



Recent MRO/HiRISE Discoveries on Mars

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The High Resolution Imaging Science Experiment (HiRISE) on the Mars Reconnaissance Orbiter (MRO) has acquired more than 9,500 images of Mars with 8.2 Terapixels of data, covering 0.6% of the surface. Images are generally 5–6 km wide with 3-color coverage over the central 20% of the image swath, and their resolutions usually range from 25–60 cm/pixel. More than 1,000 stereo pairs have been acquired and 50 digital terrain models (DTMs) completed; these data have led to some of the most significant science results. New methods to measure and correct distortions due to pointing jitter facilitate topographic and change-detection studies at sub-meter scales. There are recent results concerning Noachian bedrock stratigraphy, fluvially-deposited fans in craters and in or near Valles Marineris, groundwater flow in fractures and porous media, quasi-periodic layering in polar and non-polar deposits, tectonic history of west Candor Chasm, geometry of clay-rich deposits near and within Mawrth Vallis, dynamics of flood lavas in the Cerberus Palus region, new evidence for pyroclastic deposits, columnar jointing in lava flows, recent collapse pits, evidence for aqueous modification of well-preserved impact craters, newly-discovered large rayed craters, and glacial and periglacial processes including candidate pingos and “gullies”. We are particularly interested in ongoing processes such as those driven by the wind, impact cratering, avalanches of dust and/or frost, relatively bright deposits on steep gullied slopes, and the dynamic seasonal processes over polar regions. In the middle latitudes, 5 very recent impacts (at least 3 and perhaps all 5 occurred in 2008) have exposed shallow ice. We are also especially interested in the oldest exposed rocks, the Noachian megabreccia commonly found in the central uplifts of large craters in or near Noachian (>3.8 Ga) terrains; near the rims of large basins, such as Isidis; and in deep exposures, such as the floor of Uzboi Valles and in parts of Valles Marineris. Life on Earth may have begun during the period of heavy bombardment, but Mars preserves a much better record of the environmental effects of heavy bombardment into a water-rich crust. HiRISE has acquired hundreds of large images of past, present, and future landing sites and has contributed to scientific and engineering studies of those sites.