PRESENCE OF THE TWO-GENERATION POLYGONAL NET WITHIN THE IMPACT CRATERS ON HIGH LATITUDES OF MARS. O.N. Abramenko[1], R.O. Kuzmin[2]. [1]*Geological Department, Moscow State University, Vorob'evy Gory, Moscow, Russia, 119899, (oleg_abramenko@inbox.ru)*
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Introduction: Processes of frost cracking on the Earth are widely distributed both in a zone of distribution permafrost rocks, and in an active layer. As result of the process the net of the polygonal relief is widespread on the different geomorphologic surface of the permafrost areas. The size of the features varies from first meters to 70-100 m in cross depending of many climatic and lithological factors [1,3]. In the terrestrial arctic zone the features represent the main morphological indicators of water ice presence in the rocks and sedimentary deposits [2]. Recently wide spreading of the polygonal landscapes have been found in the high-latitude regions of Mars due to the high-resolution imaging of Mars (1.4÷10.0 meter/pixel) by the Mars Observer Camera (MOC) boarded on the spacecraft "Mars Global Surveyor"[4]. Studying of the Martian polygonal forms of a relief in comparison with morphologically similar forms on the Earth can help more precisely to understand the frost processes occurring on Mars.

Observation: It was shown [3] that in many case the polygonal relief on Mars is located in the interior parts of the impact craters. As object of our research one of such craters (MOC image R1104544) has been chosen. The diameter of the crater is about 2800 meters and it is located in near-polar area in the southern hemisphere (fig. 1).

The crater is characterized by presence of two-generation polygonal net (the first - large, the second – fine within the first one). Three zones have been allocated within the crater floor based on the morphological distinction in a polygonal net of the first generation. The first zone located in a peripheral part of the crater's bottom is characterized by distinct orthogonal crossing of cracks resulted to rectangular shape of polygons were generated. The zone represents a ring belt with a width from 400 up to 600 meters and length about 8000 meters. The second zone settles down closer to the center of a crater and differs from first one by more irregular shape of the polygons, and also prevalence of three-beam crossings of cracks. It, as well as the first zone represents a ring in width from 750 up to 1250 meters and length about 4000 meters. The third zone is a center of a crater floor with radius 150-200 meters. Polygons here are

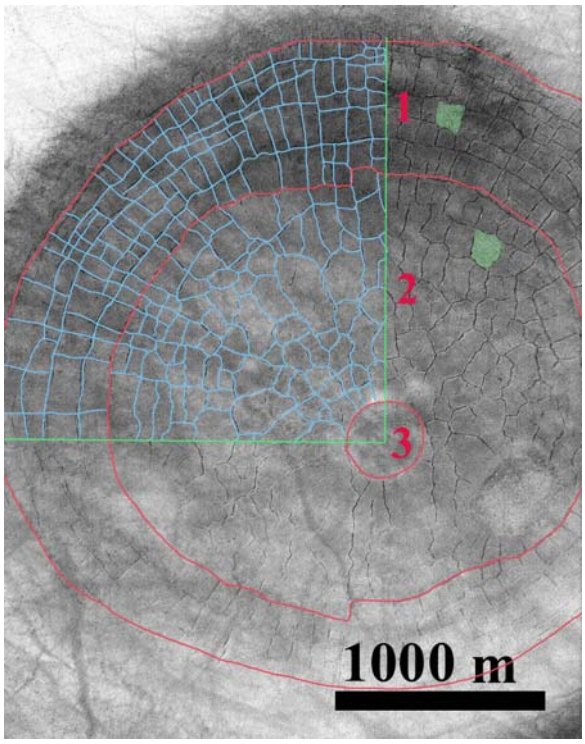

Figure 1. ***Polygonal forms inside impact crater (MOC R1104544, resolution 1.5 m/pixel). The isolated sector - area of the analysis.***

fragmentary and less distinct due to overlapping by their young sediments, or their erosion. Their exact sizes cannot be established because of the limited resolution of the picture (1.5 meter/pixel).

For detailed morphometric and the statistical analysis of the polygons the quarter sector of the crater (see fig. 1) is chosen. During researches the net of a polygonal relief has been outlined and the diagrams of the polygons size distribution were constructed (fig. 2).

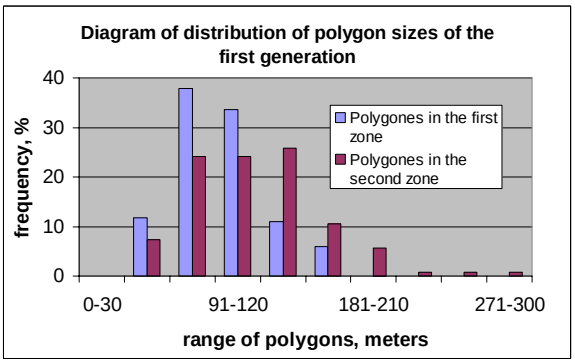

Figure 2. ***Diagram of distribution of polygon sizes of the first generation.***

The analysis has shown that for the first zone the disorder of polygons makes from 45 up to 172 meters at mean value in 93 meters.

For the second zone the disorder of the sizes of polygons is characterized by wider range and has made from 35 up to 289 meters at mean value in 116 meters. As seen from fig.2, both zones are characterized by similar character of the polygons distribution.

For definition of the sizes of smaller polygons the analysis of larger ones has been made and some well defined large polygons were chosen in ring zones (fig. 3).

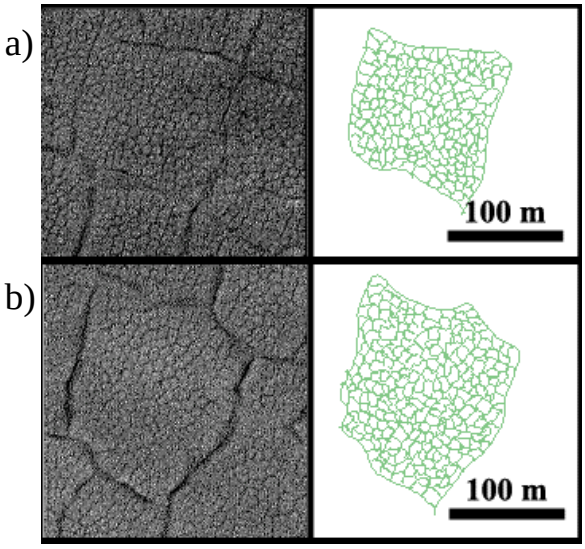

Figure 3. ***Images and sketches show the net of the second generation polygons. a) – from the first zone, b) – from the second zone.***

It was found that the size ranges of the polygons of second generation in both ring zones are very similar: from 3 up to 14 meters in the first zone (in the size of 7 meters prevail) and from 2 up to 13 meters in the second zone with prevailing size 6 meters (fig.4).

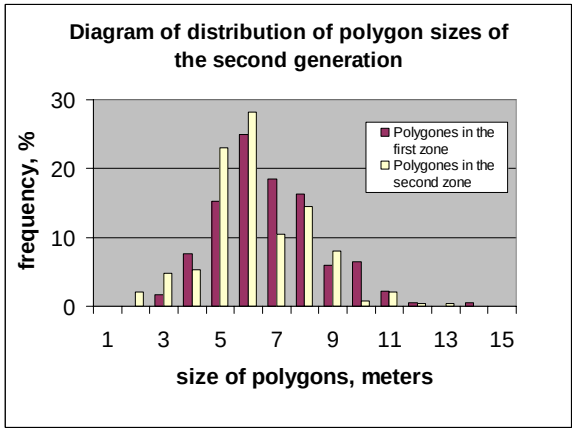

Figure4. ***Diagram of size distribution for the polygons of the second generation.***

Also average sizes of disclosing of cracks have been determined. For first, larger generation, the sizes make from 3 up to 8 meters. For the second generation the sizes of disclosing of cracks are close to the resolution of a picture and matter up to 1.5 – 2 meters.

Discussion: Conducted analysis shown that the net of the polygonal relief within the crater floor have distinct circular-radial shape. At that, in the peripheral belt of the net the sharp rectangular polygons are dominated while from periphery to the center of the crater floor the polygons characterized by more irregular shape and here three-beam crossing of cracks starts to prevail above four-beam.

Formation of the similar concentric-radial zoning of the polygonal net is very typical in terrestrial conditions for the surfaces of the meanders and closed thermokarst depressions-alases. However it is not yet clearly whether studded two generations of cracks on Mars represent consecutive cracking polygons with formation of smaller forms (i.e. influence of process of cracking in time) or fine ranges are the reason of presence of a upper layer of younger sediments which material lithologically differs from a underlying material.

For understanding of leading factors of formation of two-generation polygons on Mars we plan to increase number of researched craters for carrying out of the similar analysis in various geomorphologic conditions.

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