**BACKGROUND**

Dark sand is found at all latitudes on the Martian surface, with known sources nearby to each sand deposit. Sources which—so far—are sedimentary units (e.g., figs. 1 and 2), leaving outstanding the question of primary igneous origins of dark sand, a missing piece of the Martian sediment cycle.

Scientists hypothesize that friable layered deposits (fig. 3) may be sources of sand. Some of these are hypotthesized volcanioclastic deposits, which would provide an igneous origin. However, we have yet to infer or observe sand generation from any such deposit.

This research is a case study in Aeolis Dorsa, Mars (fig. 4), where dark sand overlies bedrock consisting of a hypotthesized volcanioclastic unit, the Medusae Fossae Formation (MFF, fig. 5). Here, we used sand distribution, paleo-wind directions, and high-resolution images of bedrock exposures to identify likely sand sources.

MFF origins remain unresolved but an increasingly large body of data suggests that an ignimbrite (pyroclastic flow). The MFF is characterized by variable layering (fig. 5a), light tone (which dust contributes), and extensive yardang fields (wind-scoured hills, fig. 5b).

In Aeolis Dorsa, the MFF is the unit comprising Aeolis and Zephyria Planum (fig. 4).

**RESULTS**

The southern highlands are visible at the southwestern corner of Aeolis Dorsa (fig. 6a). But morphological similarity between bedrock blocks in the southern depression (outlined in Fig. 4) and the southern highlands suggest that the blocks in the southern depression (starrred in 6a) may be remnant southern highland materials.

Potentially sand sources:

1. Elysium Mons: Erosion of edifice material, or transport of explosive volcanic material, may serve as sand source for AD
2. Cerberus Plains: Extensive lava flow deposits may be eroded to loose sediment that is transported to Aeolis Dorsa
3. Southern highlands: Dark sand occurs on southern highlands south of AD, and may be transported to southern AD
4. In situ erosion of AD bedrock: Posits that sand is sourced from erosion of the Medusae Fossae Formation (MFF) and/or inferred remnant Southern Highlands material

Sand distribution supports sand sourced from the southern highlands and/or MFF. Sand distributions show winds deflected around topography.

...and bedrock erosional patterns show apparent sediment generation from bedrock. 100+ talus slopes in the southern depression (fig. 13) and 20+ alcoves* in the MFF (figs. 14 and 15) suggest that sand production from MFF can, and may be, occurring. Similar phenomenon observed on Earth (e.g., the Campo Piedra Pomez (CPP) ignimbrite of Argentina).

Volume of sediment in alcoves is small relative to total volume of sand mapped in AD, so these erosional alcoves do not explain the origin of all dark sand in AD.

**REFERENCES**


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