

Geomorphic map of the catchment of Hypanis and Nanedi Valles, Mars

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This work extends recent efforts [1,2] to characterize (a) the geology of the dichotomy boundary along the Chryse escarpment, (b) the regional history of the Hypanis deposit, and (c) the nature of the past climate in this topographically-important region of Mars. We present a geologic map of the Hypanis Valles catchment and of the region surrounding the Hypanis deposit at its terminus. We mapped these two regions at different scales: 1:2,000,000 for our catchment map (~-5-10° N, 300-315° E) and 1:500,000 for our Hypanis/Sabrina inset map (~10-13.5° N, 313-316.5° E). Our mapping provides new morphologic insights relative to previous maps of the region [*e.g.*, 3,4,5,6] that were produced using lower spatial resolution data.

We defined units based on morphology, albedo, thermal inertia, elevation, and spectral parameters (*e.g.*, D2300 and HCP from [7]). We interpret several units as volcanic (flows, cones, or maars) and propose that episodic volcanism played a role in filling the Chryse basin as early as the early Noachian, and that some volcanism in the region could have been active as late as the recent Amazonian. We also investigate whether mud volcanism could be responsible for some mounds and cones which appear to post-date Hypanis fluvial deposition.

The upstream catchment contains crater units with what appear to be central pits and slurry ejecta, potentially indicating an icy regolith in the Noachian. We sub-divide the early, middle, and late Noachian highlands units (eNh, mNh, INh) and early Hesperian transition unit (eHt) from [5] into smaller locally-relevant units in our analysis of the Hypanis Valles catchment.

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