

VENUS MAPPING AT SMALL SCALE: SOURCE DATA PROCESSING AND CARTOGRAPHIC INTERPRETATION

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INTRODUCTION

In 2008 the Venus hypsometric hemispheres map at a scale 1:90M (fig.1) was compiled in Lunar and Planetary department (SAI) [1]. This map was prepared on the base of heights the 64800 object points, having obtained from the Magellan altimetry data [2,3]. The heights on Venus were referenced to a sphere of radius 6051.0 km [4]. In 2010 the new Venus hemispheres relief map at a scale 1:45M was compiled and published (fig.2). As compared with the former map the new one, source data and compiling techniques have some special features.

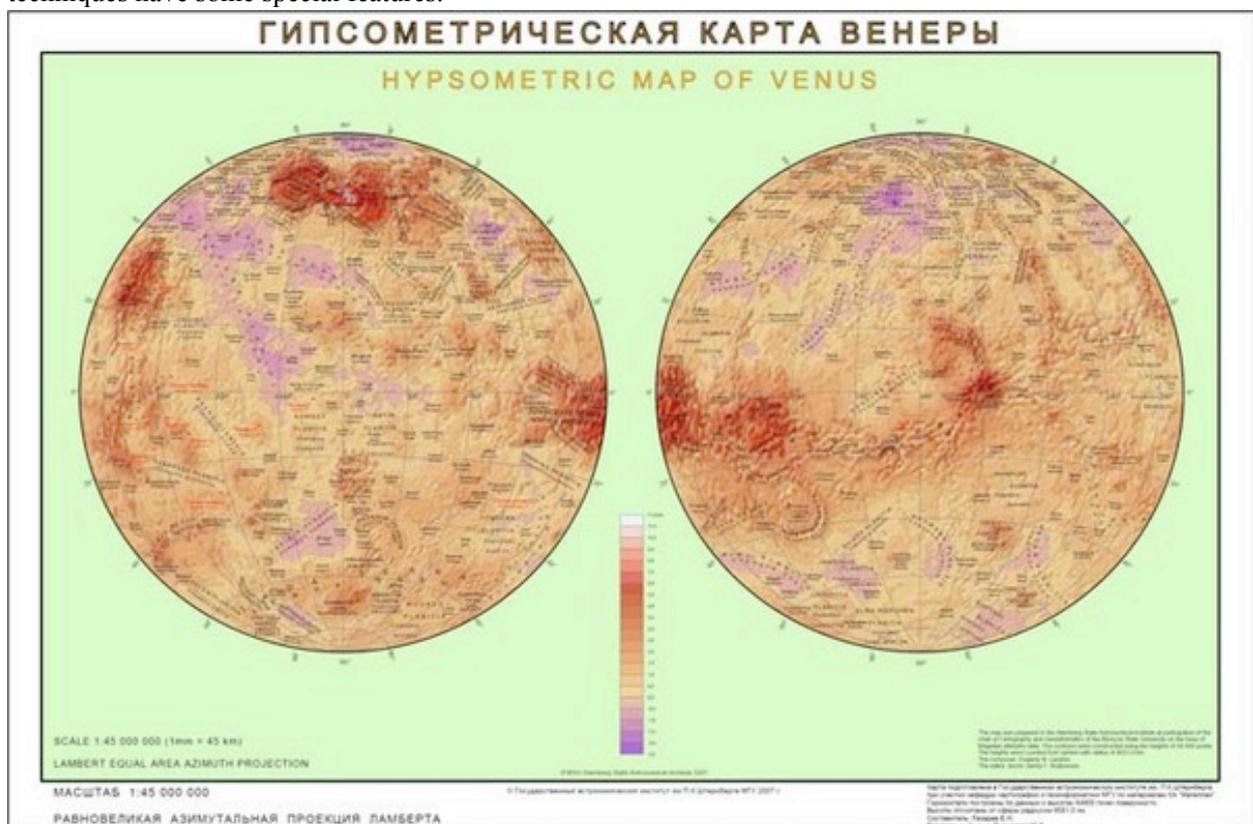


Figure 1. Venus hypsometric map (2008)

VENUS RELIEF MAP

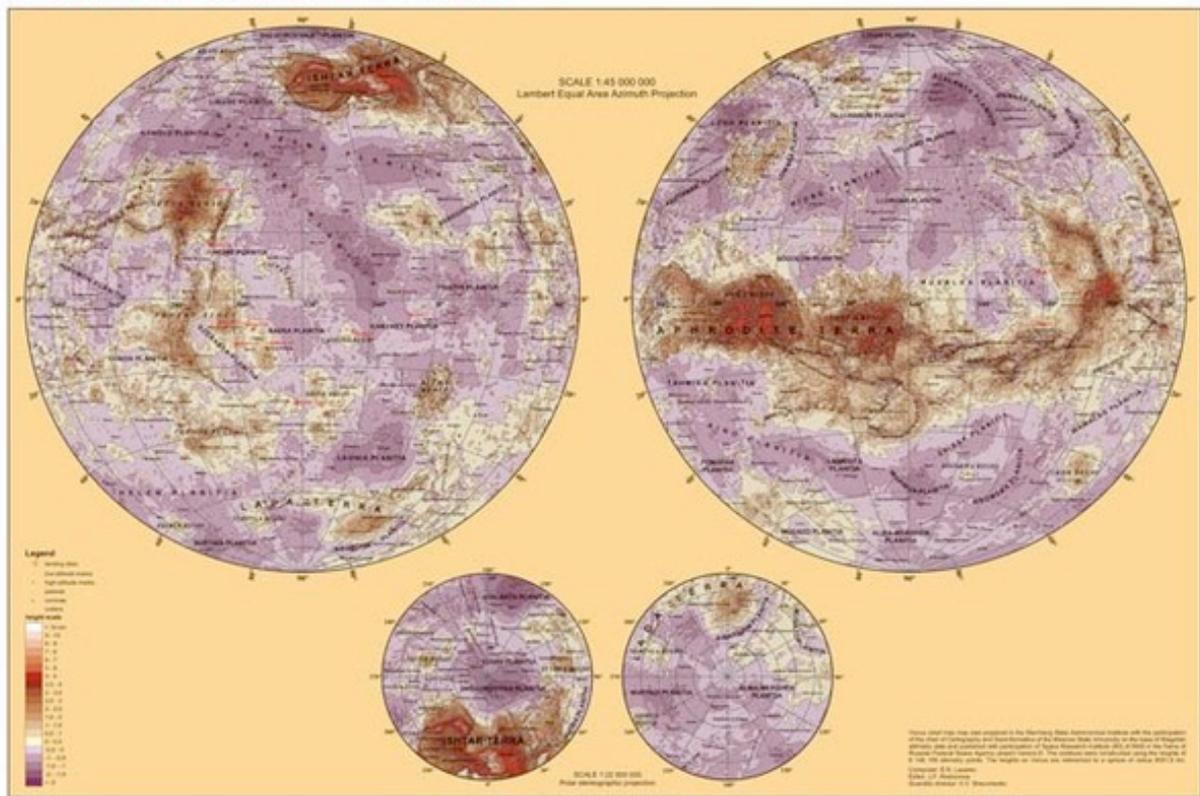


Figure 2. Venus relief map (2010)

APPROACH

For map compiling the sphere with the radius 6051,8 km was used as a reference surface [5]. The DTM consisted of more than 33 mln. object points and compiled on the base of the NASA spacecraft Magellan radar (SAR) data was used as a source of height values. To compile the map more correctly we had to average the source DTM to the size of 6 mln. points. For it the polygon cells net was created for the whole Venus surface and superimposed with object points. The size of each polygon was 7,5 to 7,5 km. Then the average height for each cell was calculated using the heights of each point having “fallen” in this cell (fig.3). And finally coordinates of new object point are latitude longitude of cell centroid and new mean height.

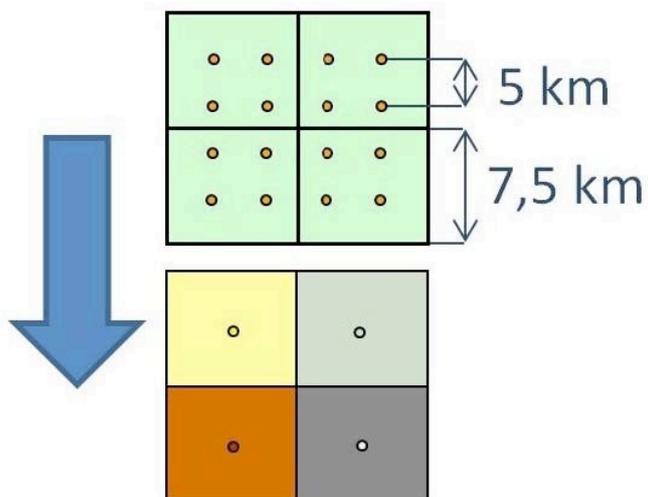


Figure 3. Source DTM processing. Using polygon cells net to calculate new object points with the distance between them 7,5 km.

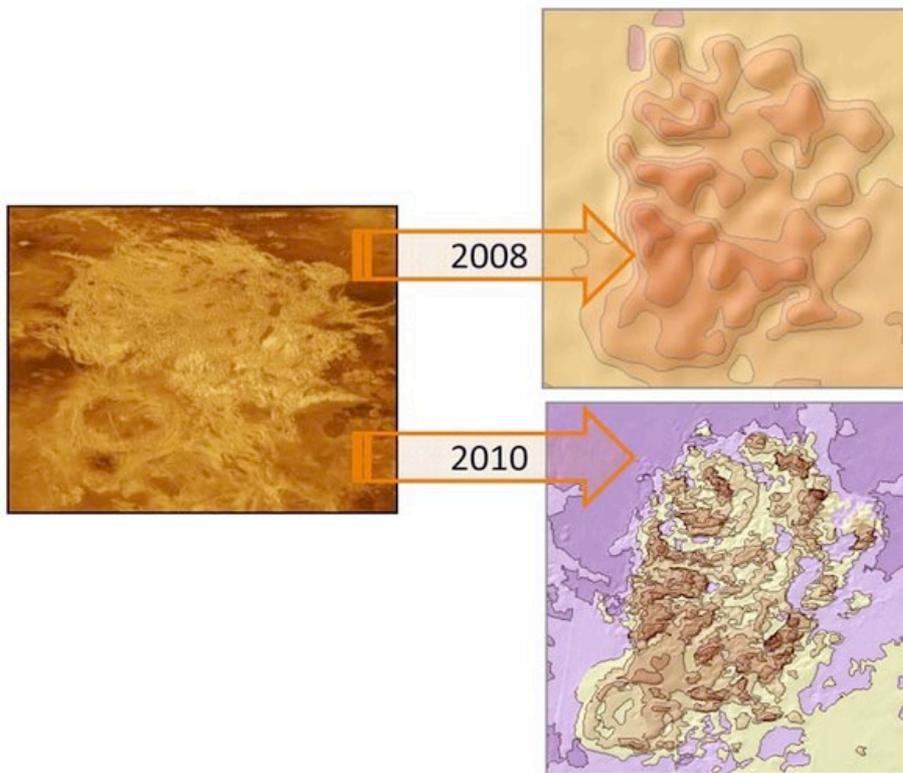


Figure 4. Alpha Regio. Both Venus maps: comparison of relief representation

The location of central meridians of both Venus hemispheres were selected using the fact, that every 583 days Venus is positioned between the Earth and the Sun. In this position the hemisphere of Venus with the 320°E central longitude turns to the Earth. This situation will be observed at least 600 years [6]. Based on these conditions 320° and 140°E longitudes are the central meridians for the of the Venus relief map hemispheres compiled in Lambert equal area azimuth projection.

CONCLUSIONS

As a result of data processing and compiling the Venus hemispheres relief map was created. Besides, the small maps were compiled for the Venus Polar regions. For this map the special height color scale was developed, where lowlands being below zero level represents by violet color. The precision of relief representation of the new map is much higher, than for the previous map having published in 2008 (fig.4). The DTM obtained can be used for creating different height histograms (fig.5) and for 3D modeling of Venus relief (fig.6). In future it is planned to continue compiling relief and other thematic maps of terrestrial planets, their moons and moons of Giant planets in different scales using the developed approaches. At the same time 3D modeling and data processing will allow to make investigations of space bodies' relief and compare them with each other in different ways.

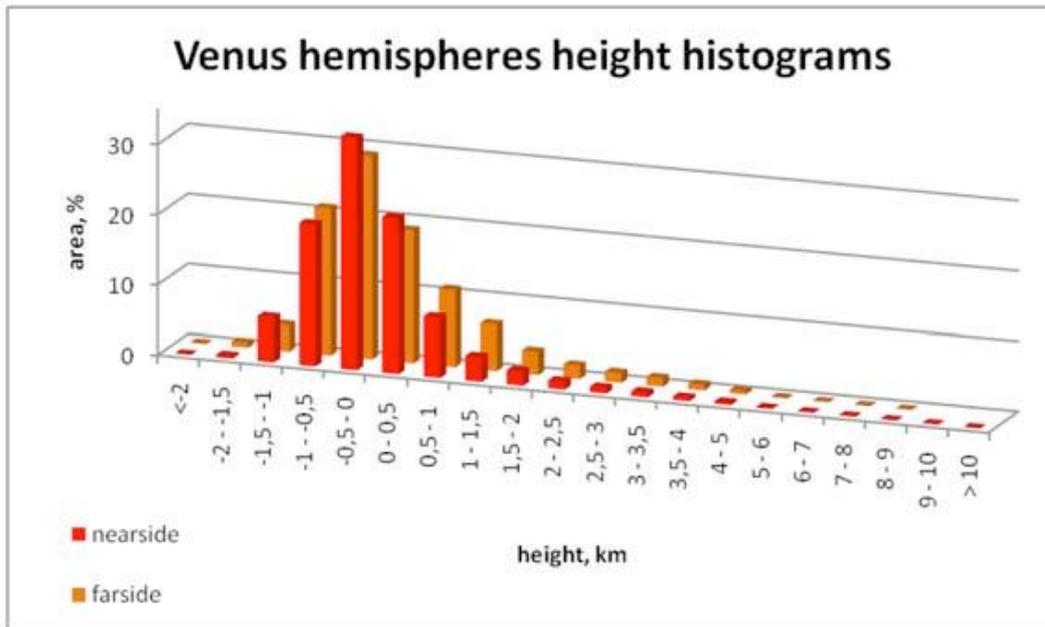


Figure 5. Height histogram for both Venus hemispheres.

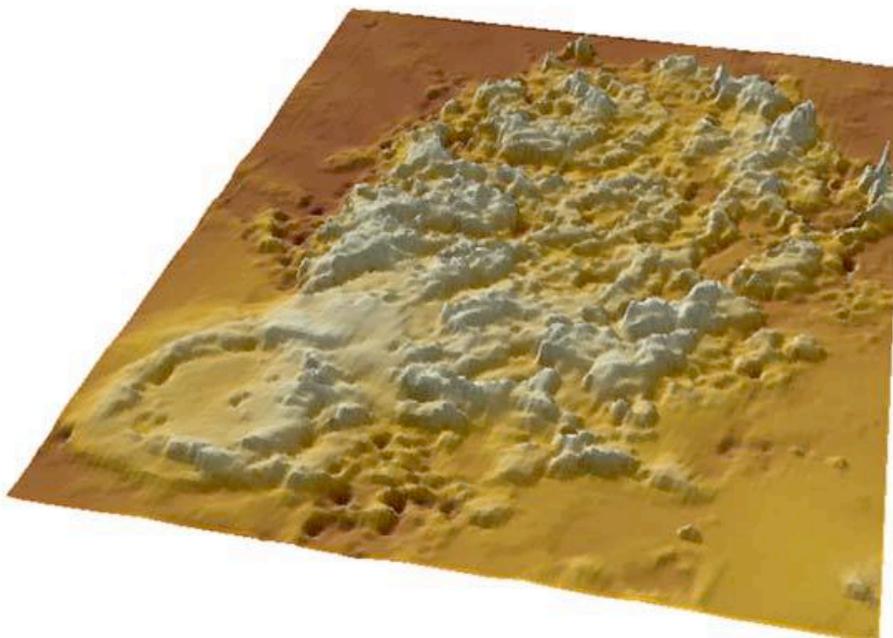


Figure 6. 3D model of Alpha Regio.

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