

Cenozoic weathering periods recorded in a deep lateritic profile in northern Brazil

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Laterites are deep stratified weathering profiles which form through tropical weathering and can evolve over millions of years. The South American Guiana shield has been tectonically stable and in tropical latitudes supposedly since the Cretaceous, allowing the formation of very deep (> 100 m) and old (tens of Ma) lateritic profiles.

In this contribution we present a coupled data set of (U-Th)/He ages of supergene hematite and goethite and kaolinite electron paramagnetic resonance (EPR) ages from a deep (> 120 m) weathering profile exposed in an open pit gold mine in the northern Brazilian state of Amapá. Coupling of the two methods which target different components of the lateritic profile reveals information on past weathering episodes and allows us to reconstruct the formation and evolution of the presented profile throughout the entire Cenozoic. (U-Th)/He ages on supergene hematite and goethite from the ferruginous duricrusts on the top of the profile record three discrete weathering events during the Late Cretaceous/Early Paleocene, Oligocene and Middle Miocene with slightly variable climatic characteristics. Kaolinite EPR ages available from different levels of the profile allow an insight into the vertical evolution of the profile. The oldest kaolinites, which are very well-ordered, are preserved in the lower and saprolitic part of the profile whereas the kaolinites in the top of the profile show very recent (Pliocene or younger) rejuvenation. Disordered kaolinite captured in the lateritic duricrust was protected from this rejuvenation.