

**COMPARATIVE MORPHOMETRIC ANALYSIS OF THE RIFTS OF VENUS (ATLA, BETA-PHOEBE) AND EARTH (KENYAN-ETHIOPIAN RIFT).** E. N. Guseva, Vernadsky Institute, 119991, Moscow, Russia, [guseva-evgeniya@ya.ru](mailto:guseva-evgeniya@ya.ru)

**Introduction.** The preliminary analysis of the topography and morphology of the rift zones of Venus (Atla and Beta-Phoebe) and continental rift of the Earth (Kenyan-Ethiopian rift) [1] shows the following similar features for rift of the two planets: 1) the rifts are spatially associated with large regional-scale uplifts (domes) and confined by them [2; 3], 2) the rift uplifts represent centers of volcanic activity, their formation is associated with the activity of mantle diapirs [4; 5]. The main difference previously established between the studied rifts – superiority the rifts of Venus over the rifts of Earth in width of the rift valley by 30%.

**The goal of this work** was to compare morphometric parameters of the studied rift valleys (height of the flanks, width, depth and shapes of the valleys) of Venus and Earth for possible future estimates of the thickness of lithosphere of Venus, based on terrestrial analogs.

**Observations and results.** The studied rifts of Venus and Earth are comparable in length. The total length of the Kenyan-Ethiopian rift is ~ 2200 km [6], the rifts of Atla Regio extend on ~ 3500 km and rifts of Beta-Phoebe Region extend on ~ 2600 km [1].

The rift valleys of the Atla Regio (NW, SE and SW branches) are often of complex shape (Fig. 1, 21 cases), less W - or V - shaped; the average height of rift flanks is ~  $2.4 \pm 1.3$  km and ~  $2.2 \pm 1.2$  km, the average visible depth of the rifts is ~  $2.5 \pm 1.2$  km, the average width of the studied rifts is ~  $243.3 \pm 94$  km. The maximum height of the rift uplifts, which are associated with the rifts of the Atla region, is ~  $2.3 \pm 0.9$  km.

The rift valleys of the Beta-Phoebe region (N, SW, S branches) are often of complex shape (Fig. 1, 21 case), less V - or W - shaped, the average height of rift flanks is ~  $2.0 \pm 1.2$  km and ~  $2.1 \pm 1.4$  km, the average visible depth of the rifts of the Beta-Phoebe region is ~  $2.2 \pm 1.4$  km, the average width of the rifts is ~  $212.5 \pm 75$  km.

The maximum height of the rift uplifts, which are associated with the rifts of the Beta-Phoebe region, is ~  $3.15 \pm 0.9$  km.

The rift valleys of the Ethiopian area are often W - shaped (Fig. 1, 5 cases), less V - shaped and complex shape, the average height of rift flanks is ~  $1.8 \pm 0.4$  km and ~  $1.7 \pm 0.5$  km, the average visible depth of the rifts of Ethiopian region is ~  $1.7 \pm 0.4$  km, the average width of the rifts is ~  $156.5 \pm 45.5$  km. The maximum height of the rift uplifts, which are associated with the rifts of the studied region, is ~  $1.7 \pm 0.4$  km.

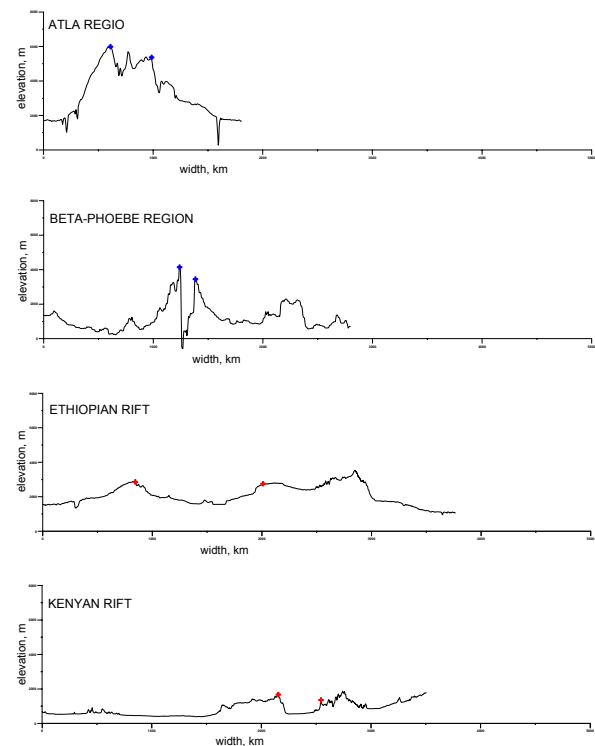


Fig.1. Topographic profiles across the rifts of Atla and Beta-Phoebe (Venus) and Ethiopian and Kenyan rifts (Earth).

The rift valleys of the Kenyan area are often V - shaped (Fig. 1, 4 cases), less W - shaped, trough - shaped and of complex shape, the average height of rift flanks is ~  $0.7 \pm 0.3$  km and ~  $0.8 \pm 0.5$  km, the average visible depth of the rifts of the area is ~  $0.7 \pm 0.4$  km, the average width of the Kenyan rifts is ~  $97.5 \pm 42.6$  km.

The maximum height of the rift uplands, which are associated with the rifts of studied region, is  $\sim 0.8 \pm 0.5$  km.

**Conclusion.** The studied rift valleys are comparable in length, shape of rift valley and their morphometric parameters. The parameters of the rifts and the uplands of Venus (height of flanks, width of the rift valley, height of upland) are approximately two times higher than the corresponding parameters of the rifts of East Africa (tabl.1). This difference may be due to differences in thickness and rheological properties of the lithosphere of the Earth and Venus.

Tabl. 1. Morphometric parameters of rifts.

Rift region	height of the flanks(km)	mean depth of rifts, (km)	mean width of rifts (km)	height of the domes (km)	form of rift valley	asymmetry of rift valley
Atla	2,4±1,3 2,2±1,2	2,5±1,2	243,3±94	2,3±0,9	complex*	left-sided
Beta-Phoebe	2,0±1,2 2,1±1,4	2,2±1,4	212,5±75	3,2±0,9	complex*	left-sided
Ethiopian	1,8±0,4 1,7±0,5	1,7±0,4	156,5±45,5	1,7±0,4	W-shaped	sided
Kenyan	0,7±0,3 0,8±0,5	0,7±0,4	97,5±42,6	0,8±0,5	V-shaped	sided

\* Complex shape of the rift valley – the valley does not have a clear shape in relief with a horst uplifts at the bottom and complicated of the scarps on the flanks.

**Further study** will be directed on estimation of the thickness of lithosphere for the rifts regions of Venus and Earth using the ratio of the morphometric parameters of the rift uplands and valleys with the same parameters of terrestrial continental rifts in the East African rift zone.

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