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Banded Terrain in Hellas Basin, Mars: Results from Geomorphological Investigations and Morphometry.

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Hellas basin is a large impact basin situated in the southern highland of Mars. The north-western part of the basin has the lowest elevation ($\sim$ -7.5 km) on the planet and contains a unique terrain type, which we informally call "banded terrain". The banded terrain is composed of smooth-looking banded deposits that display signs of fluid behavior and a paucity of superimposed impact craters. In this study, we use newly acquired high spatial resolution images from the High Resolution Imaging Science Experiment (HiRISE) in addition to existing datasets to characterize the architecture of the banded terrain using a geomorphological and morphometric approach. The banded terrain is generally confined to the NW scarp of the Alpheus Colle region. The individual band-like features are $\sim$5–15 km-long and are separated by narrows inter-band depressions, which are on average $\sim$60 m–wide and at least 10 m–deep. The bands display several morphologies that can vary from linear to concentric forms. Morphometric analysis reveals that the banded terrain is present on relatively steep slopes of $\sim 7^{\circ}$ and in a pro-scarp trough. Crater-size frequency analysis yields a late Amazonian age for the terrain ($\sim$1.02 Gyr $\pm$ 0.09), which along with the presence of very few degraded craters; either implies a recent emplacement or a resurfacing. The apparent sensitivity to local topography and preference for concentrating in localized depressions are compatible with deformation as a viscous fluid. In addition, the bands display clear signs of degradation and slumping in its margins along with a suite of other features that include fractured mounds, polygonal cracking at many size-scales, and knobby/hummocky textures.
Together, these features suggest an ice-rich composition for at least the upper layers of the terrain, which is currently being heavily modified through loss of ice and intense weathering.
However, the nature of the material composing the bands is still not well understood and need further investigations through detailed investigations of the thermal data from THEMIS, a modeling approach and/or a geomorphic comparison with possible terrestrial analogues (solifluction processes, permafrost features, rock glaciers. . .).