Geophysical Research Abstracts, Vol. 8, 07784, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07784

Carbon stocks in soil organic matter fractions, separated by size and density, of the CARBOEUROPE site network

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In the framework of the CARBOEUROPE integrated project, the quantification and understanding of carbon stabilization processes in soils represents a key objective. There are several mechanisms through which C can be immobilised in SOM, with physical protection playing a fundamental role. In particular, microaggregates (53-250 μm) are identified as place where C stabilization on the long lived silt and clay fraction ($<$ 53 μm) take place, thus the relative abundance of microaggregates in soil may be considered as an index of SOC stabilization.

For this reason, the C content of soil organic matter fractions, separated by size and density, was analysed in order to distinguish the labile and non protected pools from the chemical and physical protected soil fractions.

Soil samples from 10 cores at two depth interval (0-5, 10-20 cm) from the 12 main sites of the CARBOEUROPE network, consisting of 3 broad-leaved and 3 coniferous forest, 3 croplands and 3 pastures, subject to differing climate and management practices, were fractionated for size and density. Briefly, 100 g of air-dried 8 mm-sieved soil sample is wet-sieved and separated into three main classes of aggregates: macroaggregates ($>$ 250 μm), microaggregates (53-250 μm) and silt and clay ($<$53 μm; SC). The M fraction is further separated into three pools: coarse particulate organic matter ($>$250μm, CoarsePOM), microaggregates within the macroaggregates (53-250 μm, mM), and silt and clay ($<$53μm, SC_M). A density floatation is then operated to distinguish the light fraction (LF), the silt and clay (SC), and the intra-aggregates particulate organic matter (I_POM) of the m and mM using a solution of

1.6 g cm^{-3} Sodium Polytungstate.

Results from the complete fractionation will be presented. Preliminary results on aggregates distribution indicate significant differences not only among ecosystems but also within different tillage managements of crop soils with, respectively, the grasslands and no-tilled soils being the ecosystems with the highest C levels.