CONTROL ID: 2564834

TITLE: Grid-Mapping of Hellas Planitia, Mars - Geostatistical Analyses of Cold-Climate Landforms

ABSTRACT BODY:
Abstract (2,250 Maximum Characters): Hellas Planitia is one of the largest impact basins on Mars, with a diameter of 2,300 km and located in the southern mid-latitudes. The basin also contains the topographically lowest parts of the planet, making it of special interest for water and ice-related geomorphological activities. We applied a Grid-Mapping method to analyze the geographical distribution of possibly ice-related landforms (e.g., latitude-dependent mantle [LDM] and scalloped terrain) in a visual and statistical manner. Thus, we are able to look for yet unrecognized correlations between the landforms themselves and external parameters such as elevation, slope inclination, slope aspect (azimuth), and thermal inertia.
By using this method, the study area is separated into 20,100 grids, each 20×20 km. Mapping is based on CTX images at a scale of 1:30,000 in a GIS environment. Because of the huge size of the study area, only every second grid has been mapped. For 21 different landforms, we attributed one of the five following classes to each grid: “dominant”, “present”, “possible”, “absent”, and “no data”. The non-mapped grids were interpolated later. Statistical calculations have only considered “dominant” and “present” values for reliable results. In normalized distribution diagrams only bins with more than 30 samples are shown.
Despite LDM covers Hellas almost entirely, our map shows an elliptical 800×200 km gap in NE Hellas. We suggest this lack of LDM may be the result of the dominant wind circulation pattern within the basin. According to global climate models, cold south-polar wind currents enter Hellas at a breach in its SW rim and rotate clockwise in Hellas. When they reach the northern parts of the Hellas floor around 30°S they warm up, and begin to move south again, subliming or preventing the evolution of LDM in the NE portions of Hellas because of the higher air temperature. In contrast to LDM, scalloped terrain occurs on higher inclined slopes between 6° to 9°. As they are apparently shaped by sublimation, we assume their location on steep slopes is caused by higher solar insolation, with the aspect maximum of these slopes towards north, and thus, to the sun.

CURRENT * CATEGORY: Mars: Surface

CURRENT : None

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