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Quantifying organic carbon stocks in Irish soils

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Soil organic carbon (SOC) is of global importance as it is the largest carbon stock in most terrestrial ecosystems (Eswaran et al. 2000, Jobbagy and Jackson 2000). SOC stocks are being altered worldwide due to anthropogenic disturbances, such as deforestation, cultivation, urbanization, and peat extraction, and may be further altered due to the effect of a changing climate on biomass production and decomposition. In order to know if Irish soils are a sink or a source of carbon to the atmosphere, Ireland needs an initial estimate of the carbon stock in its soils. This study represents a baseline assessment of soil carbon stocks in Ireland.

In order to quantify SOC and understand its spatial variability, we sampled soil at 71 sites to 50 cm depth throughout Ireland in 2006/2007. The complexity of calculating SOC stocks for Irish soils arises not just from the range of soils found, but also their spatial heterogeneity. We covered a range of land use and soil type combinations, which reflects the physical and chemical properties of soils. We found that soil type is a better predictor of SOC stocks than land use, primarily with respect to mineral versus organic soils. Land use is a broad categorization that masks the effect of soil type, in part because soil type determines land use to a large degree. Differences in the SOC stock found when grouping sites by land use are primarily attributable to the high organic carbon content of peat soils.