Mars Climatic Evolution and Potential Habitability: the OMEGA/Mars Express View

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Orbiting around Mars on board the ESA Mars Express mission, the OMEGA VIS/NIR spectral imager is acquiring a complete coverage of the surface constituents: frosts, ices dust and minerals. Among these, both unaltered magmatic rocks and alteration products have been mapped, with in particular the identification of hydrated sulfates and phyllosilicates. The geological context of these minerals clearly indicate an evolution in the Martian environment, with in particular the characterization of an early phase during which liquid water might have been perennial over geological timescales, as indicated by the presence of hydrated smectites. This era was followed by a Mars global change, towards an acidic environment within a tenuous atmosphere, leading to the dry, cold and arid conditions lasting up to now. This global change was triggered by the massive outgassing coupled to the first onset of volcanic activity that built the Tharsis bulge, after the magnetic dynamo had faded out. As a consequence, the potential for Mars to have harbored habitable conditions should be recorded and searched for in terrains identified by their phyllosilicate content. At a microscopic scale, such minerals might still host biorelics that future planned missions might reveal. We will present the major results supporting this renewed Mars climatic History, and indicate the astrobiology potential of future missions.