ME 03 Soil carbon dynamics and variability at the landscape scale: its relation to aspects of spatial distribution in national emission databases

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Context / Social problem

An important part of the carbon cycle is the storage of carbon in the soil in the form of organic matter. Compared with vegetation, the soil can absorb far more carbon and fix it for a longer period. For mitigation of climate change, therefore, it is interesting to know exactly how carbon storage in the soil works. Moreover, under the Kyoto Treaty the Netherlands is obliged to report each year on the carbon store in the soil, surface and underground biomass, dead wood, litter and organic matter in the soil.

What do we know/not know?

The biggest component of the carbon store is organic matter in the soil, but this is also the component with the highest level of uncertainty. A global estimate has been made of the carbon store in the Netherlands and an initial estimate of the changes in the carbon store. The top 30 centimetres of mineral soil in the Netherlands contain 210 to 310 Mt carbon and the agricultural soils in the Netherlands emit 0.7 Mt carbon per year. These figures are based on a few hundred measurements. It is not clear where in the Netherlands organic matter is stored in the soil and how much of it is stored, how much is added or disappears each year, and what the stock and the increase or decrease are influenced by. Increasing insights into the spatial and temporal variation in the soil carbon store and into the processes influencing the soil carbon store can help to reduce this uncertainty.

What is being studied?

ME03 is investigating how the carbon store is affected by agricultural management methods (for example, ploughing or not ploughing, breaking up grassland or not, amount of fertiliser), by land use history and by forest management. We are currently conducting research into how forest management can influence the storage of carbon in the soil in the forest are of Speulder- en Sprielderbos. We are also researching the influence of land use changes in the past on the carbon store now present in the soil. In a case study area to the south-west of Meppel, we are investigating in two places whether reclaimed heathland of various ages have different soil carbon stores.

What are the results, and who are they for?

The result of the two cases studies will be greater insight into the factors that influence the soil carbon store and better understanding of the spatial variability of the soil carbon store in our case study areas. We can then use these data to make better estimates of the soil carbon store throughout the Netherlands. This improved understanding can in turn be used to produce better national reports, survey systems and estimates at the European scale in relation to land use changes.