CORONAE-SOURCES OF YOUNGER VOLCANISM ON VENUS: LACK OF SIZE-ERUPTIVE PRODUCTIVITY CORRELATION. E.N. Guseva and M.A. Ivanov, Vernadsky Institute, RAS, Kosygin st., 19, Moscow, Russia, guseva-evgeniya@ya.ru.

Introduction: Morphologically distinct volcanic complexes associated with the formation of coronae are usually concentrated within their annulus [1]. In some cases, however, young lava flows, which form lobate plains (pl), extend beyond the annulus [2]. In these coronae, volcanic activity associated with the late stages of the evolution of the parent mantle diapirs is thus manifested. Presumably, the corona size depends on the size of the diapir, although, of course, there may be deviations from this possible trend and, for example, evolution of a large diapir may cause formation of a cluster of small coronae instead of a large one.

We plan to explore this possibility in future work, and in this study, we assume that the apparent size of the coronae is a function of the size of the parental diapir. In our work, we tried to establish whether there is a relationship between the late eruptive productivity of the parental diapir and its size. Productivity was estimated by area of lobate plains sourced from a particular corona, diameter of this corona was considered as a proxy of the diapir size.

Coronae-sources of lobate plains: We have analyzed known catalogs of coronae [1; 3; 4] using the global geological map of Venus [5] and found that only a small part of the entire coronae population (90 coronae out of 532, or 17%) shows signs of late volcanic activity. Approximately half of these coronae (40 out of 90) belong to the topographic class D [6; 7] and represents dome-shaped highs, probably reflecting the progressive stage of evolution of the parental diapir [8]. The lobate plains associated with these coronae probably characterize the current stage of the diapir evolution.

The later-stage volcanic activity may be reflected by lobate plains in association with coronae of W and U topographic classes [6; 7]. These coronae are characterized by the presence of either a complex (W) or simple (U) central topographic depression that likely characterize the late stages of the evolution of the diapir [8]. Of the remaining 50 coronae-sources of lobate plains, 25 are of class W and 25 are of class U.

Clear cases of the genetic relationship of coronae and lobate plains: In order to estimate the eruptive productivity of coronae, we calculated areas of occurrences of lobate plains that are linked with particular coronae using the global geologic map in the Mollweide equal area projection.

However, determining the area of lobate plains that were sourced by an individual corona is difficult/impossible when fields of the plains are formed by merged lava flows from different sources. Because of this, we have considered only those cases where the fields of the plains can be unambiguously associated with a particular corona. There are 46 such cases, and among them approximately the same proportions of coronae of different topographic classes are preserved (41% of class D, 31% of class W and 28% of class U).

Correlation between diameter of coronae and area of lobate plains: The forty-six analyzed coronae form two size groups (Fig. 1): (1) small coronae (<=200 km) and large coronae (>250 km). Within these size groups, there is no correlation between the coronae diameter and the area of associated lobate plains. The correlation coefficient between these parameters is 0.13 for the small coronae and 0.28 for the large ones.

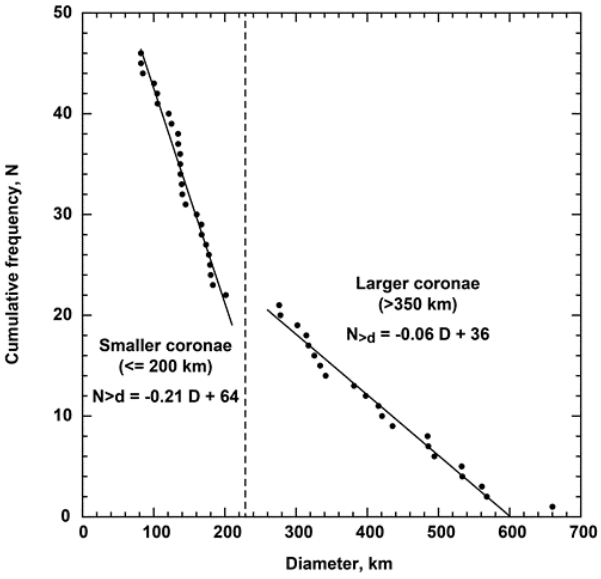

Figure. 1. Size groups of coronae: (1) small coronae (<=200 km) and large coronae (>250 km).

Conclusions: Our analysis of the late volcanic activity of some coronae showed that the size of the parental diapir has little (if any) effect on the eruptive productivity of the coronae. This is probably because the magmatic melts of the diapir are mainly distributed in the subsurface in the form of intrusive bodies.

The later volcanic activity was manifested by eruptions of random parcels of residual melts to produce lava flows of lobate plains. This conclusion is in agreement with: (1) the prediction of the prevalence of an intrusive component during evolution of such magmatic centers as coronae [9] and (2) the abundant radial graben systems, which likely represent the surface manifestations of dikes, that characterize most of Venusian coronae [10; 11].

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