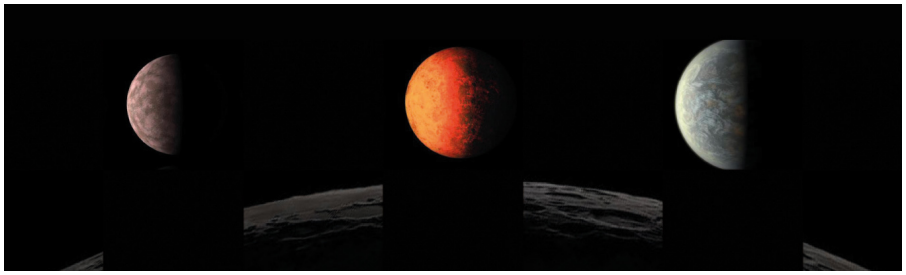

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Aeolian processes in Meridiani Planum, Mars

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Aeolian processes, such as accumulation, erosion, and transport, were investigated in the western part of Meridiani Planum. This is an equatorial region of Mars that was explored by the NASA Opportunity Rover of the Mars Exploration Rover mission. This area is also fully covered by high-resolution images taken by the HiRISE and CTX cameras of the Mars Reconnaissance Orbiter mission. The studied area consists of two geomorphological units: the plains, covered by sparsely distributed small impact craters, and Endeavour crater, older than the plains, large impact crater (22 km in diameter).

The aim of the work was to determine the present and past wind patterns, the activity of various aeolian landforms, the size and shape of transported grains, and the changes in the intensity of aeolian processes in Meridiani Planum. The region was investigated in a period of 10 Mars years using simultaneous data from the surface and from orbit, providing a unique insight into aeolian processes on Mars. It was found that on Mars: (i) there are seasonal changes in wind patterns, (ii) medium sand grains are trapped in craters, and (iii) aeolian ripples have the same morphometry even if they are characterized by different particle size distributions.

Today, in Meridiani Planum erosion dominates, but in the past a high sand supply allowed for the formation of large coarse-grained ripples and dunes. Coarse sand particles (0.5-2.0 mm in diameter) and even gravel particles (> 2 mm) are transported by wind, but only over short distances, which do not allow grains from both geomorphological units to mix. The transport path of fine sand grains (< 0.25 mm) is very long (probably global). However, the small amounts of medium and fine sand available for transport resulted in the stagnation and erosion of the dunes and coarse-grained ripples. Aeolian accumulation occurs mainly on the floors of the small impact craters (< 30 m in diameter), where fine sand ripples can rarely be found.

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