasson, M.*, **Marvin, M.C.**, Gunn, A., Ielpi, A. and Lapôtre, M.G.A. (2023), A depositional model for meandering rivers without land plants. *Sedimentology*.
<https://doi.org/10.1111/sed.13121>
- 2023 Heintzman, R.*, Brandi, A., Kelley, M., & **Marvin, M.C.** (2023) A Physical Geography Lab's Online Transition: Student and Instructor Insights Using iGEO Video Games during the Pandemic. *Journal of Geography*.
<https://doi.org/10.1080/00221341.2023.2216705>
- 2022 González, C.*, Kelley, M.*, **Marvin, M.C.***, López-Castañeda, N., Dorn, R. I., & Schmeeckle, M. (2022). Regional piedmont incision during base-level rise in the northeastern Sonoran Desert, Arizona, USA. *Physical Geography*, 43(1), 67-97. <https://doi.org/10.1080/02723646.2021.1934964>
- 2021 Shandonay, K.L., Moll, H., **Marvin, M.C.**, López-Castañeda, N., Kelley, M., Hilgendorf, Z., Heintzman, R., & Dorn, R. (2021). The Fieldwork of Shared Experiences. *The Geographical Bulletin*.
<https://www.gammathetaupsilon.org/the-geographical-bulletin/2020s/volume62-2/A/article7.pdf>
- 2021 Hilgendorf, Z.*, **Marvin, M. C.**, Turner, C. M., & Walker, I. J. (2021). Assessing Geomorphic Change in Restored Coastal Dune Ecosystems Using a Multi-Platform Aerial Approach. *Remote Sensing*, 13(3), 354. MDPI AG.
<http://dx.doi.org/10.3390/rs13030354>

PUBLICATIONS IN PROGRESS, REVIEW, OR REVISION

- 2024 **Marvin, M. C.***, Hilgendorf, Z., Turner, C. M., & Walker, I. J. (2024). Rebuilt foredune evolution in a high-energy coastal environment: a multi-decade remote-sensing approach. *Journal of Coastal Research*. (in prep).
- 2024 **Marvin, M.C.***, DeMeester, J.*, Schaffer-Smith, D., Muenich, R. (2024). Revisiting water management at Kerr Reservoir on the Roanoke River. *Journal of the Water and Climate Change*. (in prep).
- 2024 **Marvin, M.C.***, Bo, W., Radebaugh, J., Gunn, A., Day, M.D., and Lapôtre, M.G.A. (2024) Global analysis of dune patterns on Titan. (in prep).

NON-REVIEWED PUBLICATIONS

- 2021 **Marvin, M. C.***, Abbey, P., Mrazek, J., Weitzel, E., & Work, R. (2021). Assateague Island National Seashore Ecological Forecasting: Characterizing Nearshore Suspended Sediments and Landcover Change Relative to Sediment Bypassing and Catastrophic Events. NASA DEVELOP National Program.
- 2021 Dialesandro, J.*, Kruskopf, M., **Marvin, M. C.**, & Vargas, M. (2021). San Diego Urban Development: Utilizing NASA Earth Observations to Identify Drivers of Extreme Urban Heat and Generate a High-Resolution Vulnerability Index for Urban Planning and Climate Resiliency in San Diego, California. NASA DEVELOP National Program.

CONFERENCE PRESENTATIONS

First author (* presenting)

- 2023 **Marvin, M.C.***, Bo, W., Radebaugh, J., Gunn, A., Day, M.D., and Lapôtre, M.G.A. (2023). Global analysis of dune patterns on Titan. *AGU Fall Meeting 2023*, EP31D–2112.
- 2023 **Marvin, M.C.***, Lapôtre, M.G.A., Gunn, A., Day, M., and Soto, A. (2023). Dune interactions as an indicator of morphodynamic disequilibrium. *International Conference on Aeolian Research XI*, Abstract #324.
- 2023 **Marvin, M.C.**, Bo, W., and Lapôtre*, M.G.A. (2023). What can and cannot be learned from dune interactions on Titan from Cassini SAR images. *Titan Through Time VI*.
- 2022 **Marvin, M.C.***, Gunn, A., Day, M., and Lapôtre, M.G.A. (2022). Quantifying dune interactions on planetary surfaces: exploring pattern development dependence on environmental conditions. *7th International Planetary Dunes Conference*, Abstract #3023.
- 2022 **Marvin, M.C.***, Gunn, A., Day, M., and Lapôtre, M.G.A. (2022). Quantifying dune interactions on planetary surfaces: updated methodology and implications for dune pattern analyses. *53rd LPSC*, Abstract #1236.
- 2021 **Marvin, M.C.** (2021). Effectiveness of foredune restoration in high-energy coastal environments. *AAAS: Understanding Dynamic Ecosystems*. (2nd Place, Environment and Ecology).

Contributing author (* presenting)

- 2023 Hasson, M.*, **Marvin, M.C.**, Lapôtre, M.G.A. (2023). Determination of paleo-transport environments of sand grains using deep learning. *AGU Fall Meeting 2023*, EP31D–2112.
- 2023 Hasson, M.*, **Marvin, M.C.**, Gunn, A., Ielpi, A., Lapôtre, M.G.A. (2023). Preservation of meandering river deposits in unvegetated arid landscapes: Implications for paleoenvironmental interpretations of fluvial deposits on the pre-vegetation Earth and Mars. *International Conference on Fluvial Sedimentology 2023*, Abstract S03–04.
- 2021 Heintzman, R.*, Brandi, A., Kelley M.M., **Marvin, M.C.** (2021). Student and Instructor Insights for an Online Synchronous Introductory Geography Lab Using Interactive Geovisualization “Video Games” – Fall 2020 Term at Arizona State University (Presented by R. Heintzman). *American Association of Geographers (AAG) Annual Meeting*.

TECHNICAL SKILLS

Software: ArcMap, ArcPro
QGIS
ImageJ
Google Earth Pro
Google Earth Engine (GEE)
R, MATLAB, Python, JavaScript (GEE)

Hardware: Electron Microscope (SE, BSE, EDS)
Malvern 3000 (particle size analyzer)
ASUWIT (wind tunnel)
FRANTZ Magnetic Separator
Heavy Liquids Separation (lithium metatungstate)

IN THE NEWS

- 2023 “Dune patterns reveal environmental change on Earth and other planetary bodies”
<https://earth.stanford.edu/news/dune-patterns-reveal-environmental-change-earth-and-other-planetary-bodies>
<https://phys.org/news/2023-08-dune-patterns-reveal-environmental-earth.html>
<https://www.lifetechnology.com/blogs/life-technology-science-news/dune-patterns-reveal-environmental-change-on-earth-and-other-planets>
<https://www.sciencedaily.com/releases/2023/08/230802105822.htm>
- 2021 “In pursuit of global impact, geography Dean’s Medalist to study planetary surface processes of Saturn moon”
<https://news.asu.edu/20210429-pursuit-global-impact-geography-dean%E2%80%99s-medalist-study-planetary-surface-processes-saturn>
- 2020 “Barrett students win Barrett Global Explorers Grant for worldwide research projects”
<https://barrethonors.asu.edu/news-events/news/barrett-students-win-barrett-global-explorers-grant-worldwide-research-projects>

2019

“New ASU fellowship program addresses urban equity through geographic perspectives”

<https://asunow.asu.edu/2019/1002-new-asu-fellowship-program-addresses-urban-equity-through-geographic-perspectives>