



Predicting future spatial distribution of SOC across entire France

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Soil organic carbon (SOC) is widely recognized as a key factor controlling soil quality and as a crucial and active component of the global C-cycle. Hence, there exists a growing interest in monitoring and modeling the spatial and temporal behavior of this pool. So far, a large attempt has been made to map SOC at national scales for current and/or past situations. Despite some coarse predictions, detailed spatial SOC predictions for the future are still lacking. In this study we aim to predict future spatial evolution of SOC driven by climate and land use change for France up to the year 2100. Therefore, we combined 1) an existing model, predicting SOC as a function of soil type, climate, land use and management (Meersmans et al 2012), with 2) eight different IPCC spatial explicit climate change predictions (conducted by CERFACS) and 3) Land use change scenario predictions. We created business-as-usual land use change scenarios by extrapolating observed trends and calibrating logistic regression models, incorporating a large set of physical and socio-economic factors, at the regional level in combination with a multi-objective land allocation (MOLA) procedure. The resultant detailed projections of future SOC evolution across all regions of France, allow us to identify regions that are most likely to be characterized by a significant gain or loss of SOC and the degree to which land use decisions/outcomes control the scale of loss and gain. Therefore, this methodology and resulting maps can be considered as powerful tools to aid decision making concerning appropriate soil management, in order to enlarge SOC storage possibilities and reduce soil related CO₂ fluxes.