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Petrochronology of zircons from mafic metasedimentary rocks of the Yaounde Group as a record of the west Gondwana amalgamation

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Integrated LA-ICP-MS in-situ zircon trace elements and U-Pb geochronology were carried out from unreported mafic metasedimentary rocks (amphibole schist) exposed along the southernmost edge of the Yaounde group, within the Central African Fold Belt (CAFB) in Cameroon. Drillholes from Ndogbesol area present a metasedimentary succession consisting of amphibole schist, mainly underlain by garnet micaschist at the bottom of the sequence, and scarce intercalations of biotite garnet gneiss. Although zircon is very rare in the investigated amphibole schist, few grains were identified during microscopic studies. Zircon grains show a wide range of shapes, consisting of elongated, rounded, ovoid, and prismatic crystals. Except for few metamict grains with homogeneous to complex internal textures and variable Th/U ratios (0.07–1.9), the most common population show oscillatory zoning and high Th/U ratios (> 0.4), typical of magmatic zircons. The latter also show chondrite-normalized REE patterns marked by steep positive slope with HREE enrichment over LREE and MREE, positive Ce (Ce/Ce*=5.27–286.62) and negative Eu (Eu/Eu*=0.12–0.92) anomalies similar to magmatic zircons. Geochemical discrimination diagrams suggest derivation from the continental crust within a collisional arc-related or orogenic setting. U-Pb dating defined coeval magmatic (ca. 975 Ma – 807 Ma and ca. 596 Ma – 560 Ma) and metamorphic (ca. 899 Ma – 726 Ma and ca. 556 Ma – 547 Ma) events during Tonian and Ediacaran times, supporting a complex crustal evolution of the CAFB. One metamorphic zircon yielded a Paleoproterozoic $^{207}Pb/^{206}Pb$ age of ca. 2009 Ma, comparable with the Eburnean-related metamorphism reported in the adjacent Nyong complex and indicating minor contribution from older crustal material. A cluster of Ediacaran magmatic zircons yielded a concordant $^{206}Pb/^{238}U$ age of ca. 572 Ma, defining a new maximum depositional age of the Yaounde Group. Late Ediacaran metamorphic event (ca. 556 Ma – 547 Ma) correlates with previously reported rutile U-Pb age (ca. 560 Ma), suggesting that the Yaounde Group recorded the final stage of West Gondwana amalgamation.