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Paleogene to Quaternary geodynamical evolution of the lowland Central Amazonia inferred by weathering phases dating

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The landscape in lowland Amazonia is shaped by large rivers, whose depositional-erosive dynamics built fluvial terraces covered by upland forests. Thus, fluvial deposits distributed across lowland Amazonia are of crucial relevance since they represent the best accessible archives to study the history of environment and climate change. The timing of the assembly of the modern transcontinental Amazon River is considered a key event in the landscape evolution of Amazonia, however, proposed ages range from Miocene, early Pliocene to Pliocene/Pleistocene. Therefore, regional stratigraphic correlations need to improve to ensure a better understanding of reconstructions of past conditions in Amazonia during the Cenozoic. Yet, these are difficult due to the lack of absolute ages to constrain phases of sediment deposition or erosion and weathering. In lowland central Amazonia, past environmental conditions are recorded in the Alter do Chão and Novo Remanso Formations. Both units are dominated by sandy and highly oxidized sediments with scarce paleontological remains complicating the application of biostratigraphy dating methods. The Alter do Chão and Novo Remanso Formations are well exposed in the left margin of the Solimões-Amazon River main stem and show remarkable zones rich in supergene iron weathering products, which has been used to define the stratigraphic boundaries among the Alter do Chão Formation, Novo Remanso Formation and overlying sediments. In this study, we use the (U-Th-Sm)/He dating method on goethite and hematite grains to determine the age of iron-enrichment layers and duricrusts that mark boundary surfaces used to define the stratigraphic framework of the Alter do Chão and Novo Remanso formations. The (U-Th-Sm)/He ages allow to improve chronological constraints for both formations and to discuss the timing of fluvial terraces building and weathering conditions in central Amazonia through time.