

Re-evaluation of Leonian and Liberian events in the geodynamical evolution of the Man-Leo Shield (West African Craton)

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The Leonian (3400–3100 Ma) and Liberian (2850–2700 Ma) events are important magmatic and tectono-metamorphic events in the Archean domain of the Man-Leo Shield in the southern West Africa Craton. The older Leonian event was associated with crust formation, which was variably reworked during the younger Liberian event. In the Man domain of western Côte d'Ivoire, zircon in-situ dating by LA-ICPMS of Granulitic Grey Gneisses (GGGs), the Mangouin charnockite and the Lagoulalé augen orthogneiss allows for the re-evaluation of magmatic and metamorphic activity related to the Leonian and Liberian events. We report here our findings that the GGGs represent the oldest rocks in the study area and formed during the Leonian event. The ages recorded in the GGGs in the Man area are 3156 ± 24 , 3098 ± 19 , 3093 ± 49 and 3019 ± 53 Ma. The ages of 3156 ± 24 and 3098 ± 19 Ma represent Leonian juvenile magmatism while those of 3093 ± 49 and 3019 ± 53 Ma represent Leonian metamorphism. The ages of the Mangouin charnockite and the Lagoulalé augen orthogneiss are 2798 ± 8 Ma and 2795 ± 9 Ma, respectively, and are interpreted to record peak metamorphic conditions during the Liberian event. Zircon from the augen orthogneiss includes an inherited core with an age of 3121 ± 37 Ma, which corresponds to Leonian GGG ages. This inheritance indicates that the Mangouin charnockite and the Lagoulalé augen orthogneiss were derived either partially or completely from Leonian formations. A previously constrained Sm–Nd model age of 3250 Ma for the charnockite and augen orthogneiss agrees with such a process. The majority of Th/U is higher, indicating a magmatic origin for most zircons. The Leonian and Liberian events are proposed as two distinct events in Man-Leo Shield.

Keywords: Leonian, Liberian, Birimian, Tectono-metamorphic event, Reworking