



Insights into the volcanic histories of Hadriaca and Tyrrhena Paterae derived from Mars Express HRSC data

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The High Resolution Stereo Camera (HRSC) on the ESA Mars Express orbiter obtained color and stereo images of the martian highland volcanoes Hadriaca Patera and Tyrrhena Patera during the summer of 2004. We are using these data to assess the volcanic histories of these structures through: a) comparison of nadir images (Hadriaca: 44 m/pixel; Tyrrhena: 36 m/pixel) to Viking orbiter-based geologic mapping for veracity of contact relationships; b) acquisition of new crater counts to assign cratering model age dates to specific volcanic units; and c) identification of potential color differences of surficial materials that are related to specific geologic processes. Color images using the red, green, and blue channels of the HRSC show little variation within previously mapped units. However, the gullies and channels on the eroded flanks of both shields are darker and bluer in color compared to the brighter and redder flank materials. We suggest that the fluvial events that formed the gullies and channels that dissect these shields excavated dark, probably basaltic material from which these shield are built. Crater counts of Hadriaca Patera suggest multiple units were emplaced in the caldera floor between 1.1-3.5 Ga, indicating that activity within the caldera was pervasive throughout much of martian history. Channeled flank units of Hadriaca have a model age of 3.3 Ga, which may constrain the time of primary fluvial activity. The oldest shield-building events occurred 3.7-3.9 Ga, prior to the end of the Noachian period (3.5-3.7 Ga), verifying that these are the earliest recognized central-vent volcanoes on Mars.