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Regional impacts of simulated irrigation in the IPSL climate model.

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The recent years have shown increasing interest and effort to include simulation of irrigation in Earth System Models to better account for the effects of this anthropogenic process on climate. We present here preliminary results about the impacts of simulated irrigation on surface-atmosphere interactions using LMDZ and ORCHIDEE, the atmosphere and land surface components of the IPSL Climate Model. The DYNAMICO-LMDZ configuration, coupling the physics of LMDZ to the recent icosahedral dynamical core DYNAMICO, is run as a Limited Area Model (LAM) to conduct a regional study over North-Eastern Spain. The simulation domain encompasses the Ebro valley where the LIAISE (Land-surface Interactions with the Atmosphere In Semi-Arid Environment) field campaign was conducted in 2021. This campaign was specifically designed to provide better understanding of the local and regional impacts of irrigation and the surface heterogeneities it creates. A new representation of irrigation, based on a soil moisture deficit approach, has recently been developed in ORCHIDEE and simulations are run with and without it to assess the impacts of simulated irrigation in the model. Direct effects at the land-surface interface (soil moisture, turbulent fluxes, temperature) are studied first, before focusing on the structure of the boundary layer and precipitations. Field observations from the campaign are used to evaluate the model, and the outputs will also be compared to higher-resolution simulations that have been conducted using the Meso-NH model in the context of the LIAISE project. The impacts of irrigation will be studied using various resolutions of the LAM from 10 to 50km, to better understand the scales at which land-surface coupling processes can be explicitly resolved by the dynamics of the model, and assess the importance of parametrizing these processes.