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

Paul Yves Jean Antonio^{1,2}, Lenka Baratoux², Ricardo Ivan Ferreira Trindade¹, Sonia Rousse², Anani Ayite³, Cristiano Lana⁴, Mélina Macouin², Emmanuel Williams Kobby Adu⁵, Caroline Sanchez⁶, Marco Silva⁴, Anne-Sophie Firmin², Carmen Irène Martinez Dopico⁷, Arnaud Proietti⁸, Prince Ofori Amponsah⁵, and Patrick Asamoah Sakyi⁵

¹University of São Paulo, Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Geofísica, Sao Paulo, Brazil (paulantonio0931@gmail.com)

²Université Paul Sabatier (UPS) - Toulouse III, Observatoire Midi-Pyrénées (OMP), Géosciences Environnement Toulouse (GET), 14 Avenue Edouard Belin 31400 Toulouse – France.

³Ghana Geological Survey Authority, 6, 7th Avenue West Ridge, Box M80, Accra – Ghana.

⁴Universidade Federal de Ouro Preto (UFOP), Applied Isotope Research Group, Departamento de Geologia, Escola de Minas, Rua Diogo de Vasconcelos, 122, 35400-000 Ouro Preto – MG, Brazil.

⁵University of Ghana, Department of Earth Science, P.O. Box LG 58, Legon, Accra – Ghana.

⁶GEOPS, Université Paris-Sud, CNRS, Université Paris-Saclay, Rue du Belvédère, Bât. 504, 91405Orsay, France.

⁷INGEIS- Instituto de Geocronología y Geología Isotópica. Av. Int. Güiraldes, Ciudad Universitaria, Ciudad Autónoma de Buenos Aires – Argentina.

⁸Centre de Microcaractérisation Raimond Castaing, 3 Rue Caroline Aigle, 31400 Toulouse – France

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 Rodinia 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-Azononia-Congo-São Francisco were associated in a long-lived WABAMGO juxtaposition (~1100–800 Ma).

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

