



Mars: Recent and Episodic Volcanic, Hydrothermal, and Glacial Activity Revealed by the Mars Express High Resolution Stereo Camera (HRSC).

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The HRSC Experiment on the ESA Mars Express Mission has obtained new insight into the geologic activity of Mars. The analysis of the image data taken over the first half year of the mission shows that calderas on five major volcanoes in the Tharsis and Elysium regions have undergone repeated activation and resurfacing during the last 20% of Martian history, with caldera floors as young as 100 Ma, and flank eruptions as young as 2 Ma. The results confirm that the edifices are constructed over billions of years and are characterised by episodically repeated phases of activity continuing almost to the present and suggesting the volcanoes are potentially still active today. It appears that the more recent volcanic activity on both the Tharsis and Elysium volcanoes clustered around 100-200 Ma ago, practically coinciding with radiometric ages of several Martian meteorites. Glacial deposits at the base of the Olympus Mons escarpment show evidence for repeated phases of activity over the last 5% of Martian history as recently as approximately 4 Ma ago. Bright deposits on the flanks of Olympus Mons at the edge of the western scarp are interpreted to be remnants of ice and dust accumulations dating from these times and even earlier periods as old as 3.8 Ga ago. Morphological evidence is found that snow/ice deposition on the Olympus

construct at elevations more than 7000 m high led to episode(s) of glacial activity at this height. The data suggest that water ice protected by an insulating layer of dust may now be present at high altitudes at the edge of the Olympus Mons shield. The presence of the young glacial deposits in the tropics of Mars at the base of the Olympus Mons escarpment supports the hypothesis of recent climate changes with snow and ice accumulation possibly due to changes in the obliquity of Mars. A summary of our highlight findings is published in. Since then, new even higher-resolution data of the western and eastern edges of Olympus Mons have been obtained showing in greater detail especially the remains of glacial and hydrothermal activity. A synthesis of forms and new results will be presented at the conference.