Topic: Climate change adaptation and mitigation at the farm scale
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Assessment of climate change impacts on SOC dynamic in rainfed cereal cropping systems managed with contrasting tillage practices using a multi model approach.

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Conservation tillage (i.e., reduced- RT and no till - NT) is frequently proposed as mitigation practices as it can contribute to increase soil organic carbon (SOC) compared to conventional mouldboard ploughing (CT). In this study, we assessed the long-term effects of different tillage management practices on crop yield and SOC stock dynamics in Mediterranean rainfed cereal cropping systems at current and future climate scenarios. We relied on data obtained from long term experiments (LTEs) coming from ICFAR network coupled with four simulation models (APSIM, DSSAT, EPIC, SALUS). Two LTEs dataset were used: AN (Ancona, Marche, 1994-2015) characterized by a two-year durum wheat-maize rotation (NT vs CT: 40 cm deep mouldboard ploughing) and PI2 (Pisa, Toscana) based on a maize continuous crop from 1994 to 1998 followed by a durum wheat-maize rotation (RT: 15 cm disc tillage; vs CT: 30 cm deep ploughing). Climate scenarios were generated by setting up a statistical model using predictors from ERA40 reanalysis and seasonal indices of temperature and precipitation from E-OBS gridded data for the period 1958-2010. The statistical downscaling model was applied to CMCC-CM predictors to obtain climate scenarios at local scale over the period 1971-2000 and 2021-2050 (RCP45 and RCP85 emission scenarios). The multi-model mean was able to better reproduce and with less uncertainty SOC dynamics than a single model, hence better SOC predictions are also expected to occur in the future assessment. Overall, our study showed a decrease of SOC stocks in both sites and tillage systems in future scenarios. However, even if conservation tillage was more affected by climate change losing more SOC than CT, these systems were still able to stock more soil organic carbon also under future scenarios.