

Parallel Session B: Coupled Models

B1: Atmosphere-land

Quantifying the evolution of agriculture impact on climate in Europe by observation and regional climate model simulations

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Agricultural sector is an important part of the anthropogenic land use change which plays a prominent role in stabilizing global mean temperature rise to 2 °C or less. Changes in the extent and magnitude of local-to-regional climate by agriculture evolution are still not explored. In this study, we simulate and analyze the climate response to different ranges of agricultural area changes with a regional climate model (WRF v.3.9.1) in EURO-CORDEX (European branch of the international Coordinated Regional climate Downscaling Experiment-CORDEX initiative) domain. Different experiments are envisioned in this study, including a control run and simulations based on idealized extensive cropland loss or cropland gain. The simulations also include more realistic agricultural area changes across different land cover classes. The investigated parameters will be the changes of temperature, precipitation, and frequency of temperature extremes at both the entire EURO-CORDEX domain (regional scale) and the changed grids (local scale). Results will also be compared to observation data gathered from satellite retrievals. In the grid cell affected by land cover change, we expect to find climate changes that are more significant than in non-affected areas. A latitudinal pattern and seasonal variability should also emerge. Of particular interest will be the understanding of the spatial patterns of the climate response to the transition between cropland and other types of land cover changes, their sensitivity to space and location, and the analysis of possible correlations with different kinds of cropland and climate parameters. As biophysical effects from agriculture evolution shape European climate in different ways, further developments and better understanding of land-climate interactions can ultimately assist decision makers to modulate land management strategies at different scales in light of climate change mitigation and adaptation.

Keywords: land use/cover change, regional climate mode, biophysical mechanisms, cropland, EURO-CORDEX