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## Sea spray and land use affect clay mineral and soil organic matter properties in soil on machair (Harris, Scotland)

**Thilo Rennert** and Ludger Herrmann

Universität Hohenheim, Institut für Bodenkunde und Standortslehre, Stuttgart, Germany (t.rennert@uni-hohenheim.de)

‘Machair’ describes a landscape form that is present along the Atlantic seaboard of Scotland and Ireland, and that is characterized by a gently sloping coastal plain developed from aeolian carbonate and quartzose sand. We characterized three grassland soil profiles along a coastal transect on Harris (Outer Hebrides, Scotland) by standard methods (colour, texture, pH, wet-chemical extractions), infrared spectroscopy, X-ray diffractometry, X-ray fluorescence spectrometry and differential scanning calorimetry. Our aim was to understand the impacts of humankind, matter input, weathering and accumulation of soil organic matter (SOM) on chemical processes and soil properties. One of the profiles differed distinctly from the other two, in particular regarding depth, texture, carbonate and SOM contents, and properties of SOM (relative content of rather labile permanganate-oxidizable SOM, transformation state), presumably caused by earlier land use as arable land. We classified the soil with the least depth as Hypereutric Leptosol, and the others as Cambic and Calcaric Phaeozem. Thermally stable SOM was present in all samples, likely pointing to pyrogenic SOM, i.e. black carbon. The mineralogical composition differed among the profiles and reflected the intermediate character of the local rocks. In all topsoil horizons, we identified Mg-hydroxy-interlayered minerals (HIMs), which are rather rare, given the commonly low abundance of Mg ions in the soil solution relative to Ca, or Al in acidic soil. The share of Mg-HIMs of the total minerals in the clay fraction ranged from 25% in a subsoil to 71% in a topsoil horizon. We suggest that sea spray is the source of subsequently intercalated Mg. This composition of the clay fraction, which is possibly typical of soil on certain machair sites, and is the result of a pedogenic process, surely affects soil properties and processes such as cation exchange capacity and SOM storage and thus element cycles.