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38th COSPAR Scientific Assembly 2010

Space Studies of the Earth-Moon System, Planets, and Small Bodies of the Solar System (B)
Mars Exploration (B02)

SPECTRAL ANALYSIS OF DARK DUNES SANDS OF KA'U DESERT (HAWAII) WITH REGARD TO THEIR APPLICABILITY AS TERRESTRIAL ANALOGS TO MARTIAN DUNES

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Dark basaltic dunes represent the majority of Martian eolian bedforms. However, on Earth there are only few places where basaltic dunes can be found. Is has been suggested that the Marian dunes sands are volcanic in origin because their mineralogical composition consists of pyroxene and olivine. The dark dunes in Ka'u Desert on the Big Island of Hawaii are located on the western flank of Kilauea volcano. The dark sands are derived from volcanic ash and reworked pyroclastic material. Thus, the Hawaiian dark sand dunes could be an adequate analog to Martian dunes, particularly for testing the hypothesis of volcanic origin and to determine basic spectral characteristics that may be associated with differences in grain size and chemistry indicative of maturity and transport distances. Samples of different dark dunes in Ka'u Desert were collected during a field trip in summer 2009. We measured the samples with an ASD field spectrometer in a laboratory. We compared the terrestrial spectra with typical OMEGA and CRISM near-infrared spectra of different Martian dark dune fields. The overall spectral shape of the terrestrial spectra reflects a basaltic composition of the sands fairly similar to that of Martian dunes, dominated by olivine. These rock-forming minerals form as the lava cools, and are commonly found in basaltic volcanic ash. The correlation in mineralogical composition of terrestrial and Martian dunes hints to a similar origin of the dark sands on Mars and Earth. Since some terrestrial spectra show a beginning aqueous alteration of the dark sands these samples could be used to analyse alteration features of Martian dark dunes.