



Composition and radiocarbon age of chemically stable soil organic matter fractions

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Understanding the formation of long residence time carbon pools in soils is crucial for balancing global carbon budgets. We used oxidative degradation (H_2O_2) and demineralisation (HF) to gain organic matter (OM) pools of different chemical stability. The resistant fractions of both treatments were analyzed for their radiocarbon age and chemical composition (^{13}C CPMAS NMR). Samples were taken from topsoil and subsoil horizons of a Dystric Cambisol and a Haplic Podzol.

The oxidation-resistant fraction was isolated by H_2O_2 , assuming that chemical oxidation imitates natural oxidative processes. It was found to be up to 6000 years old, i.e. 500 to 3900 years older than the bulk soil material. In forest floor horizons the oxidation resistant OM is mainly composed of aliphatic material.

Demineralisation was done, because we presume that HF dissolves soil minerals *and* the mineral-associated OM. In A horizons the ^{14}C age of organo-mineral associations (HF-soluble OM) is 100-200 years older than the age of particulate OM (HF-resistant OM). In subsoil horizons, surprisingly, ^{14}C ages of the mineral-associated fraction are up to 3000 years *younger* than compared to the free particulate OM. This may indicate that (i) either the mineral associated soil OM fraction of deeper horizons is more easily replenished by input of young adsorbing materials as it is the case for the particulate OM or that (ii) stabilization due to interactions with the mineral matrix is not as effective as the mechanisms, which stabilized the particulate OM. The composition of the HF soluble material changes with soil depth and differs between Haplic Podzol and Dystric Cambisol. It is mainly composed of small, water soluble molecules with a high contribution of labile carbohydrates.