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Soil profile of Yellow-brown Earth overlying Red Clay in southern Anhui Province: A pedogenic response to the Last Glacial – Interglacial cycle in mid-subtropical China

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Soil profile of Yellow-brown Earth (YBE) overlying Red Clay (RC) is commonly seen along the Yangtze River in mid-subtropical China. To study its paleoclimatic implications, one YBE - RC profile in Langxi county, southern Anhui Province, were dated with the optically stimulated luminescence (OSL) method in detail. The results indicated that the dual – layered profile is actually a pedogenic response to a great climatic change during the Last Glacial – Last Interglacial cycle: The YBE is homogenous to the aeolian Xiashu Loess widely distributed along the Yangtze River and was dated from 12.2 ka to 57.1 ka; and the underlying RC approximately from 60 ka to 132.8 ka, which fully suggests that the YBE is really the Last Glacial loess, correlated with the Malan Loess in the Chinese Loess Plateau, Northwest China, and the RC was mainly formed during the Last Interglacial. Two sub-class events of the Last Glacial, the Last Glacial Maximum (LGM) and the Last Glacial Optimum (LGO), correlated with the marine oxygen isotopic stage (MIS) 2 and 3, can be separated and identified in the YBE. Likewise, the RC can be divided into the Uniform Red Clay (URC) and Reticulate Red Clay (RRC). The URC was formed during the transitional time from the Last Interglacial to the Last Glacial, and the RRC mainly during the Last Interglacial, MIS 5. The RC is highly weathered but still shows aeolian-dust characteristics. The duplicate information implies that the paleoclimate during the Last Interglacial is instable and might also oscillate between warm and cold, but sub-class paleoclimatic events, potential correlated with MIS 5 a – 5 e, cannot be identified in the RRC possibly due to the overlapped paleoclimatic information caused by highly chemical weathering. A great climatic transfer during the Last Glacial – Interglacial cycle left soil parent materials diversified in the study areas and hence caused the parallel distribution of different zonal soils in a small scale. Two surface soils, Yellow-brown Soils (Acrisols), derived from the YBE, and Red Soils (Plinthosols), derived from the RC, often coexist in the areas. The Red Soils are really relict and not correlated with the current soil-forming conditions. Sometimes, the influence of climatic change on the pedogenesis is so significant that it should never be neglected.