Specific Features of Zoning of Ancient Platforms' Territories according to the Degree of Perspectiveness of Diamondiferous Kimberlites' Intrusion

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Diamondiferous kimberlites are attributed to stable sites of crystalline basement of ancient platforms. This and other most common features are formulated in the rule of Clifford. Application in practice of the above rule is impossible without preliminary zoning of crystalline basement, that is, without dividing it into territories varying in the modes of tectonic development, time of consolidation and a number of other indications. Each of the platforms is characterized by its specific features of the structure, however, all ancient platforms have one common canvas, one scheme of development. All platforms of northern hemisphere have undergone three tectonic-metamorphic stages: katarchean - ancient of 3,5 milliard years, Archean - 3,5-2,5 milliard years and Early-Proterozoic - 2,5 - 1,6 milliard years. After the last stage the basement has not undergone a more fundamental reprocessing and remobilization. Ancient platforms of southern hemisphere during Riphean-Vend and partially early Cambrian in individual belts have undergone tectonic-thermal activization with repeated metamorphoses and recrystallization. Besides, beginning from Riphean they were overlayed by saggings (aulacogeosyncline) with all indications of complete geosyncline cycle ending with regional metamorphoses and introduction of sour intrusions, that is, crystalline basement of platforms of southern hemisphere as the sole consolidated foundation, has been formed only to the beginning of Early Cambrian. Having analysed the position of kimberlite fields of some ancient platforms of the World in relation to crystalline basement we thought it possible to give concrete expression to the rule of Clifford in the following way. Diamondiferous kimberlites are attributed to the sites of Katarchean-Early Archean crystalline basement (orthocratons), which have not undergone the influence of subsequent tectono-metamorphic episodes. Non-diamondiferous or low diamondiferous kimberlites are attributed to the sites of Archean consolidation of crystalline basement (craton belts). Tectono-thermal processing of kimberlites does not occur within Early-Proterozoic belts. This modernized rule of Clifford acts as the working hypothesis. Zoning of crystalline basement according to this rule on shields represents a complicated in solution task. It is even more complicated to employ this rule to the platforms overlayed by thick sedimentary cover. In this case the most objective data are magnetic and gravimetric maps, as well as samples of rocks of the basement raised from few deep boreholes. The exposed sites (shields) give material for identification of gravimagnetic anomalies with definite structural-formational metamorphical complexes.

Let us show the results of such zoning on the example of the Siberian Platform, which in Preriphean time consisted of consolidated shield composed of metamorphic complexes of Archean and overlayed on them folded and granitizated and metamorphosed protoaulacogens, protogeosyneclines or protoaulacogeosyneclines (green-stone belts) of

Archean-Early-Proterozoic age, unified on the scheme under the general name of protorift belts. If one takes them off then the platform will be like consolidated Archean craton consisting of orthocratons - Tungussky, Anabar-Mirny, Aldan-Tyungsky and Oleneksky, separated by craton belts. In the basement of orthocratons there lies katarchean sialic foundation represented by enderbite complex with the age from 3,8 to 3,5 milliard years. They preserved hardness, relative non-pliability to linear deformations in the course of all the stage of Pre-Riphean development. In the craton belts there is no katarchean grey-gneissic complex or it is reprocessed. Archean formations are laid upon relatively thin basite-plagioclase crust. This explains their pliability to linear deformations under the action of compressing tensions caused by head movement of orthocratons.

Among orthocratons of the Siberian platform we differentiate katarchean and Archean ones, though this division is relative. Its essence is in the following. Katarchean and Archean complexes of metamorphites compose independent structural floors. Within the katarchean orthocratons, representing in general huge archs, under the sedimentary cover a katarchean floor is uncovered. Within Archean orthocratons katarchean metamorphites are uncovered only in individual positive structures, and the larger part of their territory is composed by Archean metamorphic series. This occurrence has deep historical roots, that is, katarchean orthocratons in Archean were anteclises and thick layers of Archean rocks within them were minimum. On the opposite more powerful enderbite crust in them was even more consolidated by granitoid magmatism. In other words, katarchean orthocratons acted as more massive, cold and stable in relation to deformations of the block.

That is why within the katarchean orthocratons, as a rule, no linear folding is observed, though they are the most ancient sites of the Earth's crust and overlived all tectonic collisions. It is quite possible that Tyungsky and Aldansky blocks are independent orthocratons and they are separated by Archean folding belt occupying the basin of middle-low stream of the Vilyuy river. Early-Archean orthocratons rather often become the arena of tectonic-thermal Proterozoic reprocessing and that is why their initial structure is greatly disturbed. We suggest calling such disturbed Early-Archean orthocratons as paracratons. Anabar-Mirny Archean orthocraton consisted, evidently, of separate Anabar and Mirny orthocratons, separated by transverse weakened zone, passing in 170-200 km north off the Vilyuy river valley. One can judge about the character of the processes having turned Anabar Early-Archean orthocraton into paracraton by tectonic situation on Anabar shield. Imposition of tectonic-thermal reprocessing caused here secondary tectonic dislocations, retrograde metamorphism, formation of linear zones of diaphthoresis and mylonitization. In the result of recrystallization the most ancient gneisses and granite-gneisses are dated by absolute age of Early Proterozoic. Secondary folding-explosive dislocations carried clearly expressed linear character. That is why primary mosaic-ovoid folding, preserved in the form of relict shading system of structural lines, was reprocessed into compressed linear folds and zones of faults of thrust-faults and upthrusts. The shield acquired the structural appearance of a folding belt. However its initial orthocraton origin is marked not only by relict of initial structural plan, but also by absolute age of rocks which have not

undergone the stage of secondary metamorphism. On Anabar shield there are several zones of mylonitization of cataclasis, granitization and other phenomena of retrograde metamorphism of Early Proterozoic activity, which create broad areas of rejuvenated Archean rocks. At the same time they appear to be upcast faults with shifting in horizontal direction to west. Besides these main faults other faults of listric character are also observed. In fact Anabar shield is composed by a number of overthrust blocks with their general shifting in south-western direction.

It was noted above that the granite layer of the cratons' crust consisted of katarchean and Archean floors. Separating them surface, evidently, under the influence of horizontal tensions becomes the surface of the overthrust, for it separates thick layers of various competency, that is, under certain conditions it becomes the surface of a special type of structural discord: the upper thick layer along listric faults reaching katarchean basement suffers warping, whereas katarchean rocks remain in relatively primeval strucrural state. The same picture obviously can be observed in Anabar shield and south of it within the slab part of Anabar paracraton, where magnetic anomalous fields of stripe-mosaic structure are earmarked. Large gravitational steps of submeridional direction, testifying about strong disturbance of the basement, are typical for this territory. Metamorphic series of the shield and zones of cataclasis and mylonitization, as stripes of decreased magnetization and negative gravitational anomalies, are traced here by the anomalous magnetic field. In the slab part of Anabar paracraton one can observe mainly linear structure of the regional anomalous magnetic field, but in its general configuration one can clearly see the circular structure of the nuclear. It looks as if it were compressed in latitudinal direction, that is, it has the shape of an ellipse, extended in meridional direction. It is typical that its concentric circular elements in the area of the contact with Tyungsky orthocraton and Olenek-Zhigansky belt are greatly drawn together (compressed), and from west - are cut by Tungussko-Vilyuysky belt. Other zones of diaphthoresis and mylonitization are also relatively conformal to circular elements. Thus, there are foundations to allocate Anabar paracraton. But within its limits there are allocated residual orthocratons, that is, relict sites of primary katarchean-Archean basement with undistorted circular structures and untouched areas of diaphthoresis and mylonitization zones. Two residual orthocratons are allocated - Arga-Salinsky and Alakit-Daldynsky. By similar indications Botuobinsky residual orthocraton is allocated in the south. Availability of similar structures is presupposed to be on western periphery of Anabar anteclise. Tungussky orthocraton is not divided into para- and residual orthocratons, for there is no data for such division. Oleneksky katarchean orthocraton and part of Aldansky one are classified as paracratons, for it is not known to what degree they have been altered by Early Proterozoic tectono-thermal processes, though there can be no doubt about availability of residual orthocratons in them.

In conclusion we should note that Anabar-Mirny Archean orthocraton is tectonically deformed to a maximum, metamorphosed for the second time and turned into a paracraton due to its central position between katarchean orthocratons. Their centripetal relative motion caused not only congregation of Archean belts but also deformations of compression on Anabar-Mirny orthocraton. Alakit-Markhinskoye and Daldynskoye

kimberlite fields are located in Alakit-Daldyn residual orthocraton and are controlled, evidently, by zones of faults attendant to Middle-Paleozoic Kotuisky aulacogen and Angaro-Saiyany Cambrian rift creations. Mirny kimberlite field is within Botuobinsky residual orthocraton and Nakyn and Muna fields - within Tyungsky orthocraton. The first two fields are controlled by Vilyuy-Markha tectono-magmatic zone, and Muna field, evidently, by faults related with Biliro-Udzhinsky aulacogen. There is no doubt about activizational role of Middle-Paleozoic aulacogens in all cases.