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Overview of Initial Results From Studies of the Bagnold Dune Field on Mars by the Curiosity Rover

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The Curiosity Rover is currently studying the Bagnold Dunes in Gale Crater. Here we provide a general overview of results and note that other EGU presentations will focus on specific aspects. The in situ activities have not yet occurred as of this writing, but other analyses have been performed approaching and within the dunefield. ChemCam passive spectra of Bagnold Dune sands are consistent with the presence of olivine. Two APXS spots on the High Dune stoss slope margin, and two others in an engineering test sand patch, show less inferred dust, greater Si, and higher Fe/Mn than other "soils" in Gale Crater. ChemCam analyses of more than 300 soils along the Curiosity traverse show that both fine and coarse soils have increasing iron and alkali content as the Bagnold Dunes are approached, a trend that may reflect admixtures of local rocks (alkalis + iron) to the fines, but also a contribution of Bagnold-like sand (iron) that increases toward the dunefield. MAHLI images of sands on the lower east stoss slope of High Dune show medium and coarse sand in ripple forms, and very fine and fine sand in ripple troughs. Most grains are dark gray, but some are also brick-red/brown, white, green translucent, yellow, brown,, colorless translucent, or vitreous spheres

HiRISE orbital images show that the Bagnold Dunes migrate on the order of decimeters or more per Earth year. Prior to entering the dune field, wind disruption of dump piles and grain movement was observed over multi-sol time spans, demonstrating that winds are of sufficient strength to mobilize unconsolidated material, either through direct aerodynamic force or via the action of smaller impacting grains. Within the dune field, we are, as of this writing, engaged in change detection experiments with Mastcam and ChemCam's RMI camera. Data we have so far, spanning 8 sols from the same location, shows no changes.

Mastcam and RMI images of the stoss sides of Namib, Noctivaga, and High Dune show that the "ripples" seen with HiRISE are more akin to $\sim$1 m scale wavelength bedforms that exhibit clear stoss slopes, sinuous crests, slip faces, and grain flow and fall features. One interpretation is that these are fluid drag bedforms that form in an aeolian regime distinct from that on Earth due to the large viscous sub-layer in the low density Martian atmosphere**.** Superimposed on these bedforms are more definitive ripples of $\sim$10 cm wavelength, similar to impact dune ripples on Earth. The slipface of Namib Dune shows distinct flow lobes, bounded at the top by alcoves and at the bottom by lobate toes, with prominent detachment scars. Ripples upon and oriented orthogonal to the slipface indicate sand transport from winds within the dune recirculation zone. Some of the flow lobes have few ripples, indicating recent avalanching. The internal structure and stratigraphy of the edge Namib Dunes will likely be forthcoming in the trenching at the first in situ stop and will be reported at EGU.