



Towards integrated modelling of soil organic carbon cycling at landscape scale

V. VIAUD

INRA, UMR SAS, Rennes, France (valerie.viaud@rennes.inra.fr)

Soil organic carbon (SOC) is recognized as a key factor of the chemical, biological and physical quality of soil. Numerous models of soil organic matter turnover have been developed since the 1930ies, most of them dedicated to plot scale applications. More recently, they have been applied to national scales to establish the inventories of carbon stocks directed by the Kyoto protocol. However, only few studies consider the intermediate landscape scale, where the spatio-temporal pattern of land management practices, its interactions with the physical environment and its impacts on SOC dynamics can be investigated to provide guidelines for sustainable management of soils in agricultural areas.

Modelling SOC cycling at this scale requires accessing accurate spatially explicit input data on soils (SOC content, bulk density, depth, texture) and land use (land cover, farm practices), and combining both data in a relevant integrated landscape representation. The purpose of this paper is to present a first approach to modelling SOC evolution in a small catchment. The impact of the way landscape is represented on SOC stocks in the catchment was more specifically addressed. This study was based on the field map, the soil survey, the crop rotations and land management practices of an actual 10-km² agricultural catchment located in Brittany (France). RothC model was used to drive soil organic matter dynamics. Landscape representation in the form of a systematic regular grid, where driving properties vary continuously in space, was compared to a representation where landscape is subdivided into a set of homogeneous geographical units. This preliminary work enabled to identify future needs to improve integrated soil-landscape modelling in agricultural areas.