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Kimberlites from the Kundelungu Plateau (southeast D.R. Congo): Age determination, implications for regional tectonism and mineralization

Batumike, J.M.[1,2,3], Lubala, R.T.[2], Chabu, M.[2], Ferriere, L.[4], Kaseti, K.[2], Griffin, W.[3], Belousova, E.[3]

[1]Rio Tinto Exploration, 37 Belmont Avenue, Belmont, WA 6104, Australia
[2]Département de Géologie, Université de Lubumbashi, Route Kasapa, Lubumbashi, Katanga, R.D. Congo
[3]Department of Earth and Planetary Sciences, Macquarie University, NSW 2109, Australia
[4]Natural History Museum, Burg ring 7, A-1010, Vienna, Austria

In the D. R. Congo, kimberlites are known in 2 main areas namely Bakwanga in the Central part and the Kundelungu Plateau in the southeastern edge of the country, about 200 km north of Lubumbashi city. In the Kundelungu Plateau, 35 kimberlite pipes forming 2 main clusters are known. However, preliminary geophysical investigation suggests that more kimberlitic pipes are to be discovered on the plateau as they might be buried under a few tens of meters thick sand covers reported to the Karroo. The kimberlites are intrusive into undeformed and subhorizontal sandstones interbedded with limestones and shales reported to the Biano Sub Group, which constitute the upper formations of the Neoproterozoic Kundelungu Group [1, 2]**.** The eastern part of the Kundelungu plateau is affected by the Luizi impact crater, a circular structure of 18 km of diameter recently described [3]. Four kimberlite pipes are found inside the Luizi crater. This latter structure is affected by the NNW-SSE trending faults related to the opening of lake Mweru, actually considered as the southern part of the western branch of East African Rift System (EARS). From a morphological point of view, most of the regarded kimberlitic bodies are typical of the diatreme facies, characterised by the occurrence of xenoliths of sandstones and shales, pelletal lapilli features and serpentinized olivine. Peridotite xenoliths are also abundant. These characteristics indicate that kimberlite pipes can be classified as tuffitic kimberlite breccia [4]. This is the typical facies for a diatreme environment with occurrence of pelletal lapilli, serpentinisation (of olivine) and country rock xenoliths.

U-Pb analyses of perovskites from the Msipashi and Katuba kimberlites provide emplacement ages of 33 Ma and 23 Ma respectively, suggesting that the kimberlitic magmatism in the Kundelungu Plateau lasted at least 10 Ma, therefore contemporaneous with the first stage of the EARS. The location of the kimberlites along the NE-SW structures associated with the Mweru graben that crosscut the Luizi impact crater provides another constraint of its relative age.

On the whole, Pb isotopic composition of perovskites from the Katuba kimberlite is similar to that of sulphides from the late Cu-Ag mineralisation in the Dikulushi deposit located 130 km to the north. This mineralisation in Dikulushi is situated along NW-SE structures that are correlated with the Mweru graben, which in turn is associated with the EARS. This and the fact that the Pb isotope composition of sulphide and perovskite are comparable, suggest that the fluid responsible for the remobilisation of the mineralisation in the Dikulushi deposit would be related with the kimberlite magmatism. Similarly, the Cu-Zn-Pb-Ge-Cd mineralisation in the Kipushi deposit to the south, which is also located along similar structures may have been remobilised during the same event. The upwelling of the asthenosphere associated with the kimberlite magmatism may have supplied the heat for fluid generation or contributed the remobilising fluids responsible of this mineralization.

References:

[1] Batumike J.M. et al., 2007a Earth Planetary Science Letters, 267, 609-619.

[2] Kampata M. et al., 1985 Annales de la Société géologique de Belgique, T, 119, p. 55-70.

[3] Ferrière L. et al., (2011) Geology, v.39 n°.9 - pp.851-854.

[4] Cas R. et al., (2008) J. Volcanol. and Geother. Res. 174, 226–240.