



## **Magmatic-driven manifestations on Mars exemplified at central Valles Marineris, Melas Chasma, and Claritas rise.**

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Regions on Mars display magmatic-driven manifestations through detailed geologic mapping investigations. Such manifestations include uplift and related tectonic deformation, which includes possible hydrothermal activity. This activity is best exemplified at the central part of Valles Marineris (Melas Chasma and surroundings) and Claritas rise, both of which occur in the Tharsis region. Melas Chasma, for example, displays a prominent MOLA-based topographic rise, consistent with Viking-era geologic mapping investigations that unfolded magmatic-driven tectonism, HiRISE-identified landforms on the floors of the canyons that are interpreted to reveal a volcanic field on the floor of Melas Chasma, CRISM-based identification of sulfate-rich outcrops, which could be indicative of hydrothermal deposits, GRS K/Th signature interpreted as either ice-magma interactions and/or variations in rock composition, and geophysical evidence that may indicate partial compensation of the canyon and/or higher density intrusives beneath it. The other example, Claritas rise, displays a well-defined, highly deformed promontory located to the south of Syria Planum along a crustal/lithospheric zone of weakness. Claritas rise is interpreted to be basement complex among other rock types, a center of tectonism, which includes the greatest percentage of faults preserved in Noachian materials, a distinct spectroscopic signature, including Fe/Mg-rich hydrated phyllosilicates, as well as serpentine, when compared to the well-defined lava flows of Syria and Solis Planae, a possible magnetic signature, and geophysical results consistent with dense igneous material formed on a weak, thin elastic lithosphere early in Martian history when heat flow from the planet's interior was high. Both sites, which may include the interaction of water and magma, are considered prime candidate sites for future exploration of Mars.