Aeolian sediment pathways on Mars

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# ABSTRACT

Owing to a lack of recycling through tectonic processes, large sedimentary systems accumulate on Mars’ surface. Throughout its history, cratering has produced large amounts of sedimentary material. In past climates, fluvial processes carved canyons and laid down deltas. Today, active surface processes are largely gravity-driven, cryospheric, and aeolian.

Despite a tenuous atmosphere, and frost covering sand for large periods of the year in high latitudes, aeolian activity on Mars is commonplace today. It hosts one of the largest dune fields in the Solar System, which circumscribes the north polar ice cap. This ice cap sits atop, and in places is interbedded with, a large aeolian sedimentary unit similarly as voluminous as the active dune field. At lower latitudes, dune fields are dotted throughout the landscape, often found accumulating within craters which act as sedimentary sinks.

In this talk I will discuss our recent progress in understanding how these aeolian sediments are distributed and moved on Mars’ surface. I will contextualize and highlight our studies on aeolian sediments in craters (Gunn et al., 2022), around the north pole, and more broadly across the globe (Rubanenko et al., 2023; Rubanenko et al., 2022; Gunn & Jerlomack, 2022). These studies inherently make use of remotely sensed data; we employ a broad range of instruments onboard NASA spacecraft including HiRISE, CTX, SHARAD, and MOLA. These data are interwoven with theory, painstaking manual and automatic mapping of geologic and geomorphological features, and compared to global climate model and mesoscale simulations of Mars’ atmosphere. Together, these studies help us understand climate history, the atmospheric dynamics that contribute to geomorphic work, and the long-term evolution of sedimentary systems and how they are connected.

# REFERENCES

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