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Kimberlites from the Kundelungu Plateau (Southeast Democratic Republic of Congo): Age and Implication for regional tectonism and mineralisation

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The Kundelungu Plateau is located in the southeastern part of the Democratic Republic of the Congo (DRC), 200km north-northeast of the city of Lubumbashi. A total of 34 pipes were discovered up to date, and the kimberlites are intrusive into subhorizontal and undeformed sandstones interbedded with limestones and shales belonging to the Biano Subgroup, at the top of the Neoproterozoic Katangan Supergroup. Geophysical data from this area suggest the presence of more kimberlite bodies that may be buried in thick sand cover. The eastern part of the plateau is affected by the Luizi impact structure, a circular structure of 18 km diameter, which is the first confirmed impact structure in central Africa [1]. This Luizi structure crosscuts NNW-SSE trending faults related to the Mwero graben considered to be part of the western branch of the East Africa Rift (EAR).

Most of the kimberlites in the Kundelungu Plateau are typical of diatreme facies characterised by the occurrence of abundant sandstone and shale xenoliths derived from the host Biano Subgroup, pelletal lapilli structures and strong serpentinisation of groundmass minerals, phenocrysts and megracrysts. The kimberlites are classified as tuffitic kimberlite breccias. The diamond potential of these kimberlites is considered to be low, however, the low conductive geotherm and the presence of remnant cratonic subcontinental lithosphere underneath the plateau suggest favourable conditions for diamond formation [2].

U-Pb analysis of groundmass perovskites from Msipashi [3], Kambeli [3] and Katuba pipes indicate that the kimberlite magmatism lasted at least 10 years (33-23Ma) and correspond to the tectonic movement that lead to the opening of the Mweru graben and the EAR. Petrographic investigation of Katuba kimberlite located inside the Luizi structure did not reveal any sign of shock metamorphism. This indicates that the impact structure is older than the kimberlite intrusion and the Mweru Graben opening, as it cross-cuts faults related to the opening of the graben. It is not clear if the impact was the trigger for the kimberlite magmatism. However, more kimberlites are found in the northern part of Zambia at the same latitude than the Kundelungu Plateau. Age dating of these kimberlites will provide more insights to the kimbermlite magmatism in the region, thus the tectonic evolution.

Perovskites from the kimberlites have Pb-isotopic composition similar to that of sulphides from the late Cu-Ag minerlisation in the Dikulushi deposit located 130km to the north. This mineralisation is located along NW-SE structures related to the EARS. Further south inside the copperbelt, the mineralisation in the Kipushi deposit, located also in NW-SE structures, may have been remobilised during the same tectonic eposide. The isotopic signature of the mineralising fluid is similar to mafic rocks like Mwanshya and Karagwe-Ankole [4]. However, around the area such rocks are not known. The kimberlite magma

may have played a role as a heating source to generate fluid that remobilised existing mineralisations or provided fluid with the isotopic signature that is now measured in sulphides and other gangue minerals.

References:

[1] Ferrière L et al. (2011) Geology 39, 9: 851-854
[2] Batumike JM et al. (2009). Lithos 112S, 166-176
[3] Batumike JM et al. (2008). Earth and Planetary Science Letters 267: 609-619
[4] Van Wilderode J et al. (2014) Geologica Belgica 17, 2: 137-147