



## **Chronostratigraphic and morphologic investigation of the south-western Hadriaca Patera drainage system**

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Hadriaca Patera, one of the ancient Martian highland volcanoes, is situated at the north-eastern rim of the Hellas Basin. The volcano displays a radial drainage pattern on the flanks. New HRSC (High Resolution Stereo Camera) imagery shows that runoff from these channels was collected by a channel system leading into the Hellas Basin. Cratering age measurements indicate that this system of small fluvial valleys was formed prior to 3.3 Ga ago. It precedes the formation of Dao Vallis, a large channel for which an origin due to catastrophic discharge of water was proposed.

These two drainage systems differ markedly in their directions. The development of the radial valleys on Hadriaca Patera was governed mainly by the underlying slope of the volcano flanks. The system leading into the Hellas Basin in general follows the slope of the Hellas Basin, but the flow direction was also strongly influenced by angular fracture systems and individual lava flows on the plains units of Hesperia Planum. The channels display a characteristic morphology, with very flat, broad beds and streamlined islands. Study of the small channel systems offers important insights into the factors influencing the redistribution of water in the region. Water entering the subsurface through fractures may also have accumulated as ice and later influenced the formation of Dao Vallis.

By combining MEX HRSC imagery with data from other imaging sensors, we analyzed the structure of the drainage system and the surrounding geomorphology. For Hadriaca Patera and some regions in the Dao Vallis main trough, cratering ages were measured, which puts constraints on the age of the drainage system.