ANALYSIS OF THE TERRAIN AND SURFACE SLOPES OF THE POTENTIAL LANDING AREA OF THE EXOMARS SPACECRAFT OXIA PLANUM. O. I. Turchinskaya[1], I.A. Agapkin[1], A.A. Dmitroskiy[1], E.N. Slyuta[1], [1]Vernadsky Institute of Geochemistry and Analytical Chemistry, Moscow, Kosygina 19, Russia, olgaturch@yandex.ru

Introduction: Topographic information for the entire Oxia Planum region is provided by the MOLA Laser Altimeter. Based on these data, a global topographic map of Mars was constructed with a spatial resolution of 463 m/pixel. In our study, we used this map to provide a general topographic characterization of the Oxia Planum landing site and to estimate the spatial and frequency distribution of long wave slopes (based on 463 m) in the landing areas The overall topographical configuration of the Oxia Planum area is made up of two main provinces, low-lying plains and elevated mainland terrain (Fig.1).

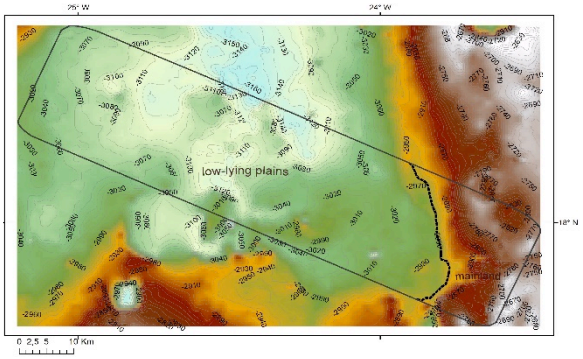

Fig. 1. Topographic map of the Oxia Planum planting area. The section of isolines is 10 m.

Lowlands: Within the lowlands, the relief varies slightly, within (100-150) m at a distance of about 80 km. The main topographical details in this province are the gentle hills corresponding to the positive landforms of the older area, and the relics of impact craters. . The dissection of the terrain within the lowlands is more contrasting near the southern edge of the planting area and less contrasting along the central axis of the planting area.

Almost the entire surface of the lowlands is characterized by small surface slopes (less than 2°, Fig. 2), which occupy more than 90 % of the territory in the lowland topographic domain. Practically all slopes steeper 4° concentrated in mainland topographic domain (Fig. 2). The frequency distribution of slopes on the basis of 463 m at the landing area Oxia Planum is summarized in table 1.

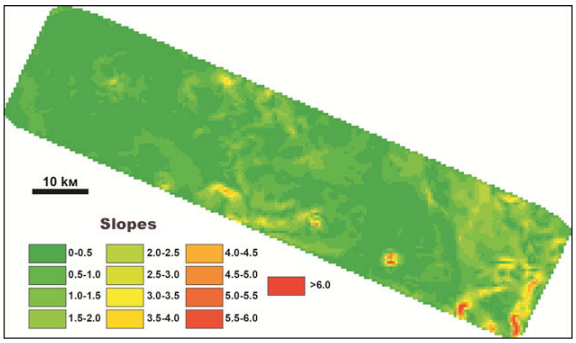

Fig. 2. Spatial distribution of surface slopes (base 463 m) in the area of Oxia Planum planting. The slopes are calculated from the topographic data of the MOLA laser altimeter.

Table 1.Cumulative probability of meeting slopes (base 463 m) at the landing site of Oxia Planum

Slopes, °		Cumulative probability, %
From	to	
0	0,5	52,3
0,5	1	78,4
1	1,5	89,5
1,5	2	95,1
2	2,5	97,3
2,5	3	98,3
3	3,5	99,1
3,5	4	99,5
4	4,5	99,7
4,5	5	99,8
5	5,5	99,9
5,5	6	100,0
6	6,5	100,0

Mainlands: Within the mainland province, the surface is located at higher topographic horizons and the dissection of the relief is noticeably stronger. The main forms that determine the topography of the mainland province in the Oxia Planum landing area are depressions of the fluvial beds of Coogoon Valles with a depth of about (50-60) m and coarse-grained ejections of one of the large continental craters with a height of up to 100 m.

In our study, slope was defined as the long base (463 m) and short-base - 5 m (Fig.4). Therefore, on shorter bases, steeper slopes should be expected, concentrated mainly in the mainland area (Fig.5, Tab.2).

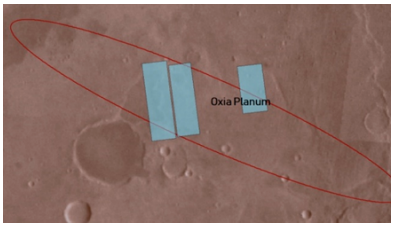

Fig. 3. Coating of digital relief models by images of HiRISE on landing places of Oxia Planum.

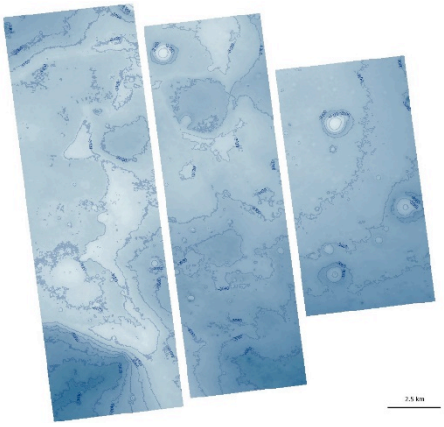

Fig. 4.Topographic map of part of the landing area of Oxia Planum, compiled from stereo images of the camera HiRISE and having a spatial resolution of 5 m. The section of isolines is 20 m. The values of some altitudes are indicated in kilometers.

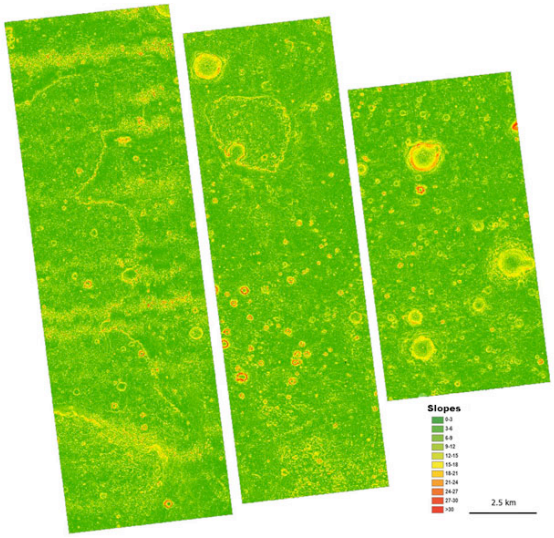

Fig. 5. Spatial distribution of slopes on the basis of 5 m according to high-resolution DTM data.

Table 2. Cumulative probability of slope encounter (base 5 m) at Oxia Planum landing point

Slopes , º		Cumulative probability, %
From	to	
0.00	0.50	3.2
0.50	1.00	11.7
1.00	1.50	23.1
1.50	2.00	35.1
2.00	2.50	46.1
2.50	3.00	55.4
3.00	3.50	63.1
3.50	4.00	69.3
4.00	4.50	74.3
4.50	5.00	78.3
5.00	5.50	81.6
5.50	6.00	81.7
6.00	9.00	93.3
9.00	12.00	97.0
12.00	15.00	98.6
15.00	18.00	99.4
18.00	21.00	99.7
21.00	24.00	99.9
24.00	27.00	100

Results: The general topographic configuration of the Oxia Planum area is represented by lowlands and elevated mainland terrain. The relief of the proposed landing areas of Oxia Planum is characterized by small long-wave surface slopes of the order of 2o and 3o, respectively, occupying more than 90% of the area.