LARGE-SCALE GEOLOGIC MAPPING OF SOUTHEAST NIA MENSA IN EASTERN CANDOR CHASMA, MARS.

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Introduction: This abstract summarizes the current efforts in mapping the southeastern portion of Nia Mensa using a High-Resolution Imaging Science Experiment (HiRISE) [1] stereo pair for high-resolution structural and geologic mapping.

The goal of this work is to better understand the evolution of eastern Candor Chasma and the sedimentary deposits within. Our mapping effort is concentrated on the southeastern edge of Nia Mensa (**fig. 1**), where both landslide deposits from the southern wall of Candor Chasma and stratified sedimentary deposits have been observed. We plan to identify and characterize allostratigraphic units, and work to determine the origin of the sedimentary units within our mapping area.

Layered deposits within Valles Marineris remain enigmatic in their origin. Currently, there are two main hypotheses that address the formation of these deposits in relation to Valles Marineris. 1) Layered deposits predate the formation of the chasmata. Hesperian-aged plains materials and Noachian-aged bedrock of layered deposits were cut into by the forming chasmata, subsequently exposing the preexisting layered materials [e.g., 2-4]. 2) Layered deposits formed concurrently and possibly after the formation of the chasma. The layered deposits then are estimated to be Hesperian to Amazonian in age, emplaced over Noachian-aged bedrock [e.g., 5-8]. By using HiRISE imagery for our mapping purposes, we can identify subtle features and unit relationships that were not possible using lower resolution data. As we map this area, we will work to identify onlapping relationships, distinctions between layered deposits and landslide debris, and estimate relative ages in order to further develop these hypotheses.

Methods: The primary datasets used for our mapping purposes are two HiRISE stereo pairs (23 cm/pix) (ESP_039749_1720 and ESP_039604_1720). A 1-m post spacing Digital Terrain Model (DTM) was extracted from these and subsequently used to orthorectify the associated HiRISE images [10]. The map area is defined by the bounds of the stereo pair. For geologic context and regional stratigraphic relationships outside of the map area, Context Camera [11] observations and Mars Orbiter Laser Altimeter mosaic [12] were used.

We are mapping allostratigraphic units (defined by unconformities at their upper and lower contacts). Allostratigraphy is used because at HiRISE scale, bounding unconformities can be directly observed, are the most prominent stratigraphic divisions, and are mappable in a systematic way.

Current results: Our mapping area represents a unique confluence of debris flows, interior layered deposits, and aeolian bedforms.

Aeolian bedforms are located throughout the map area in local depressions. Where these bedforms thicken and mask the underlying bedrock we have mapped them as their own unit. Along the western edge of the map are interior layered deposits. These deposits are medium-toned, and form a smooth, undulating erosional surface. Near the southern edge of this unit appears more eroded and rugged, no longer displaying the relatively uniformed layers. Numerous medium-light toned yardangs extend through the central-eastern portion of the map. These yardangs are comprised of thinly bedded layers and erode to form terraced slopes (**fig. 2**). The western-facing slopes tend to be steep (~30°) and have been smoothed by wind erosion. The terraced slopes on the eastern-facing sides are much broader, and therefore has better exposures of the layered stratigraphy. On the northeastern slopes of several yardangs are remnants of younger material draping over the layered yardangs (**fig. 3**). The younger unit extends over the top of the layered yardangs and drape down the slopes as thin ridges.

The highest point on the map are the layered deposits along the western edge (i.e., 2045 m). The yardangs to the east sit in a localized high (~1640 m in elevation), and as the yardangs taper off both to the north and south, the floor lowers in elevation (i.e., 1020 and 1000 m, respectively).

We are now working to finish mapping unconformities and will begin to delineate geologic units and identify relative timing between sedimentary layered deposits and erosional processes (i.e., debris flows).

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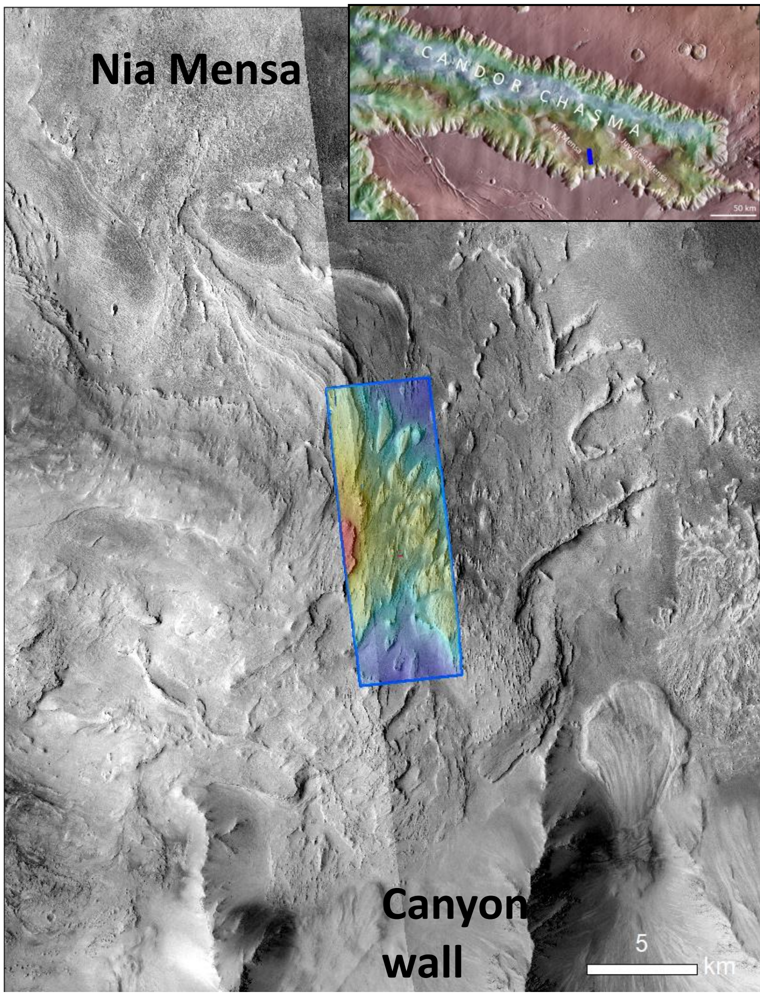

Figure 1. HiRISE colorized DTM of map area outlined in blue. Red indicates high elevation and blue/purple is low elevation. HiRISE footprint is overlain onto a CTX mosaic. Image in upper right corner is a MOLA colorized layer overlain onto THEMIS Daytime IR, and shows location of map (blue rectangle) in reference to east Candor Chasma.

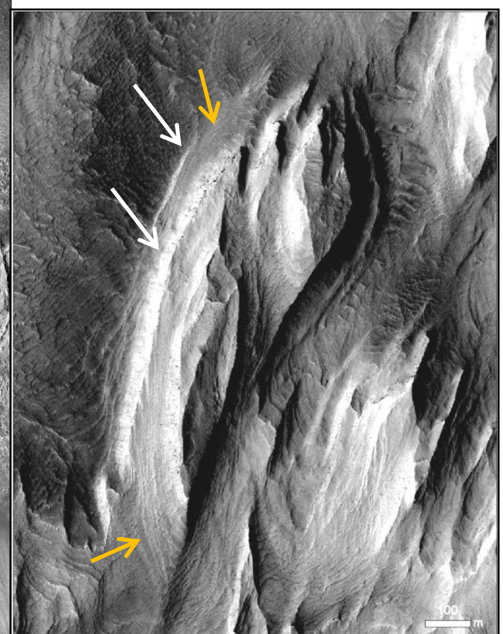

Figure 2. Example of a yardang in the mapping area. White arrows point to slope terraces and orange arrows point to finely bedded layers.

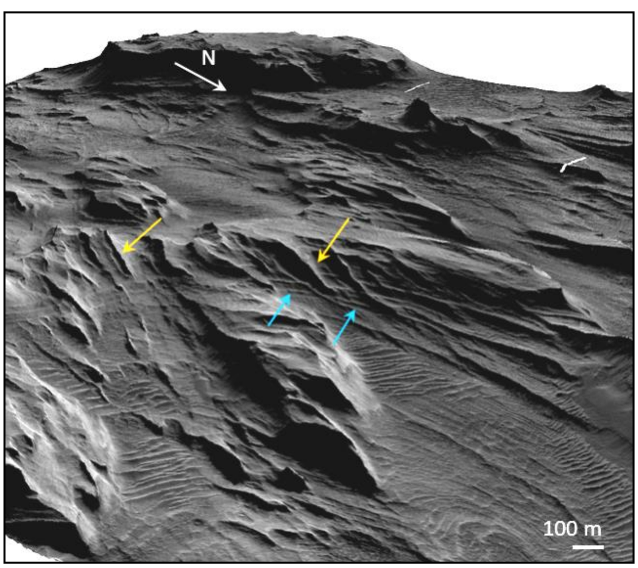

Figure 3. Remnants of younger material draping over finely bedded yardangs. Blue arrows point to beds that comprise the yardangs. Yellow arrows point the narrow ridges that drape down the northeastern slope of the yardangs.