1. Introduction

The Hypanis fan-shaped deposit in Xanthe Terra has been interpreted by many to be a late Noachian aged delta along the dichotomy boundary (1-5), and has been interpreted by others to be an alluvial fan or mudflow [4]. It was a compelling candidate landing site for the future Mars 2020 and ExoMars rover missions [1,5]. We hypothesize that Hypanis is a delta [2]. This may imply there was once a large Chryse sea [2].

2. Regional Geology

The Hypanis fan-shaped deposit lies within a region of transition morphology (NH) [7]. The upstream catchment to the south is middle/late Noachian age (mNh), while the smooth volcanic/fool plains to the north contain large N-S trending wrinkle ridges, defining Hesperian volcanism with smooth cones along its profile. We hypothesize that the formation of rounded cones in 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.

3. Topographic Analysis

New DEMs of Lederberg crater rim (2 m/pix) and distal island deposit (24 m/pix)

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 cones in 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.

4. Additional Work

• Polygonal fractures found in patches within the floor/planits unit surrounding layer fan deposit [2] and as far as the Lederberg crater rim with matching orbital mineralogic signatures of Fe/Mg smectite clays.

• This may point to desiccation (mud-cracking) as the source of these features, as opposed to cooling of a volcanic unit.

5. Summary

We used HiRise and CTX stereopairs to connect new DEMs of Hypanis, and our results strongly suggest the deposit is deltaic in origin. We investigated adjacent landforms (polygonal fractures, wrinkle ridges, and volcanic cones) to better understand the timing and timing of surficial events at Hypanis.

6. References