

THE AGE DIVISION OF THE KIMBERLITIC AND RELATED MAGMATITES IN THE N.-E. OF THE SIBERIAN PLATFORM (METHODS AND RESULTS)

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1. The region covers the Anabar anteklise and its slopes under Upper Paleozoic (the Tunguska sineclise) and Mesozoic (the Viluy sineclise, Predverkhoyan and Lena - Khatanga basins) sediments. At the South the Nepa - Botuobiya anteklise is within the region boundaries. About 26 fields of kimberlitic and related magmatites (near 1000 various bodies) are disorderly placed there on the area of approximately 1,5 million sq. km. The magmatites of northern and southern parts of this region essentially differ in some material parameters. These differences may be caused by the following reasons:

- a) the inherent difference in material compositions of magmagenerative substrata,
- b) the variations of thermodynamical regimes of magmatic systems formation,
- c) the petrological evolution of substrata in their repeated activization periods during the Phanerozoic.

It is possible all these factors functioned together. The only basis for the correct deciphering of the true reasons of these differences is the reliable age of these magmatites or the time of all the kimberlitic events in the region.

2. Our experience in work with various information sources concerning the ages of these magmatites showed, that there are no universal age markers which are constantly reliable. That is why it is necessary to use the age markers of both the geological and isotopic nature to increase the dating accuracy of particular bodies as well as the epochs of kimberlitic activization.

3. The set of used age markers includes:

a) Geological location of magmatites (the ages of broken through and overlying sediments). In the region the markers of this group have auxiliary or local significance, as nearly 90 % bodies are outcropped on the Archean - Lower Ordovician surface and covered only with the quarternary sediments.

b) Primary intermediate collectors (the basal strata of the sedimentation cycles with the typomorphic kimberlitic minerals). These collectors arise only as a consequence of the washing-out of the newly formed kimberlitic and related bodies and have the regional spreading and correctly fix the upper boundaries of the corresponding epochs of magmatism. They are more informative in the dating than the overlying sediments which are very frequently eroded completely in the known kimberlitic fields.

c) Dated xenoliths in the explosive bodies (the fragments or relics of sedimentary rocks with the distinguished fauna + flora remains and rarely the fragments of the Phanerozoic basite rocks). In principle, such xenoliths have to define the lower boundaries of the kimberlitic magmatism epochs. However, in practice they fix the relatively more ancient boundaries. This is due to the permanent washing-out of the upper part of prekimberlitic sediments and the vertical dispersion of the xenoliths. That is why the youngest xenoliths are absent in the pipes with the considerable denudation. Nevertheless the age markers of this group permit to define the beginning of the magmatic epochs with the acceptable accuracy.

d) Results of the isotopic dating (Rb/Sr and K/Ar dates of the matrix in the breccias and intrusive rocks with the microlitic phlogopite, U/Pb and U-track dates of zircons,

U/Pb dates of perovskites). Now there are nearly 480 different dates for the 260 kimberlitic and related bodies of the region (our and reference data). In contrast to geological markers isotopic dates show not the age of these bodies but the time of the crystallization and transformation of the above minerals. The conformity of such time and age of the dated bodies it is not obvious. That is the reason of the dating conflicts between the geological and isotopic dates. Therefore such dates can not be used in these nominal values and need some special interpretation.

4 . The basis of the interpretation is the proved link between the events of the kimberlitic magmatism and the periods of the long or contrast lifting of the big parts of the Siberian platform ("the paleotectonic niches"). In the Phanerozoic history of the region there were 10 such lifting. All of them are fixed by the regional interruptions (breaks) on the corresponding stratigraphic levels. These interruptions have the variable volume and plausibly define the real geochronological position of the known and possible epochs of the kimberlitic and related magmatite formation.

5 . The position of the isotopic dates fluctuates from the ideal coincidence with the boundaries of the epochs (1/3 of the dates) to the increase of the age by the tens million years. Sometimes the isotopic dates correspond to the "nonkimberlitic" periods of the immersion of the earth blocs and of the sedimentation. Rb/Sr dates of the rocks and U/Pb dates of the minerals correlate with the epochs most satisfactorily. Older dates of the concrete bodies are also used for the definition of their formation epochs in the terms of the correction. For this end the limits of the isotopic dates or the calibrate intervals of the confidence are used for this end. Each of them embraces one sedimentation cycle and corresponds to the period of physical time between the upper parts of the adjacent sedimentation interruptions.

6 . Analysis of the all accumulated age information in the terms of "the paleotectonic niche" permits to note the following:

a) in the Phanerozoic history of the N.-E. of the Siberian platform seven epochs of the kimberlite formation really existed (the figure): Later Ordovician (~450 - 440 m.y.), Later Silurian - Early Devonian (~ 410 - 395 m.y.), Later Devonian - Early Carboniferous (~ 370 - 320 m.y.), Middle-Later Triassic (~ 240 - 215 m.y.), Later Jurassic (~ 160 - 145 m.y.), Cretaceous (the boundary of Early and Later Cretaceous, ~ 105 - 95 m.y.) and Early-Middle Paleogene (~ 60 - 50 m.y.). The concrete bodies of Later Vendian, Early-Middle Ordovician and Early Paleogene epochs have not been found for the time being;

b) more intensively the kimberlitic magmatism was displayed in Later Devonian - Early Carboniferous, Middle-Later Triassic and Later Jurassic;

c) most of the kimberlitic fields of the region are polychronic and unite the various facial bodies of 2-4 epochs;

d) the first evidences that the different parts of the complicated bodies are polychronic and formed in the different epochs have been obtained.

The accumulation of the age isotopic information for kimberlitic and related magmatites of the region with the purpose to control the conclusions and some practice recommendations is going on.

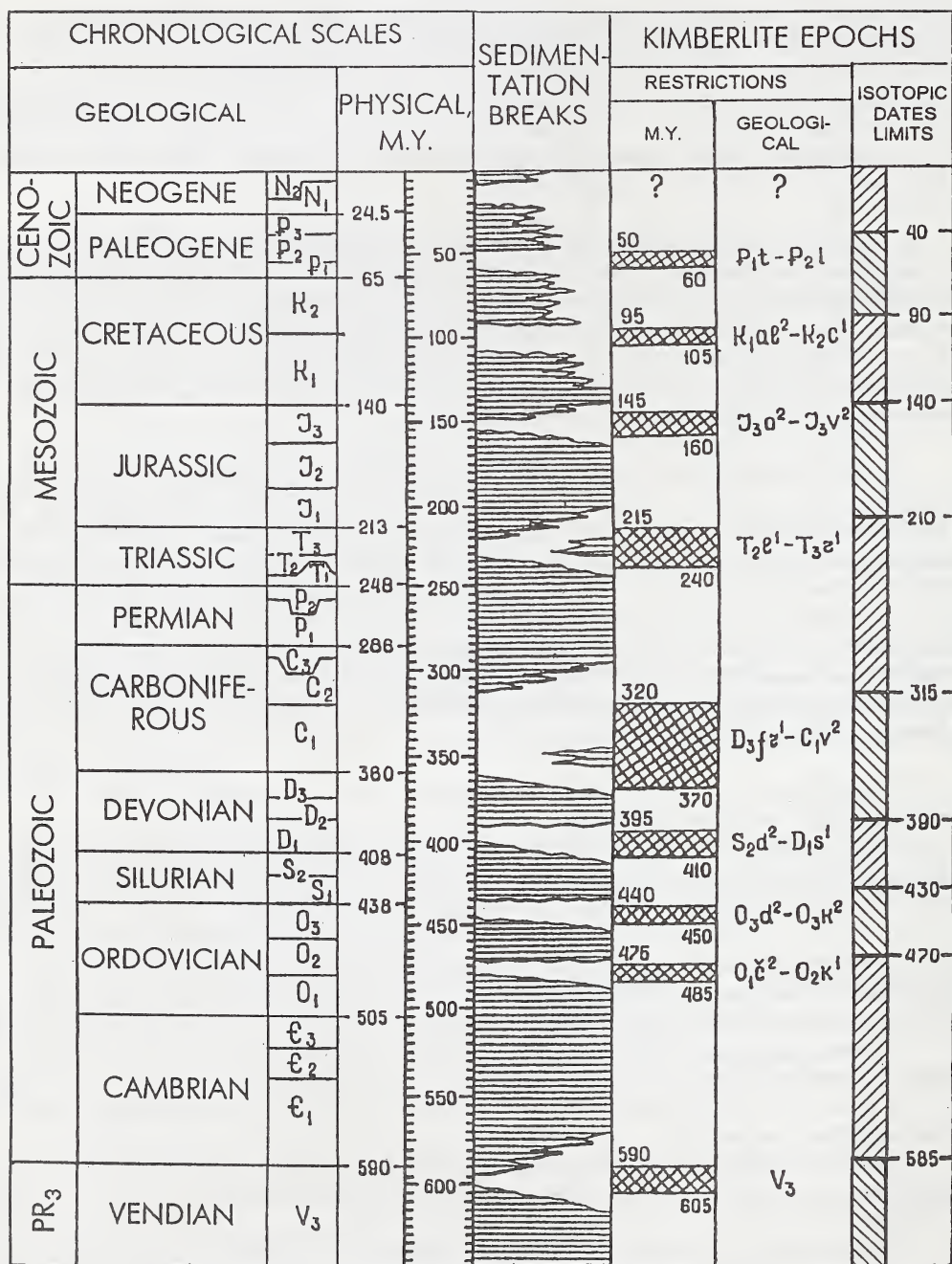


Fig. The scheme of the kimberlite magmatism epochs in the N.-E. of the Siberian platform (by F.F. Brakhfogel)