F22.021. Simulating Martian Sand Transport in the Lab

Faculty mentor: Devon Burr

Overview

This project will entail the fabrication and use of Bond mills for simulating the transport of sand on Mars. Sand is pervasive on Mars and moving globally today. However, the effects of that movement on the size, shape, and composition of the sand grains are unknown. Bond mills, table-top devices in which air flow circulates sand grains, have provided some information on how Mars-analog sand wears down, as reported in a pilot study in the peer-reviewed literature. This project will build on that initial work by creating Bond mills, exploring different experimental configurations (e.g., sediment amounts, mill orientations, air flow) in order to reduce error, and then using the optimal configuration to conduct experiments on a suite of Mars-analog sand. Data on particle size, shape, and composition will be collected periodically during the experiments to characterize changes. The result will be new insights into how sand changes as it moved across Mars.

What the student will DO and LEARN

Working in a team with the faculty member and a second-year PhD student, the student will create Bond mills, explore different experimental configurations (e.g., sediment amounts, mill orientations, air flow) in order to reduce error, and then use the optimal configuration to conduct experiments on a suite of Mars-analog sand. The student will collect data on particle size, shape, and composition during the experiments and analyze those data to characterize changes in each parameter over time. The student will contribute their data, experience, and thoughts in applying the experimental results to Mars. Lastly, the student will gain experience presenting scientific research by presenting at the UG Research Symposium (in FA2022). The student will learn: 1) techniques in the creation of experimental devices, 2) the importance of and methods in error estimation, 3) data recording and analyses, 4) information about the geology and sedimentology of Mars, and 5) scientific communication and collaboration – presenting scientific work and working as part of a scientific team

Additional benefits

The student will be part of the faculty member's research group (currently three graduate students and 4 other undergraduate students), participating in weekly research group meetings, involving discussion of other scientific projects within the group, of career-relevant topics (e.g., cv creation), of NAUrelevant matters (e.g., coursework) and of larger opportunities (e.g., relevant NASA-funded workshops). In addition, the faculty mentor will be available for at least weekly one-on-one meetings if/as the intern desires to discuss other / more individual questions or topics.

Additional qualifications

Necessary qualifications include: i) being orderly and detail-oriented, ii) being willing to experiment -- try things out, iii) having and articulating physical intuition about experiments, iv) having the interest and ability to work as part of a team and to share the work with the broader community.

Time commitment
6 hrs/week for 30 weeks