COMPARISON OF VENUSIAN NOVAE AND ARACHNOIDS. M. Aittola and V.-P. Kostama, Astronomy, University of Oulu, Oulu, FIN-90401 Finland (<maittola@paju.oulu.fi>, <petrikos@paju.oulu.fi>).

Venera 15/16 and Magellan radar data have revealed a large number of morphological features, which may have been caused by rising mantle plumes, for example, coronae [1], novae [2] and arachnoids [3]. On the basis of Magellan data, radial features or radial fracture domes, which could be considered as novae, have been described as corona-like features [4] or part of the corona formation [5]. The arachnoids are also thought to be one sub-type of coronae [6] or corona-like features [4]. Basically, the morphology of novae is very simple with stellate pattern, but still there can be great differences between them [7, 8], thus they can be divided to at least four groups based on their morphological properties [7]. Arachnoids are generally circular in plan and they are usually surrounded by a radial system of ridges. We have concentrated on comparing properties like distribution, morphology, topography and volcanism to examine how novae and arachnoids differ from each other and if there are some similarities between them. For the study, the novae and the arachnoids were selected from the Venus Volcanic Feature Catalogue [9]. However, in the case of arachnoids, in contrast to earlier studies and counts [3, 9 and 10], we have found a global population of 69 features that we can confidently call arachnoids.

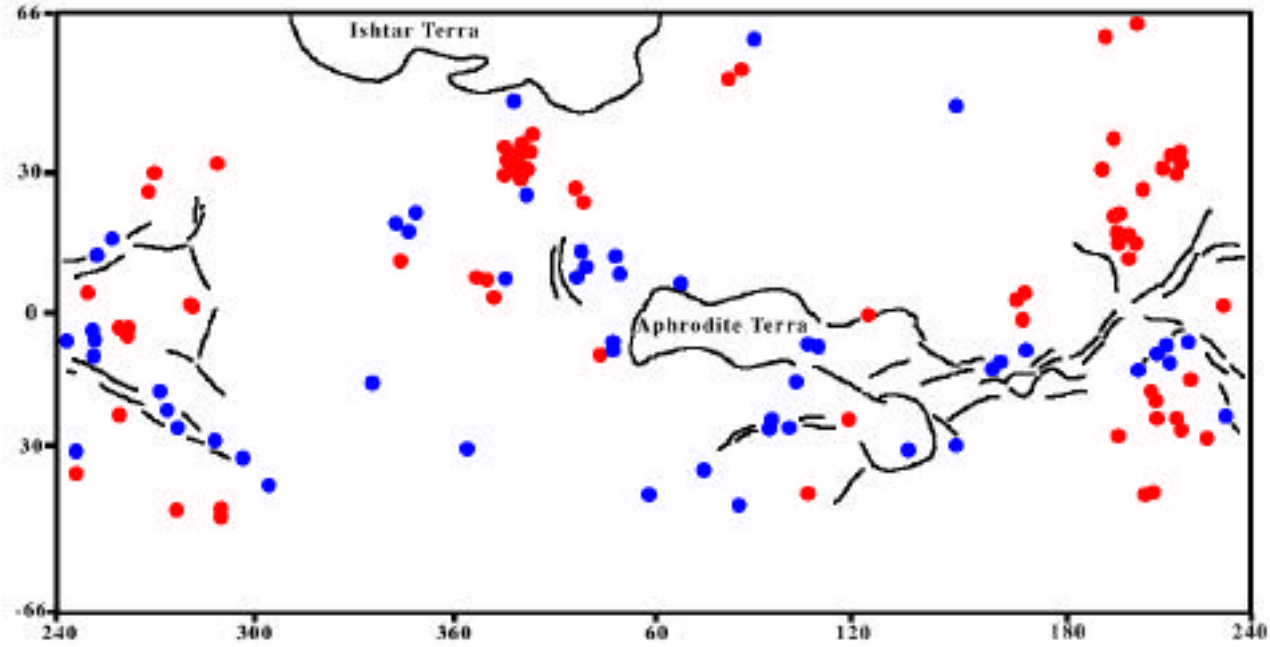
Topographic profiles indicate the dome-like elevation of the novae and the central depression of the arachnoids, excluding those few arachnoids that are located on the volcanic areas or close to the extension zone. The novae usually include a great amount of associating volcanism, unlike the majority of the 69 arachnoids studied by us, but also in this case, the arachnoids on the volcanic plains or close to the extension zone are exceptions. This divergence can be considered as evidence of the type of volcanism which is extrusive in the case of novae, while volcanism associated with arachnoids is usually intrusive, producing radial lineaments that are usually ridges in morphology. Conversely practically all the radial structures associated with the novae are extensional [7]. Thus most of the novae studied are distinct elevations and they usually are associated with distinct lava flows, which give us a reason to assume, that novae are formed by volcanic uplifting, which is the most proposed reason for the formation of novae [2] and radially fractured domes [5], which may be interpreted as novae.

Distribution of the novae and the arachnoids is presented in Figure 1. The first observation is that novae seem to be placed more or less in chains to the southern hemisphere, while the arachnoids are distributed as groups or clusters usually within the northern hemisphere. In the northern hemisphere there are distinct groups of arachnoids, the group on Bereghinya Planitia being the best example. It contains more than ten distinct structures in close relation to each other, often joined by radiating lineaments. The diameter of the area is less than 1000 km. Another good example of this kind of grouping is located near to Ganiki Planitia. Conversely novae do not form any group larger than three stellate structures. However, if surveying distribution of novae in a global scale, there seem to be a trend that novae, which are concentrated close to equator, form a certain kind of chains. An example of this kind of distribution is a deformation belt between Atla and Themis Regii. It is rather long chain, and the novae are not very closely spaced. Naturally, all novae do not form chains, but there are also single structures far away from other features with similar pattern, as one centered at 54˚N/18˚E.

The other observation concerning about distribution of novae and arachnoids is that novae appear to be located higher than mean planetary radius close to deformation zones, while groups of arachnoids are located on plains which are usually lower than the mean planetary radius. Only a few novae are not in association with deformation zone and most of these structures are close to other areas with volcanic and tectonic activity like volcanoes or coronae. The fact that most of the novae studied are connected to regions which are supposed to be rather recently active, is again a reason to assume, that novae are relative young structures, in general. These differences of geological environments besides the differences in volcanism, topography and nature of radial structures indicate that the geologic environment has to be the most determining factor in the formation process of novae and arachnoids.

Conclusion

Although novae or nova-like features and arachnoids are classified as corona like features or corona sub-types [3, 4, 5 and 6], examination of the novae and a selection of the arachnoids from the Venus Volcanic Feature Catalogue [9] express the differences between these structures besides their morphological characteristics. As an indication that novae are formed by a volcanic uplifting, they usually are dome-like elevation and have extensive volcanism, unlike the majority of the 69 arachnoids studied by us. Radial structures associated with the novae are extensional, while usually ridges are found together with the arachnoids. Other interesting result is found when studying the distribution of these structures. The novae are distributed in chains mostly on the southern hemisphere and the majority of the arachnoids form groups or clusters on the northern hemisphere. In addition to this, their geological surroundings are very different, the novae being usually located close to deformation zones close to the equator and most of the arachnoids being located on the plains. This diversity of geologic environment indicates that the characteristic structures of the novae and the arachnoids are rather due to geologic environment than the different stages of corona development. Thus the challenge of the future work is to solve



out what are the most determining factors in certain geologic environment which influence the uprising magma to form an arachnoid or a nova.

Figure 1. Locations of the novae and arachnoids excluding three novae, which are located to the north of the area. The novae are marked as blue dots and arachnoids as red dots.

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