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Soil carbon dynamics in the tropical rain forest of Ankasa, Ghana.

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The tropical primary rain forest of Ankasa Park, Ghana, was investigated in terms of quantity and mean residence time (MRT) of soil organic carbon (SOC) with the aim to elucidate the dynamics of this important C reservoir. Soil C was measured in the different pedogenic horizons and its MRT calculated based on the 14C content determined by accelerator mass spectrometer (AMS). The litter layer contains 1.5 kg m-2 of organic C, while the C in the mineral soil down to 1 m depth amounts to 14.6 kg m-2 (less than that expected), and is so distributed: 20% in the A horizon, 46% in the Bw, and 34% in the BC horizons, respectively. The radiocarbon activity reveals a strong influence from “bomb C” (C synthesized after the 1950) in the A and Bw horizons, while in the BC horizon the bulk C shows an average age of ∼80 years before present (BP; 0 BP = 1950 AD). This fact suggests that the active layer, the one exchanging C with the atmosphere, is about 50 cm, a bigger thickness than that usually found in temperate forest soils. Due to the marked presence of bomb C, the calculated MRT values are two for the A (10 or 85 years) and Bw (7 or 120 years) horizons, while in the BC horizon the MRT is unique and amounts to about 370 years. In conclusion, this work supports the hypothesis that, despite the huge amount of C present in the aboveground biomass, tropical primary forests of Central Africa can store amounts of SOC similar or even lower than those of forests of temperate countries, and that the MRT of the SOC reservoir is quite fast.