P22 The effect of drying and irrigation on the local climate with WRF-ARW model: a case of the Po Valley (Italy).

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The climate system is complex and non-linear with many feedbacks that connect different parts, such as land-atmosphere. It is scientifically agreed that changes in the atmosphere state can impact changes in the land, an example is plant species migration due to shifts in climates. However, this feedback effect happens also in the opposite direction: land use changes affect the climate on multiple scales. Recent studies found that conversion from higher natural vegetation to agricultural land cause a cooling effect on climate, though it responds drastically differently to heat waves. In fact, the low agricultural cultivar is more sensitive to drying due to the lower depth of the root zone. Therefore, soil moisture depletion due to dry conditions affects this type of vegetation strongly. To avoid drying, semi-arid summer regions use irrigation to support agriculture. These two semi-dynamic processes are not well represented within limited area numerical weather prediction models, such as the Weather Research Forecast (WRF-ARW 3.8.1) model.

Therefore, the study aims to assess the impact of drying and irrigation processes on the local climate and circulation. Firstly, the current WRF-ARW representation of the local climate is determined for a test case: the Po Valley in northern Italy, which is highly cultivated and irrigated, under heat wave conditions. Then the drying process under heat stress conditions is studied from the soil-atmosphere coupling perspective. Subsequently, the irrigation process is implemented for WRF-ARW with different parametrizations