Geophysical Research Abstracts
Vol. 12, EGU2010-2035-1, 2010
EGU General Assembly 2010

Design of monitoring networks to estimate change in soil organic carbon

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Soil organic carbon changes are an important element in our attempt to understand and quantify the role of terrestrial carbon sinks. This paper will describe the steps that need to be considered to design a monitoring network that can detect changes in soil organic carbon using examples from a number of different European countries.
Monitoring is defined as "collecting information on soil through repeated or continuous observation in order to determine possible change in soils". It is important to define what the objectives of the monitoring network are as these will inform the design of the sample sites and the frequency of sampling.
Model-based and design based methods are alternative statistical approaches to developing a sampling scheme with different strengths and limitations, depending on the objectives, measures and constraints. In general, model-based methods are best suited to providing local estimates while design-based are better suited to providing estimates of overall means; (but other factors are important in this choice). Design-based methods require some sort of randomised sampling, while model-based methods typically entail systematic sampling (on a grid, for example). Different objectives can lead to different design methods
The evaluation of different monitoring strategies will be discussed where the costs of different forms of sampling are weighed against the accuracy and precision of their results.