

EGU2020-10846

<https://doi.org/10.5194/egusphere-egu2020-10846>

EGU General Assembly 2020

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## Simulation of soil organic carbon stock and greenhouse gases emission from Perennial Energy Crops cultivation cycle in Italy with ECOSSE model: from establishment to removal

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Soil organic carbon (SOC) is an important carbon pool sensitive to land use change (LUC). There are concerns that at the end of PECs cultivation cycle, the re-conversion of these crops back to arable land could negatively impact the SOC stock. However, a positive effect of reconversion on SOC is possible, due to the high amount of C added to the soil with the disruption of belowground biomass (BGB) during re-conversion process. In this study, C storage potential in SOC and BGB of six perennial energy crops (PECs) was measured in a 11 years old field trial in Italy before its reconversion to arable land. SOC dynamics and greenhouse gases (GHGs) emission were measured in the first two years after the reconversion. SOC and GHG measurements were compared to ECOSSE soil carbon model predictions (run for a LUC from arable land to PECs and reconversion to arable land) to understand SOC dynamics. After 11 years of cultivation, PECs significantly increased SOC stock respect to arable land. In average, BGB accounted for the 68% of total carbon stocked by PECs. The ECOSSE soil carbon model successfully simulated the dynamics of SOC pool and the GHGs emissions from soil after the re-conversion of PECs.