



## **Red soils in the base of the Quaternary pedosedimentary sequences in Mesoamerica and Eastern Europe: indicators of environmental change during the Pliocene-Pleistocene transition.**

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Some distant Late Pliocene-Quaternary soil-sedimentary sequences have demonstrated an interesting common feature: in their base thick red clayey paleosols, pedocomplexes or pedosediments are found which correspond to Late Pliocene-Early Pleistocene. Such paleosols usually do not appear in the upper (Middle-Late Pleistocene) parts of these sequences and are absent in the actual (Holocene) local soil cover. The examples are: Red Clays of the Chinese Loess Plateau, Scythian clays of Southern Russia, Red Unit of the tephra-paleosol sequences of Central Mexican Highlands. We have initiated the study of the two latter red soil complexes, in order to interpret them as a integral proxy of the climatic change in the course of transition from the warmer biosphere of the Pliocene to the cooler biosphere of the Quaternary.

The Scythian clays were studied in a number of sites of Southern Russia in the valleys of Don, Kuban and Laba rivers. The paleosol profiles are 70-130 cm thick, with the set of horizons B1k – B2k – Bck. Paleosols have brown or mottled color, loamy clay to clayey texture, subangular blocky – prismatic structure. They have various pedofeatures: well developed stress cutans and abundant neoformed carbonates; ferruginous neoformations are concentrated in the upper part of paleosol profiles. Neoformed carbonates are presented by concretions and clay-carbonate nodules. Ferruginous pedofeatures are presented by mottles and rusty-yellow nodules. The following pedogenetic processes took part in the paleosol formation: aggregation, migration and precipitation of carbonates, gleyzation, vertic processes. The main tendency in the de-

velopment of Scythian clays is the gradual transition from sub-aquatic to sub-aerial conditions of sedimentation. We observed the transition from the pedosediments on the early stages of formation of Scythian clays to polycyclic pedocomplexes with differentiated soil profiles on the later stages. This reflects slowing down of sedimentation and increase of duration and intensity of pedogenesis.

In the Central Mexico, the Early Pleistocene red pedocomplex was studied in the exposures of Tlaxcala state ("Red Unit" of the Tlaxcala sequence). It consists of three Bt horizons which have a reddish-brown color (5YR4/3, 5YR5/3), a very well developed prismatic structure; thick reddish brown clay cutans over prism surfaces and in the cracks are common, besides grey and black clay cutans filling cracks are frequent. In thin sections, paleosols of Red Unit demonstrated advanced development of weathering features: volcanic glass is already absent, plagioclases, pyroxenes and amphiboles are etched and contain fine secondary products. Contrary to the overlying part of the sequence, in Red Unit well pronounced weathering features are observed also in the indurated BC horizons (tepetates). The micromorphology of clay illuvial pedofeatures is very characteristic: besides in situ clay coatings in pores, there are frequent small fragments of clay illuvial pedofeatures incorporated in the groundmass (clay papules). Rounded bodies enriched with fine material and having darker color due to humus pigmentation were observed. We interpret them as faunal excremental aggregates, welded with groundmass. The pedocomplex showed a combination of weathering, clay illuviation and redoximorphic features with bioturbation due to faunal activity.

The properties of both studied red paleosol complexes demonstrated, that although they are more weathered, than the younger paleosols, they do not achieve the ferrallitic stage, indicative of humid tropical/subtropical climates. We suppose domination of the subtropic climatic conditions with contrasting seasonality, with some considerable wet/dry fluctuations within the formation period of the studied paleosols.