

Regional stratigraphy from stereo imaging near the Hypanis fan deposit: Marking the extent of the largest delta on Mars?

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The layered fan-shaped sedimentary deposit at the terminus of Hypanis Valles has been classified by some as an ancient delta marking the presence of a sea in Chryse Planitia, Mars. The deposit's age is estimated to be 3.6 Ga based on crater counts in the upstream catchment. We further our research on the Hypanis deposit and its relative age by analyzing digital terrain models and high-resolution orbital images of two key study areas: Lederberg crater rim and the distal island deposits. We constructed a 2 m/pix digital terrain model from our requested HiRISE stereo images (0.5 m/pix) of the Lederberg rim northwest of Hypanis, as well as a 24 m/pix digital terrain model from CTX stereo images (6 m/pix) of the island structures northeast of Hypanis. Both terrain models were controlled to MOLA shot data. We added these elevation models to a regional elevation mosaic in order to assess stratigraphy. We found that the Lederberg crater rim has polygonally fractured units, consistent with those in the plains near Hypanis, as well as an example of a distinct mildly sinuous ridge with smooth cones along its profile. We hypothesize that the formation of rounded cones in this region of Xanthe Terra near Hypanis is related to the presence of wrinkle ridges and degraded crater rims. Furthermore, we investigate whether these cones are the youngest geologic formations in the region, postdating the aqueous periods in which the delta and hydrovolcanic cones were formed. We also analyzed the elevation profiles of potential deltaic distal island deposits, and found that some islands are likely part of the main lobe of Hypanis, while others more closely match the chaos units to the east. From our analysis, it is unlikely that the large northern island was once part of the Hypanis deposit. Rather, a larger laterally continuous unit likely once draped the region post-Hypanis formation and has subsequently been eroded.