

## PLUME TECTONICS OF VENUS AND THE EARLY EARTH.

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The remarkable geochemical similarity of recent Venus and Early Precambrian Earth basic rocks is considered as an evidence of the uniformity of the geodynamic environment and plume tectonic regime of the crustal evolution of both planets.

**Introduction.** Previous comparative study of the Venus and the Early Earth tectonics revealed the similarity in spatial distribution of hot spots or volcanic features and their concentration within the equatorial belts ( $\pm 35$  lat.) of both planets [1]. Paleotectonic reconstructions for the Late Proterozoic evidence the location of the sialic nuclei or Earth continents predominantly in the equatorial zone which corresponds to the position of the positive topography and volcanic centers on the present-day Venus [2, 3, 4]. Our conclusion was that the continental crust growth within sialic nuclei could be related to the plume tectonic regime of the Early Earth similar to the geodynamic environment of Venus.

**Geochemical data.** Lately we have compared some geochemical characteristics of recent basalts of Venus and Archaean metabasites of the Earth taken from infra- and supracrustal sequences of the Aldan shield in Siberia. The geochemical data for Venus rocks are limited but available determinations of U, Th and  $K_2O$  contents provides important constraints on the tectonic setting of magmatic suites. U/ $K_2O$  and Th/ $K_2O$  discrimination diagrams can be used for the reconstruction of the geodynamic environment [5]. Those plots (Fig.1) suggest predominantly within-plate or rift-related origination for both Venus and Earth metabasites. Several points show a well-defined enrichment in  $K_2O$  and location within the field of island arc tholeiites. That can be interpreted as a consequence of both source and magma generation depth variations among the various geodynamic environments mostly typical for extensional tectonic setting. That goes in full agreement with plume-tectonic environment for both Venus and Early Earth [6]. The geochemistry of Archaean rocks of the Earth exhibit the evolution trend of magmatic processes which are unknown yet at Venus. A plot of Rb-Sr for metabasites and associated rocks of tonalite - trondhjemite - granodiorite (TTG) series from Early Precambrian complexes of Aldan Shield show well-defined trend of Rb enrichment and crustal thickness growth in time. It can be demonstrated by position of early low-potassium enderbites and late enderbites of normal alkalinity within the fields of different crust thickness (Fig.2). That can be considered as the evidence for the origination of granitization centers in the basic protocrust at the late stage of fluid activity in the mantle plumes [7,8].

**Conclusion.** Geochemical data evidence the similarity in crust-forming and magma-generation processes and tectonic setting of recent Venus and Early Earth. It goes in an agreement with the data on the similarity in spatial distribution of hot spots on Venus and hot fields on the Earth [9, 10], which can be agglomerated in the hot belt concept [1]. The plume tectonic regime can be considered to be the characteristic one both for Venus and Early Earth while the plate tectonics processes operating at the recent Earth were not developed in the same scale at Venus and evolved up to rift-related and orogenic processes only.

### References.

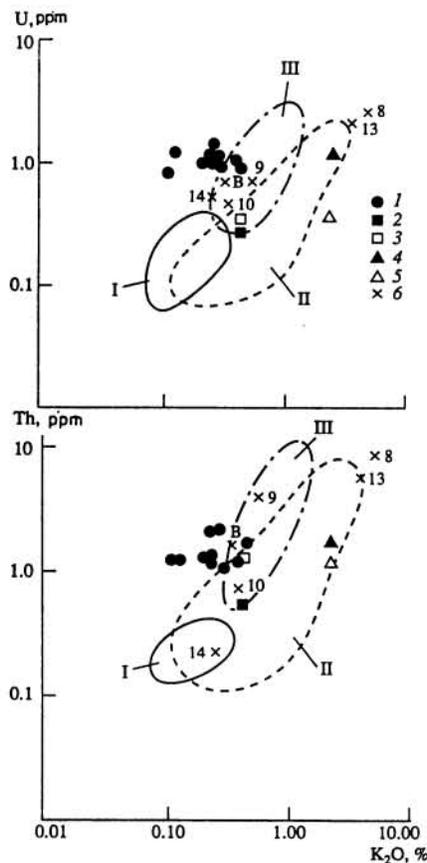
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*Figure captions.*

**Fig.1.** U/K<sub>2</sub>O and Th/K<sub>2</sub>O plots for basalts of Venus and Archaean metabasites of the Earth. 1-5 – Archaean metabasites of Aldan shield: metatholeiites of infracrustal (1), low (2), and upper supracrustal (3) complexes; alkaline metabasalts of low (4) and upper (5) supracrustal complexes; basalts of Venus (6) – numbers 8, 9, 10, 13, 14 after Space Ship - Venera, B – after space ship - Vega-2-B [5]. I - Oceanic tholeiites; II- Tholeiites of island arcs; III- Flood basalts and African rift – related tholeiites.



**Fig.2.** Rb/Sr plot [8] for metabasites and associated Early Precambrian rocks of Aldan Shield. Metabasites from infra- (1) and supracrustal (2), sequences; rocks of tonalite - trondhjemite - granodiorite series – low potassium enderbites (3) and enderbites of normal alkalinity (4).

