Elevated Flat Floor Depresions in the Mid Latitude Region of Mars. A. J. Benthem[1] and A. D. Howard[1], [1]Dept. Environmental Sciences, Univeristy of Virginia, P.O. Box 400123 Charlottesville, VA. 22904-4123 (ajb7c@virginia.edu).

Introduction: The Southern Highlands are the oldest surfaces on Mars and records the history of the past 4 billion years in its numerous, unique features. Using recent high resolution images from MRO HiRISE, CTX, THEMIS VIS, and MGS MOC. We have identified a latitude-dependent type of depression found on the elevated edges of craters and ridges which we are calling Elevated Flat Floor Depressions (EFFDs). We believe these features are related to periglacial processes. We have surveyed these features across the planet with the purpose of identifying and characterizing their morphological and contextual properties and compare them to similar periglacial features on Earth.

Description of Feature: Most of the 50 Elevated Flat Floor Depressions identified to date have been located in the Southern Highlands between latitudes 40ºS and 65ºS, although 2 EFFDs have been identified in the same latitudinal range in the northern hemisphere. EFFDs typically are isolated depressions though clusters on a single crater are not uncommon. Size range can vary greatly but typical EFFDs are approximately 1000m wide and 10's of meters deep. Depressions are observed near the top of crater rims and other steep elevation changes and have limited or no drainage. The shape and size of depressions vary greatly but are generally circular to elliptical with significant irregularities, which help distinguish them from small impact craters. EEFDs scarp edges appear to be quite steep and are observed to have relatively smooth, concave edges. Although, most EFFDs have uninterrupted scarps, short linear troughs extending from the depression are not uncommon. The global distribution of these features shows no obvious regional spatial clustering and local clustering rarely extends outside a single crater. Occurrence rates of EFFDs may be low due to under representation as well as incomplete coverage of high resolution image coverage. Many possible EFFDs have been observed but erosion, mantling, and other surface alteration processes, throw them into question.

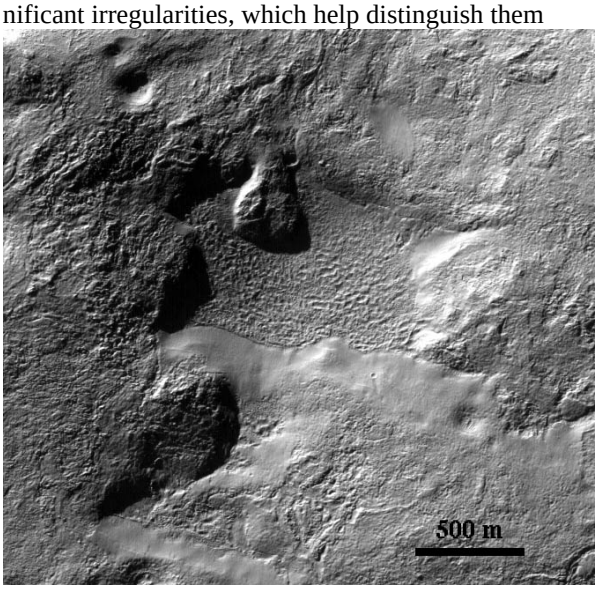

Fig 2. Close up of an EFFD (MOC image Lat 40.42S Long 352.67E

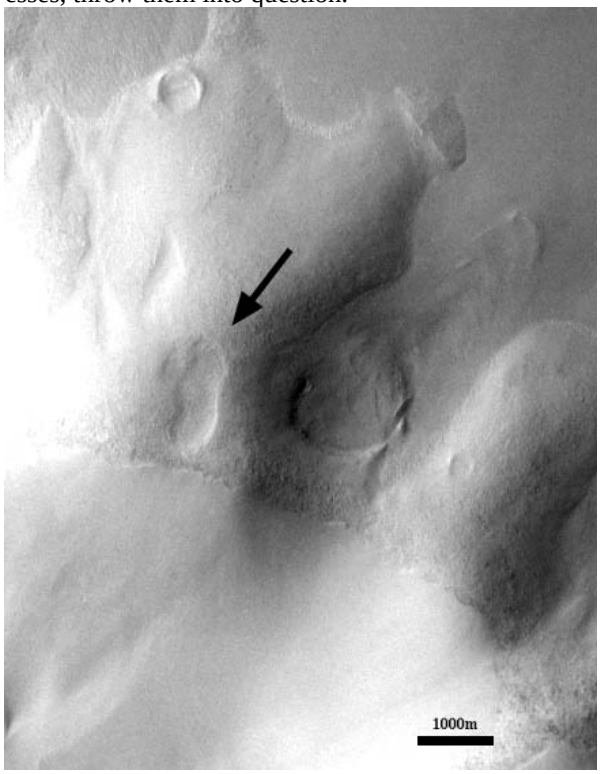

Fig. 1. Elevated flat floor depression located on a crater rim. Near the edge of Hellas. THEMIS VIS image (Lat 49.67S Lon 93.07E)

Methodology: As THEMIS VIS images offer the most extensive high-resolution coverage of the Martian surface, distribution of EFFDs have been determined primarily from these images. Special emphasis was placed on determining the spatial extent of these landforms, specifically examining latitudinal limits of these features. All images were surveyed to characterize their physical characteristics: Surface texture, albedo, crater type, crater degradation, ejecta patterns,

mantling, shape, size, ellipticity, angularity, orientation, presence of boulders, location on the crater, and evidence of aeolian modification. Higher resolution images are limited but offer an opportunity to better examine the physical properties which we identify in all EFFDs. Elevation and slope angles are also examined where possible using MOLA tracks and stereo HiRISE and CTX image pairs. Data is being compared with possible analogs on Earth and other planets.

Discussion: Identification of diagnostic geomorphic features and understanding the processes involved in their formation is crucial to determining and understanding historical conditions on Mars. A number of different processes might be capable of producing EEFds. Their location, morphology, and unaccounted volume loss make it difficult to explain EEFDs using typical fluvial, aeolian, and cratering processes. Periglacial processes such as decay of ground ice (forming thaw lakes and alases) and cryoplanation (forming cryoplanation terraces) are possible terrestrial analogs [1,2]. This, combined with the abundance of documented periglacial features on Mars[3,4], and the stability of ground ice in the mid latitudes [5] leads us to believe that these are likely periglacial features.

We suggest that creation and subsequent sublimation of subsurface ice bodies and/or niviatation processes in a periglacial environment are responsible for EFFD formation.

References: [1] Washburn A. L. *Geocryology* (1973) [2] Czudek T. and Demek J.. (1970) *Quaternary Research, 1,* 103–120. [3] Burr D. M. et al. (2005) *Icarus, 178,* 56-78. [4] Soare R.J. et al. (2007) *Icarus,* 191, 95-112. [5] Mellon M. T. et al. (2004) *Icarus,* 196, 324-340.