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Active and Recent Volcanism and Hydrogeothermal Activity on Mars

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There are no active volcanoes or geysers on Mars today, nor in the very recent past. Since 1997, we have sought evidence from targeted narrow angle camera images and daily, global wide angle images for active or very recent (decades to < 10 Ma) volcanism or hydrogeothermal events on Mars. Despite > 11 years of daily global imaging and coverage of > 60% of Mars at ≤ 6 m/pixel (with the remaining < 40% largely outside of volcanic regions), we have found no such evidence, although one lava field in Aeolis (5°N, 220°W) stands out as possibly the site of the most recent volcanism. Authors of impact crater size-frequency studies suggest some volcanic landforms on Mars are as young as tens to hundreds of Ma. This interpreted youth has implications for understanding the internal geophysical state of Mars and has encouraged those seeking sources for trace gases (methane) in the atmosphere and those seeking "warm havens for life" (Jakosky 1996, *New Scientist* 150, 38–42). We targeted thousands of Mars Global Surveyor (MGS) MOC and Mars Reconnaissance Orbiter (MRO) CTX (and HiRISE) images to examine volcanic regions; we also studied every MGS MOC and MRO MARCI wide angle image. For evidence of active volcanism, we sought eruption plumes, new vents, new tephra deposits, and new volcanogenic flows not observed in earlier images. For recent volcanism, we sought volcanogenic flows with zero or few superposed impact craters and minimal regolith development or superposed eolian sediment. Targets included all volcanic landforms identified in research papers as "recent" as well as areas speculated to have exhibited eruptive plumes. An independent search for endogenic heat sources, a key Mars Odyssey THEMIS objective, has also not produced a positive result (Christensen et al. 2005, P24A-01, *Eos, Trans. Am. Geophys. Union* 86/52).