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Paleomagnetism of the ~860 Ma Manso dyke swarm, West Africa: implications for the assembly of Rodinia

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The West African Craton (WAC) is one of the major cratons in the Rodinia jigsaw puzzle (~1000–750 Ma). In the Rodinian models, the position of West Africa is mainly constrained by the assumption that it had been a partner of Amazonia since the Paleoproterozoic. Unfortunately, no paleomagnetic data are available for these cratons when the Rodina supercontinent is considered tectonically stable (~1000-750 Ma). Thus, every new reliable paleomagnetic pole for the West African Craton during the Neoproterozoic times is of paramount importance to constrain its position and testing the Rodinia models. In this study we present a combined paleomagnetic and geochronological investigation for the Manso dyke swarm in the Leo-Man Shield, southern West Africa (Ghana). The ~860 Ma emplacement age for the NNW-trending Manso dykes is thus well-constrained by two new U-Pb apatite ages of 857.2 ± 8.5 Ma and 855 ± 16 Ma, in agreement with baddeleyite data. Remanence of these coarse-to-fine grained dolerite dykes is carried by stable single to pseudo-single domain (SD-PSD) magnetite. A positive baked-contact test, associated to a positive reversal test (Class-C), support the primary remanence obtained for these dykes (13 sites). Moreover, our new paleomagnetic dataset satisfy all the seven R-criteria (R=7). The ~860 Ma Manso pole can thus be considered as the first key Tonian paleomagnetic pole for West Africa. We propose that the West Africa-Baltica-Amazonia-Congo-São Francisco were associated in a long-lived WABAMGO juxtaposition (~1100–800 Ma).

Keywords: West Africa, Neoproterozoic, Tonian, Rodinia, paleomagnetism.