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Preliminary study of altered carbonatites from Catanda, Angola

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Catanda carbonatites belong to the lithological unit located at the intersection of four fault systems of Lucapa transcontinental rift structure cutting the Congo-Kasai Craton from NE to SW and is related to the break-up of Gondwana during the Cretaceous (1). Previous age determinations evidence time of igneous activity in the area between 138-109 My and 92 My. [1, 2]. However, it's necessary to perform a new study of absolute age of rocks of this intrusion using the newest available methods.

Carbonatites cover an area of approximately 80 km^2 and occur on the Precambrian foundation consisting mainly of granite and acid metamorphic rocks; their overburden consists of eluvial-alluvial sediments. The current morphology of the carbonatite complex stand out hills surrounding the circular depression, within which there are relics of volcanic vents. Catanda carbonatite complex is an extremely attractive research material as one of the rare instances of extrusive carbonatites containing both pyroclastic rocks as well as lava.

The current research has shown that Catanda carbonatite complex is dominated in the volume by pyroclastic rocks, represented by the tuffs which are pyroclastic fall, flow and surge deposits. The composition of juvenile pyroclasts is analogical to lavas, but tuffs are much more contaminated by crustal rocks.

Carbonatite lavas are formed in the most part by welding or agglutination of spatter, which particles are distinguished by positive relief on the surface of layers. The authors have identified two main types of lavas [3], corresponding to calcio- and silicocarbonatites, while the other researchers, using more specific criteria, have identified 3 or 4 types [4, 5]. The both types of lava are characterized by the same set of phenocrysts, xenoliths and autoliths, but are different when it comes to the modal percentage. The phenocrysts and xenocrysts components are pyroxenes (augite, diopside), amphiboles (hornblende, lamprobolite), phlogopite, biotite, olivine, apatite, calcite, sphene, plagioclase, K-feldspar, quartz, magnetite, titaniferous magnetite, chromite and pyrochlore. The groundmass consists of apatite, perovskite, calcite, picotite, ulvospinel, zirconolite, baddeleyit, pyrochlore, magnetite, titaniferous magnetite, barite, rhabdophane, hematite and very rare chromite, peryclase and fluorite.

The results of analyses of the new lava samples showed the presence of altered silicocarbonatite facies, with developed, often repeated reaction rims of various types of calcium silicates around phenocrysts mafic minerals, plagioclases, potassium feldspars and calcite. The rims of the oldest generations are formed of monticellite and wollastonite, and the younger - of tobermorite group minerals, kumtyubeite, the younger wollastonite and vesuvianite. Tobermorite also occurs as pseudomorphs after feldspars and with kumingtonite and calcite infills the vesicles and fissures cracks of rocks. The same calcium silicates were identified in the groundmass of the altered rocks. The conditions of these rims formation are the subject of the current research.

References:

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