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Contents and composition of organic matter in subsurface soils affected by land use and soil mineralogy

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Land use and mineralogy affect the ability of surface as well as subsurface soils to sequester organic carbon and their contribution to mitigate the greenhouse effect. This study aimed to investigate the long-term impact of land use (i.e. arable and forest) and soil mineralogy on contents and composition of soil organic matter (SOM) from subsurface soils. Seven soils different in mineralogy (Albic and Haplic Luvisol, Colluvic and Haplic Regosol, Haplic and Vertic Cambisol, Haplic Stagnosol) were selected within Germany. Soil samples were taken from forest and adjacent arable sites. First, particulate and water soluble organic matter were separated from the subsurface soil samples. From the remaining solid residues the OM(PY) fractions were separated, analyzed for its OC content (OCPY) and characterized by FTIR spectroscopy. For the arable subsurface soils multiple regression analyses indicate significant positive relationships between the soil organic carbon contents and the contents of i) exchangeable Ca and oxalate soluble Fe, and Alox contents. Further for the neutral arable subsurface soils the contents OCPY weighted by its C=O contents were found to be related to the contents of Ca indicating interactions between OM(PY) and Ca cations. For the forest subsurface soils (pH <5) the OCPY contents were positively related with the contents of Na-pyrophosphate soluble Fe and Al. For the acidic forest subsurface soils such findings indicate interactions between OM(PY) and Fe3+ and Al3+ cations. The effects of land use and soil mineralogy on contents and composition of SOM and OM(PY) will be discussed.