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ECOSSE biogeochemical modelling of soil organic carbon from Irish grassland systems - challenges and opportunities

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In this study we used the biogeochemical model ECOSSE-6.2b ^[1] in site-specific mode to evaluate/test model accuracy to estimate soil organic carbon (SOC) in Irish grassland systems under mineral soils. The selection of sites and management practices, as well as model inputs and model initialization followed procedures explained in Premrov et al. (2021) and (2020) ^{[2],[3]}. Results indicated a possible overestimation of modelled SOC for some grassland management categories, highlighted the sensitivity of the model to the initial SOC inputs and demonstrated the need for replicated measurements of SOC over time ^[4]. One of the challenges faced in this study was the lack of availability of site-specific data for the selected Irish sites, such as data on livestock stocking rates (SR) for grazed grasslands, which can differ greatly from year to year. SR could be only estimated as a single numeric value for each site, which demonstrated the need for greater availability and more detailed site-specific data for Irish grasslands. The availability of repeated measurements of SOC over time for the whole country represented another major challenge in modelling SOC for Irish grassland systems ^[4]. It is thought that the modelling undertaken here could be further enhanced using additional time-dependent SOC soil-point data, such as LUCAS data ^[5], as this would provide datasets that have repeated measurements of SOC needed for further model evaluation and parameterization. This work also showed a significant potential for further model improvement; grazing-induced vegetation changes, and associated impacts on SOC, could be accounted by introducing new types of grazed grassland vegetation parameters into the ECOSSE model ^[4]. These modelling opportunities could also have significant potential for further assessment of SOC dynamics and for spatial and temporal upscaling.

Acknowledgements

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Literature

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