THE FOUR ARACHNOID GROUPS OF VENUS. Kostama, V-P. Astronomy, Department of Physical Sciences, University of Oulu, P.O. BOX 3000, FIN-90014, Finland (<petri.kostama@oulu.fi>).

Introduction: A population of 96 arachnoids has been found on Venus [1]. These surface structures were first discovered on the Venera 15/16 radar images and later defined in detail by the Magellan mission [2, 3]. The arachnoids have a peculiar distribution, which is generally different to that of the coronae and particularly the novae [4]. The global distribution of arachnoids reflects certain noticeable facts: There is a clear concentration of arachnoid features in the northern hemisphere as 65,6 percent (63 feat.) of the features is located there, while only 34,4 percent (33 feat.) of the population is located in the southern hemisphere [5]. In addition, the arachnoids form four large groups which include roughly 25 % of the total population.

The arachnoids of Bereghinya and Ganiki Planitia: The arachnoid group of Bereghinya Planitia is by far the largest arachnoid concentration on Venus. The structural composition of the features of the group are generally distinct and the features are connected by a uniform, chain-like pattern of lineaments.

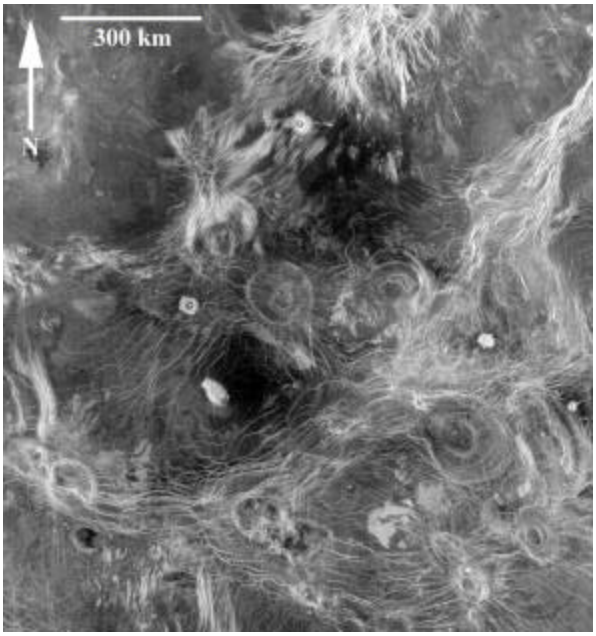

Figure 1. The large arachnoid group of Bereghinya planitia.

The group is located as a continuation of the Ausra Dorsa (Figs. 1, 2). This group includes more than ten structures identifiable as arachnoids. The arachnoids are usually younger than the surrounding features. However, at least in the case of Ausra Dorsa (DZ1), some parts of the ridge belt cut the arachnoids. This implies that the arachnoids or the group may have had several evolution phases.

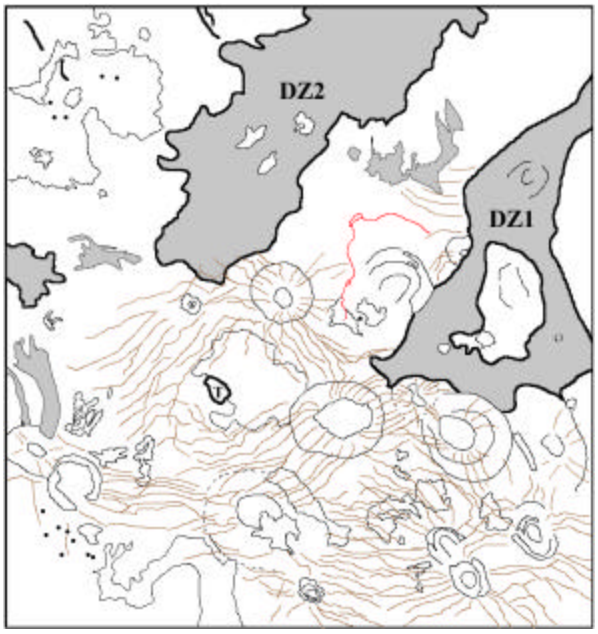

Figure 2. Scetch map of the large arachnoid group on Bereghinya Planitia. Brown lines are ridges, red represents the lava channel within the area. Deformation zones are in grey.

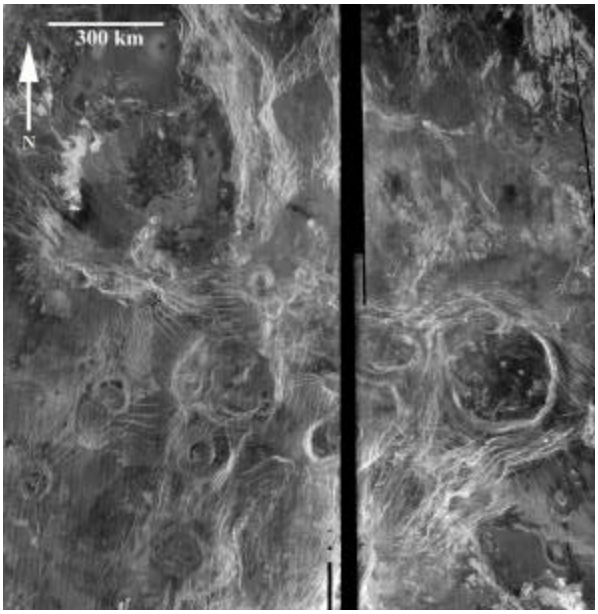

Figure 3. The arachnoid group of Ganiki Planitia.

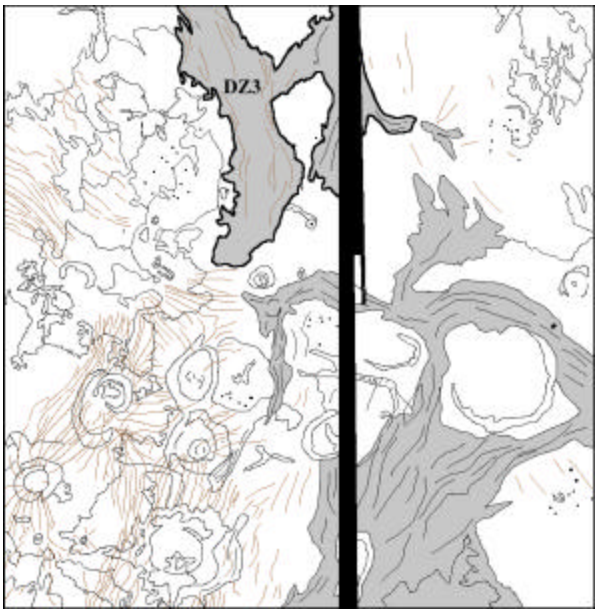

Figure 4. The geological scetch map of the arachnoid group of Ganiki Planitia. Brown lines indicate ridges and grey areas are deformation zones.

The group located in Ganiki Planitia (Figs. 3, 4) includes five arachnoids. Also in this case, the arachnoids are connected to each other by ridge-like lineaments. The features are connected as two chains to the east-west oriented ridge belt, Abe Mango Dorsa, located south of Iris Dorsa (DZ3). In this group the ring structures of the arachnoids are also identifiable. Only one arachnoid in this group has extensive lava-flows. Even if the flows cover the arachnoid, the structure has a concentric central part as well as radial lineaments. In this case, some of the lineaments are fractures. This is typical for structures with extrusive-type volcanism, such as the novae [6]. In general, the arachnoids of this group cut and cover the surrounding environment. The topography of the arachnoids is very similar, they differ from each other mostly by their volcanic properties.

According to the study, several of the studied structures have probably had more than one evolution phase. The arachnoids of Bereghinya and Ganiki Planitia or at least their latest evolution phases are young. It is therefore possible that the arachnoids have begun to develop earlier and their evolution has continued through the other events deforming the region or the activity of the arachnoids has restarted after the final formation of the surrounding environment.

Other concentrations of arachnoids: There are two other smaller groups of arachnoids on Venus. One is located close to the equator on Rusalka Planitia (Fig. 5) and other to the north of Atla Regio. Both groups display similar connecting lineaments to the larger ones on Ganiki and Bereghinya Planitia. In these cases also, the groups are located on plains with severe deformational zones or belts.

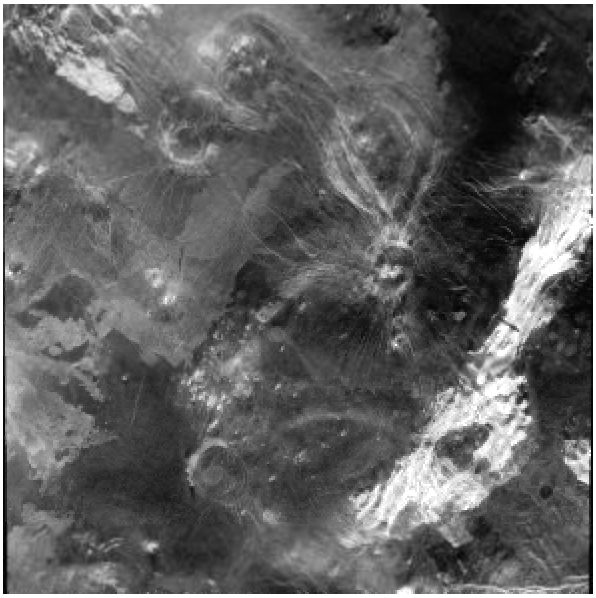

Figure 5. The arachnoid group of Rusalka Planitia.

Conclusion: Although the basic morphology of the arachnoids is always similar, there are differencies in their topography and volcanism [5, 6]. This is found to reflect the geological variations of the surrounding environment [6]. The range of differencies indicates versatility of the formation process of the arachnoids. Their global distribution [6] has been controlled by the geological properties of the various regions on Venus. The most typical location for arachnoid concentration is a plains region affected by regional compression in the close vicinity.

This tendency is seen in the fact that the formation of arachnoids due to the magma intrusion close to the surface has had a relation to the formation of the deformational belts. The more detailed global study of arachnoids and ridge belts provides an inview that these volcano-tectonic regions with arachnoids and deformation zones are tectonical borders of connected block units or regions of thinner crust, easily modified by deformational forces. The share of compression is visible especially within the ridge belts. The studied arachnoids are also important indicators for regions of interacting volcanic and tectonic development.

References: [1] Kostama and Aittola (2001) cc.oulu.fi/tati/JR/Venus/volcanotectonics/catalogue.html [2] Head et al. (1992) JGR, Vol. 97, 13153 – 13197 [3] Barsukov et al. (1986) JGR, Vol. 91, 378 – 398 [4] Kostama and Aittola (2001) LPSC XXXII, abstract#1185 [5] Kostama, V-P. (2001) PSS, in review [6] Aittola and Kostama (2000) PSS, Vol. 48, 1479 – 1489.