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Titel

The source and the age of the soil organic matter of Anthrosols in SW Norway

Abstract

Recent investigations showed that humus-rich topsoil's around the Baltic Sea have been formed by the application of pyrogenic organic matter (Acksel et al., 2016, *Geoderma Reg.* 7, 187–200) and organic materials (e.g. animal manure, organic waste) linked with human activity and, consequently, these soils were classified as Anthrosols (Acksel et al., 2017 (submitted)). Such humus-rich topsoil's, which were strongly influenced by anthropogenic activities and classified as plaggic Anthrosols, were described in SW Norway (Schnepel et al., 2014, *J. Plant Nutr. Soil Sci.*, 177 (4), 638–645.). However, the source and the formation time of the Anthrosols in Norway have not been investigated in detail. Therefore, we characterized the soil organic matter composition by pyrolysis-field ionisation-mass spectrometry (Py-FIMS), benzene polycarboxylic acids (BPCA) determination, examined the source of the SOM by isotopic signatures ($\delta^{34}\text{S}$) and estimated the age of the SOM by $^{14}\text{C}_{\text{org}}$ were similar to various Anthrosols (= (aprox) 25 % BC of C_{org}) and Chernozems (= (aprox) 13 % BC of C_{org}) worldwide and indicated an input of combustion residues to soils by early fire events. The $\delta^{34}\text{S}$ isotope signature of the SOM ranged from 10 to 13.4 ‰ at the islands and 10.6 to 15.2 in the Jaeren region of SW Norway, corresponded to the Anthrosols in the Baltic Sea region (Median: $\delta^{34}\text{S} = 11.5$ ‰) and indicated an input of marine biomass ($\delta^{34}\text{S}$ of seaweed = 20 ‰). All these results complemented the study of Schnepel et al. (2014) and provided strong evidence that these soils were formed by human activities. Ongoing analyses of ^{14}C ages from these soils enable to estimate the timing of the soil formation and link it to settlement history.

Literatur

Acksel, A., Amelung, W., Kühn, P., Gehrt, E., Regier, T., Leinweber, P., 2016. Soil organic matter characteristics as indicator of Chernozem genesis in the Baltic Sea region. *Geoderma Reg.* 7, 187-200. doi:10.1016/j.geodrs.2016.04.001.
Schnepel, C., Potthoff, K., Eiter, S., Giani, L., 2014. Evidence of plaggic soils in SW Norway. *J. Plant Nutr. Soil Sci.*, 177 (4), 638-645. doi:10.1002/jpln.201400025.