



Rapid mineral differentiation among horizons of a meadow soil

Zoltán Szalai (1,2), Marianna Ringer (2), Klaudia Kiss (1), Kata Horváth Szabó (2), Tibor Németh (3,4), Péter Sipos (3), Balázs Madarász (1), and Gergely Jakab (1)

(1) Research Centre for Astronomy and Earth Sciences, Geographical Institute, Budapest, Hungary (szalaiz@iif.hu), (2) Eötvös Loránd University, Department of Environmental and Landscape Geography, Budapest, Hungary, (3) Research Centre for Astronomy and Earth Sciences, Institute for Geology and Geochemical Research, Budapest, Hungary (szalaiz@iif.hu), (4) Eötvös Loránd University, Department of Mineralogy, Budapest, Hungary

Soil development under hydromorphic conditions may result in intense mineral transformation and rapid vertical differentiation in the profile. Original papers refer more than hundreds of years for this kind of mineral transformations. We suppose that this process could be more rapid.

Present paper focuses on the profile development of a sandy meadow soil (calcic, gleyic Phaeozem ferric, arenic) from the soil mineralogical viewpoint. The main aim was to explore the degree of mineral phase alteration via soil formation during a half-century under hydromorphic conditions.

The studied soil is located in a swampy area (near to Ceglédbercel, Hungary). The parent material deposited during an extremely heavy flood event in 1963. The reference (parent) material can be found near to the study site. We combined routine field tests (carbonate content, dipididil test) with laboratory measurements (selective extractions for the determination of amorphous and crystalline Fe, and Mn content; X-ray phase analysis; X-ray fluorescence spectroscopy; particle sizing by laser diffraction; NDIR and FT-IR and DRS spectrometry), whereas Eh and pH measured by field monitoring station.

The most intense mineralogical transformations developed in the zone of the heaviest redox oscillation. Results show that well developed horizons have emerged during fifty years in the studied soil. This time was enough for bivalent and trivalent iron mineral crystallisation and smectite formation in this zone. The high proportion of amorphous and colloidal phases refers to very intensive recent processes. Soil formation under hydromorphic conditions proceeds at higher speeds contrarily to the century time scale reported in sources (discussing non-waterlogged cases).

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