SINGULARITIES IN DISTRIBUTION OF ELLIPTICAL CORONAE ON THE SURFACE OF VENUS (PRELIMINARY RESULTS). V.P. Kryuchkov[1,2], J. Raitala[2], and T. Tormanen[2], 1Vernadsky Institute of Geochemistry and Analytical Chemistry, RAS, Moscow, Russia, kvp@geokhi.ru 2Dept. of Physical Sciences, University of Oulu, Finland

Measurements of coronae on Venus showed that most of them have an elliptical shape [1,2]. From 219 circular structures 75% have the ratio of short axis to long axis less than 0.9. A distribution of azimuths of long axes in elliptical coronae shows a rather broad variation (Fig. 1b, cf. [2]). It has been noted that the distribution of these structures have a tendency to form areal clusters and linear zones on the planet's surface. The number of elliptical coronae give a basis to assume that these structures were formed not only due to the gravitational stress field, but also under the influence of other stress fields [1, 2, 3]. Therefore it is interesting to study their distribution in details.

All measured Venusian coronae were located on the photomap of Venus (Fig. 1a). It is necessary to note, that these structures have variations in their density and distribution on Venus. The highest measured number of coronae is found in the meridian zone between Aphrodite Terra and Beta Regio (190°-290° longitude). Variation in the distribution of the corona structures is caused by two factors: 1) Coronae are not found everywhere on planet (for example they arepractically absent on tesserae and they are rare in Atalanta Planitia); 2) We did not measure the whole corona population but only those structures with a regular shape and distinctly defined boundary. On basis of azimuth direction of the long axes all studied coronae were divided into 6 main direction classes: 30°: S - N 0° ± 15°; W - E -75° – -90° and 75° – 90°; NW –30° ±15°; NW -60° ±15°; NE 30° ±15° NE 60° ±15°. Their distribution on the planet's surface is presented in Fig. 1. Linear zones of prevalence of coronae were allocated in each direction. Lines defining these zones were constructed approximately parallel to azimuths of long axes of elliptic structures (shown green in the figures). These lines border parallel zones with greater frequencies of corona occurrence. The given linear zones reflect some alternation of zones with greater prevalence of elliptic structures while the gaps indicate that such coronae are missing or absent. Within the bordering lines of the indicated zones the areas with various density of elliptic structure distribution are marked. The areas with a higher density of coronae were named areal clusters and their edges have designated dashed dark blue lines. When we located these lines on the Venusian photomap we found out that they often coincide with fracture belts, rift zones or linear features possibly indicating tectonic faults. Each measured corona is designated by color that corresponds to the range of the ratio of a short axis to long axis (cf. the legend of Fig. 1).

Allocated areal clusters are characterized by mosaic-like distribution and areal clusters of different directions are not found in the same locations. However, in some cases it is possible to see a close-located centers of two clusters. Such clusters are observed on the corona distribution photomap with azimuths of long axes -30°(a coordinate of center of cluster 25°N / 30°E) and -60° (a coordinate of center of cluster 30°N / 30°E) NW direction (Fig. 1f and 1d), and also 30° (a coordinate of center of cluster 20°N / 40°E) and 60° (a coordinate of center of cluster 20°N / 30°E) NE direction (Fig. 1e and 1g). It is necessary to note that even if their centers are located rather close to each other they clearly differ in the sizes and do not have a common boundaries. It means, that contours of areal clusters of elliptic coronae are controlled by tectonic boundaries that for each corona cluster are different and individual. The meridian zone between Aphrodita terra and Beta regio (190°- 290° longitude), mentioned above, can be an important example of such tectonic control. Here we can find a series of areal clusters of elliptical coronae which have a different direction of their observed long axes. The areal clusters with a one direction of axes are superposed on another clusters with other axes direction and as a rule they have not the same boundaries. Thus it is once again clear that coronae have a prevalence of a special direction of long axes as supervised by tectonic structures. These tectonic features are special and individual for different clusters of elliptical coronae.

The constructed scheme of areal corona clusters with similarly elliptic coronae has still now a preliminary character because of some uncertainties. Nevertheless, it is possible to consider these clusters as zones of first approximation in distribution of stress fields during formation of elliptic coronae with the similar spatial orientation in their characteristics.

References: [1] Kryuchkov V.P., Raitala J., and Tormanen T., (2006) LPSC XXXVII 1657. [2] Kryuchkov V.P., Raitala J., and Tormanen T., (2006) Vernadsky - Brown 44, m44_47. [3] Mastrapa R. M. E, and Melosh H. J., (1998) LPSC XXIX, 1204.

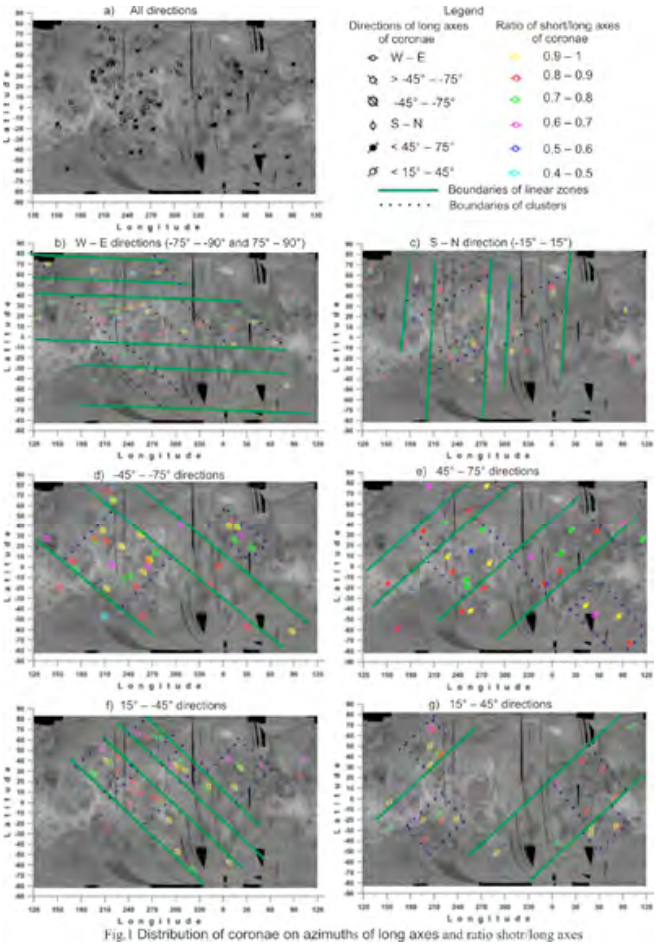

Fig.1 Distribution of coronae on azimuths of long axes and ratio shotr/long axes