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Distribution and U-Pb Ages of Newly Recognized Regional-Scale Dyke Swarms of the Leo Man Craton

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Over 20 sets of dolerite dykes crosscutting Paleoproterozoic basement in West Africa were distinguished via the interpretation of regional and high resolution magnetic airborne data of West African Craton (Jessell et al. 2015). Some of the dykes reach over 300 km in length and they are considered to be parts of much larger systems of mafic dyke swarms which are part of the plumbing system for Large Igneous Provinces (LIPs) and may be therefore used for the reconstruction of Precambrian supercontinents (e.g. Ernst, 2014). Five different dyke swarms in Burkina Faso, Niger, Ghana and Senegal were analysed and dated. From a petrographic and composition point of view, the mafic dykes correspond to tholeiitic basalts and are typically composed of plagioclase + clinopyroxene (augite) ± orthopyroxene (enstatite) ± olivine, and display a doleritic texture of variable grain size.

Eleven ID-TIMS U-Pb ages obtained on baddeleyite (for details on the technique see Söderlund and Johansson, 2002) define five generations of Proterozoic age. The oldest, the N-S trending Libiri dyke swarm, was found in Niger, in the Libiri pit of the Samira gold mine, yielded an age of ca. 1790 Ma. The N40 Bassari swarm in Senegal was dated at ca. 1764 Ma, and is potentially linked to the 1790 Ma Libiri swarm, 1400 km away. The 300 by 400

km Korsimoro N100 dyke swarm transects central Burkina Faso and was dated at ca. 1575 Ma. Five ca. 1520 Ma ages were obtained for dykes of the Essakane swarm, three in Burkina Faso, one from Ghana and one from Senegal, and document a large extent (600 km wide and 1500 km long) and short duration of dyke emplacement. The orientation of this swarm changes from N130 in Burkina Faso and Ghana to E-W in Senegal. The Manso N350 dyke swarm in southern Ghana, which is about 400 km long and about 200 km wide, yields a preliminary age of ca 870 Ma. The range of dyke swarm ages represent an initial Proterozoic LIP barcode for this portion of the West African craton which now can be compared with the barcodes of other crustal blocks to test proposed Nuna and Rodinia reconstructions involving the West African craton.

References

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