

NAVUA VALLES AND HADRIACUS MONS: DISCONTINUOUS CHANNELS, PALEOLAKES, KNOBBY TERRAINS AND MOUND FIELDS. H. I. Hargitai¹, V. C. Gulick², and N. H. Glines³, ¹ NASA Ames Research Center (MS 239-20 Moffett Field, CA 94035, henrik.i.hargitai@nasa.gov, ² NASA Ames/SETI Institute, NASA Ames Research Center MS239-20, Moffett Field, CA 94035; virginia.c.gulick@nasa.gov, ³ NASA/SETI Institute.

Introduction: The Eastern rim of Hellas Basin contains dense drainage networks. The main system of Navua Valles is a precipitation-fed discontinuous channel that transported water from its source over long distances without additional sources, which is consistent with flood origin. [1] This is also analogous to ephemeral streams on Earth. The main Navua drainage system begins with valleys that cut into Noachian highlands and continues in channels that cut Hesperian volcanic terrains. In South Hadriacus Mons, sinuous pit chains may be surface manifestations of subsurface fluid pathways.

Lakes: We have identified 13 basins which may have contained water bodies. The identification criteria for these paleolakes were: for closed basins: inlet channels with terminal deposits (potential deltas), for open basins: inlet and outlet channels approximately at the same elevation. Measuring these paleolakes in ArcGIS with MOLA in the method of Cooley [2] produces a total water fill volume of about 2400 km³.

Knobby terrain: 10s to 100s m diameter knobs occur in the source areas of the drainage systems. Knobs are very rare at lower reaches. This setting suggests that the knobs and the channels are related, however, the knobs postdate the channel's formation because they are typically located on the erosional channel floors. Some of the knobby areas are crescent shaped on mountain slopes and are associated with arcuate ridges. Among the potential interpretations are pingos and spring mounds. Mud volcanoes and fumarolic mounds have similar shapes, however, despite the proximity to Hadriaca Patera, many of these features are located on nonvolcanic mountains or crater rims which make a glacial or spring origin more plausible.

Mound fields: Fields of closely spaced mounds occur in one, small region in several patches, at the lower reaches of the Navua Valles. The main area is within a large, degraded crater that is crossed by a channel and likely also hosted paleolakes, but similar mounds also occur on a nearby lobate impact ejecta. Similar mounds are common at higher southern latitudes zonally and are interpreted as patterned ground.

Summary. The Navua Valles likely formed in a paleo-climate episodically and locally rich in liquid surface water and ground water, possibly hydrothermal, consistent with other models of persistent or repeated effects of water throughout the geologic history

in Eastern Hellas [3], Reull Vallis [4] and elsewhere on Mars [5-8].

Conditions here at the eastern rim of Hellas Basin locally enabled the formation of knobby terrain and mound fields, after the active phases of the channel and lake systems. These landscapes –channels-and-lakes, knobs, mounds – were active at different times and may represent different episodes in the history of East Hellas that have provided habitable environments in the same areas.

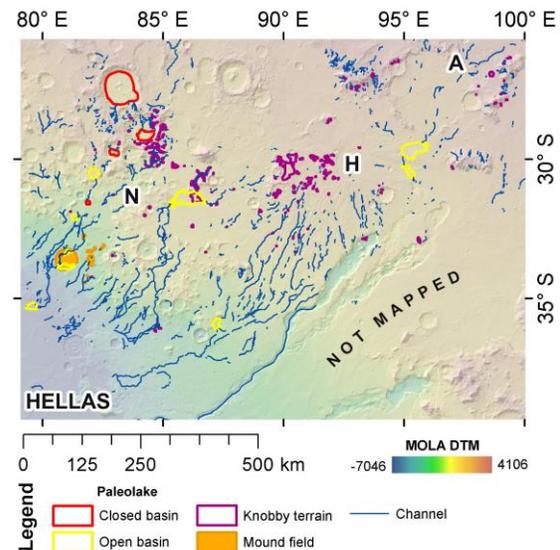


Fig. 1. Map of the Navua-Hadriacus-Ausonia area East of Hellas Basin. N: Navua Valles, H: Hadriaca Patera, A: Ausonia Montes.

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