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## Tackling climate change reporting needs regarding soil C pool: SOC modelling under different land-use categories in Croatia

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Soil organic matter (SOM) is one of five mandatory pools used in reporting of national greenhouse gas inventories under UNFCCC and EU regulations. Reporting on net change in soil organic carbon (SOC) under different land uses over time is challenging. The 2006 IPCC Guidelines for National Greenhouse Gas Inventories suggest that all estimates, including carbon (C) in SOM, should be transparent and consistent throughout the time series. For some countries assessing net change of SOC is often not easy due to lack of data, infrastructure or funding. Consequently, for the mineral part of the soil, frequently used is the simplest approach of assessment (Tier 1) which assumes no change in mineral SOC stocks. However, this assumption should be substantiated.

There is a growing need for the use of higher tiers in reporting of C changes in SOM pool, by providing estimates from field measurements and modelling. While soil C modelling is cost-effective, and in some countries already found applicable for the purpose of reporting, field measurements of soil C stocks are expensive and time-consuming, but necessary for model calibration and validation.

In our research we used Biome-BGCMuSo model, a biogeochemical model that simulates the storage and flux of water, C, and nitrogen (N) in the soil-plant-atmosphere system. Biome-BGCMuSo is a new variant of the well-known Biome-BGC model with an improved multilayer soil module. We performed spatial modelling of SOC down to 30 cm for four different land-use categories of: deciduous forests, evergreen forests, annual croplands and grasslands, for the period 1990-2014. Eco-physiological parameters for each biome (i.e. land-use) were obtained from the literature. Meteorological data was obtained from open-access meteorological database FORESEE. Management activities (i.e. thinning, planting, mowing, fertilizing, and ploughing) were estimated based on available data and consultations with the local experts. Modelling results of SOC stocks were compared to field measurements. Trends of soil C change in period 1990-2014 under different land-uses were discussed.