Patrick O'Brien

Doctoral Candidate, Lunar and Planetary Laboratory

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Education

University of Arizona *Department of Planetary Science*
Ph.D. in Planetary Science, minor in Geoscience (Expected: December 2022)
M.S. in Planetary Science (2019)

University of North Carolina at Chapel Hill *Department of Physics and Astronomy*
B.S. in Physics (2016)

Research Experience

Graduate Researcher Lunar and Planetary Laboratory
Advisor: Prof. Shane Byrne 2017 - 2022

Undergraduate Researcher University of North Carolina
Advisor: Prof. Christopher Clemens 2015 - 2017

Mission Experience

NASA Dawn

Science team member from 2017 until end of mission in late 2018. Utilized topography data from the Framing Camera instrument to investigate surface roughness and volatile cold traps in the polar regions of the dwarf planet Ceres.

NASA SUITS (Spacesuit User Interface Technologies for Students)

Geology lead for Team Aegis in the 2022 SUITS Challenge. Collaborated with engineering students at the University of Southern California to develop field geology sampling procedures using an augmented reality headset. Our design was tested at Johnson Space Center to accelerate technology development for the Artemis human landing program.

VERNE (Concept study)

Command & Data Handling subsystem lead and science team member for the 2021 JPL Planetary Science Summer School. Our team designed an aerial platform mission to study the atmosphere and crustal magnetic field of Venus in order to better understand the planet's climate history and evolution.

Teaching and Service

Lunar and Planetary Laboratory
Graduate Teaching Assistant (PTYS 170A, 170B, 411) 2020 - 2022

Project POEM (Project-Based Learning Opportunities and Exploration of Mentorship)
University Mentor for middle- and high-school students with visual impairments 2018 – 2022

TIMESTEP (Tucson Initiative for Minoritized student Engagement in Science and TEchnology Program)
Graduate Coordinator/Mentor 2021

Graduate and Professional Student Council
College of Science Representative 2019-2020

Associate Graduate Council for the College of Science
Treasurer 2019-2020

Publications

P. O'Brien, S. Byrne, "Degradation of the lunar surface by small impacts", The Planetary Science Journal, *In review.*

P. O'Brien, S. Byrne, "Physical and Chemical Evolution of Lunar Mare Regolith", Journal of Geophysical Research: Planets, 126, e2020JE006634, 2021.

T. Kareta, J. Andrews, J. W. Noonan, W. M. Harris, N. Smith, **P. O'Brien**, B. N. L. Sharkey, V. Reddy, A. Springmann, C. Lejoly, K. Volk, A. Conrad, C. Veillet, "Carbon Chain Depletion of 2I/Borisov", Astrophysical Journal Letters, 889, L38, 2019.

E. Dennihy, J. C. Clemens, J. H. Debes, B. H. Dunlap, D. Kilkenny, **P. C. O'Brien**, J. T. Fuchs, "WIRED for EC: New White Dwarfs with WISE Infrared Excesses and New Classification Schemes from the Edinburgh-Cape Blue Object Survey", The Astrophysical Journal, 849, 77, 2017.

J. C. Clemens, **P. C. O'Brien**, Bart H. Dunlap, J. J. Hermes, "Seismology of an Ensemble of ZZ Ceti Stars", arXiv: Solar and Stellar Astrophysics, 2016.

Conference Presentations

Cooler than Cool: Doubly Shadowed Regions at the Lunar Poles (poster)	LPSC 2022
Can Small Impacts Explain the Moon's Smooth Surface? (poster)	LPSC 2022
A Numerical Model for the Lunar Landscape Diffusion Rate (oral)	AGU 2021
Surface Residence Times of Regolith on the Lunar Maria (oral)	LPSC 2021
Physical and Chemical Evolution of the Lunar Landscape (poster)	AGU 2019
Lunar Landscape Evolution and Space Weathering (oral)	LPSC 2019
Constraints on Lunar Space Weathering Rates from Landscape Evolution Modeling (poster)	AGU 2018
Ceres' Global Surface Roughness: Implications for Sub-Resolution Cold Traps (poster)	LPSC 2018
Examining Infrared Excesses of White Dwarfs (poster)	UNC Celebration of Undergraduate Research 2016

Awards and Honors

Galileo Circle Scholar (2020, 2021)
Graduate and Professional Student Council Volunteer of the Year (2020)