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Assessment of soil organic matter fluxes at the EU level

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Soil has a complex relationship with climate change. Soil helps take carbon dioxide out of the air and as such it absorbs millions of tons each year, but with the Earth still warming micro-organisms grow faster, consume more soil organic matter and release carbon dioxide. The net result is a relative decline in soil organic carbon. With a growing population and higher bio-energy demands, more land is likely to be required for settlement, for commercial activity and for bio-energy production. Conversions from terrestrial ecosystems to urban and commercial activity will alter both the production and losses of organic matter, and have an indirect impact on potential SOM levels. Conversions between different terrestrial ecosystems have a direct impact on SOM levels. Net SOM losses are reported for several land conversions, e.g. from grassland to arable land, from wetlands to drained agricultural land, from crop rotations to monoculture, reforestation of agricultural land. In the context of looking for measures to support best practices to manage soil organic matter in Europe we propose a method to assess soil organic matter fluxes at the EU level. We adopt a parsimonious approach that is comparable to the nutrient balance approaches developed by the OECD and Eurostat. We describe the methodology and present the initial results of a European carbon balance indicator that uses existing European statistical and land use change databases. The carbon balance consists of the following components: organic matter production (I), organic matter losses (O), land use changes that effect both production and losses (E). These components are set against the (mostly legislative) boundary conditions that determine the maximum input potential (MIP) for soil organic matter. In order to budget SOM losses due to mineralisation, runs will be made with a multi-compartment SOM model that takes into account management practices, climate and different sources of organic matter.