Geophysical Research Abstracts
Vol. 21, EGU2019-13053, 2019
EGU General Assembly 2019

Unravelling processes and timescales of tropical pedogenesis using luminescence dating

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The age and genesis of thick and strongly weathered tropical soils is a matter of persistent debate. In-situ processes alone may not sufficiently explain the formation and spatial distribution of deep tropical soils. Allochtonous components, transported e.g. by water along the slope or by wind from longer distances have to be considered.
On Quaternary time scales, luminescence dating is a prominent tool to date sedimentation, as it is able to detect the last moment of sunlight exposure of quartz or feldspar grains. Bioturbation affects the quality of obtained sedimentation ages, but recent studies indicate the possibility to use luminescence methods to quantify soil turnover by biologic activity.
Assumptions about the rate of soil productions in the tropics require differentiating the role of soil macrofaunal activity, slope processes and aeolian influx. We currently apply a multi-method approach to study the age and forming processes of thick Ferralsols. Profiles are located in the Cerrado region of southeast Brazil, within the peripheral depression of São Paulo State, characterized by various sedimentary and igneous rocks, and under rainforest on the crystalline basement of the South Cameroon Plateau.
Preliminary luminescence data indicate Late Pleistocene to Holocene ages for most samples. We discuss the significance of luminescence ages to understand the forming processes of these soils in the interplay of pedogenesis and sedimentation and implications for paleoenvironmental reconstructions.