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Regional morphological division on Isidis Planitia on Mars

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There are thousands of small cones on Isidis Planitia on Mars. The cones have diameters of 300–500 m and heights of ~30 m. Many cones form subparallel chains several kilometers in length. Their origin is discussed in many papers [1,2,3,4] however, the mechanism of their formation is not explained, nor the reason for their arrangement in subparallel chains. The cones may be: rootless cones, cinder cones, tuff cones, pingos, mud volcanoes etc. [4]. Some of chains have a characteristic furrow suggesting possibility of fissure volcanism.

The prevalence of these chains indicates that large-scale processes are responsible for their formation. Their proper classification can help identify their origin and explain other large-scale processes on Isidis Planitia. There are a few works about statistics of cones on Isidis Planitia e.g. [1,2,5]. However, we approached the problem in a different way.

Our analysis indicates that the cones can be grouped in larger systems. We divided Isidis Planitia into several characteristic regions. There may be several types of cones in one of the distinguished regions. Our division is based on the following structures:

1. Chains of separate cones,
2. Chains of cones connected with each other,
 - 3a. Chains of cones connected to the furrow through the center,
 - 3b. Chains of cones connected to the furrow through the center with elongated, elliptical cones,
4. Chains of cones with the traces of flows,
5. Chains of irregular cones without calderas with a depression around the cones,
 - 6a. Ridge arches without cones,
 - 6b. Chains of cones on the ridges.

We also paid attention to the orientation of the chains of cones. In most of our regions there

are also groups of cones that do not form linear chains. Such group are named as "field of cones"

Our current Isidis Planitia division includes 36 regions. We distinguished 11 regions with the predominant arrangement of arcs in the directions between ENE and ESE, 5 regions with the directions between WNW and WSW, 2 regions with the directions between NNE and NNW and 15 areas with the directions between SSE and SSW, 3 areas where the arcs of the cones form circles. In the rest of our regions there are no chains of cones.

We marked also sinuous ridges, cracks and serial depressions, occurring near craters, fields with polygonally cracked surface and quasi-circular depressions sQCDs - ghost craters [4].

Plan of future research: The next stage of our research is to explain the origin of the formation of each type of cone and their chains on Isidis Planitia.

References:

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