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Can hydromorphic conditions accelerate soil development?

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The formation and development of waterlogged (hydromorphic) soils are primarily determined by long-term water saturation. The presence of water in the profile can result increasing speed of soil forming processes including the accumulation of organic matter or other components and mineralogical transformations. Original papers refer more than hundreds of years for this kinds of mineral transformations. We suppose that this process could be more rapid.
This study focuses on the mineralogical investigation of a sandy meadow soil (calcic, gleyic Phaeozem ferric, arenic) located in a swampy area in Central Hungary. The starting time of the soil formation is a well documented fact: the parent material deposited during an extremely heavy flood event in the 1960s. Therefore, the studied soil profile is the result of the last half century. Our aim was to explore the degree of mineral phase alteration via soil formation during a half-century under hydromorphic conditions.
Routine laboratory measurements (selective dissolution methods for the determination of amorphous and crystalline Fe, and Mn content, X-ray fluorescence spectroscopy measurements for elemental composition determination, X-ray powder diffraction for mineralogical composition, and particle sizing by laser diffraction) were implemented. Morphological and chemical study of carbonate and iron nodules was carried out by electron microprobe. Simple chemical tests (eg. Fe2+ indication by dipiridil test) and morphological observations were performed on the field. Redox potential (Eh) and pH were measured in 20 cm and 40 cm depths by field monitoring station during the vegetation period.
Results show that well developed horizons have emerged during fifty years in the studied soil profile. The most intense mineralogical transformations developed in the zone of the heaviest redox oscillation. Soil formation under hydromorphic conditions proceeds at higher speeds contrariwise to the century time scale reported in sources (discussing non-waterlogged cases).

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