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Insights into ECOSSE modelling of soil organic carbon at site scale from Irish grassland sites and a French grazed experimental plot

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ABSTRACT

The work provides insights into soil organic carbon (SOC) modelling procedures associated with different management practices for Irish grassland sites selected from two large soil databases (LUCAS-2009 [1] and Teagasc-SIS [2]) and a single treatment-plot from France (paddock of a long-term grassland-experiment) [3]. Modelling of SOC was done at site scale using “Model to Estimate Carbon in Organic Soils -Sequestration and Emissions” (ECOSSE) 6.2b version of the model in site-specific mode [4]. The selection of Irish sites and the Irish model input-parameters followed procedures explained in Premrov et al. (2020) [5]. As explained in Premrov et al. (2020) [5], special attention was given to model SOC-input data because the preliminary findings showed high sensitivity of model predictions to the initial SOC-inputs [5]. Initial SOC-inputs for Irish sites were extracted from the Irish soil NSDB-database [8] because of lack of data at that time. The preliminary SOC modelling results from Irish sites [RMSE >36%; 84 sites (out of total 95 pre-selected LUCAS and SIS sites after excluding 11 potential outliers [7])] indicated that further work is needed on obtaining initial SOC-input data. The new LUCAS-2015 [6] soil-point data in combination with older LUCAS-2009 [1] data provide opportunities to resolve this issue, which is currently work in progress. Considering that Irish sites were selected from large soil-databases that lacked detailed site-specific information (i.e. stocking rates and fertilisation-data could be obtained only in general form), the treatment-plot from France [3] was also simulated to gain further insights into the ECOSSE SOC modelling at site/point-scale. This work confirmed the importance of using appropriate conversion-factor when applying stocking rates as a proxy for the manure-inputs (as an alternative for grazing [7]). Further insights included the importance of assessing the modelled SOC ‘trends’ over time, and its comparison with observed ones [7].

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