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Land Surface Interactions with the Atmosphere over the Iberian Semi-Arid Environment (LIAISE): Field campaign overview

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Human activities play a key role in modifying the continental water cycle and must be better accounted for in climate projections. This issue is especially critical in bread basket regions where water resources are already limited, such as the Mediterranean basin. Such regions are known to be hot spots for biases in climate model variables, in particular land surface temperature (LST) and components of the surface energy balance. To a large degree, this stems from highly heterogeneous land cover in terms of both natural and anthropized surfaces, largely driven by the limited availability of soil moisture and the nature of the precipitation. The LIAISE project brings together ground-based, satellite and airborne measurements with modeling studies to improve our understanding of key natural and anthropogenic land processes and the subsequent feed-backs with the Mediterranean boundary layer and basin-scale hydrological cycle.

The field campaign component of LIAISE is to be held in the Ebro basin in northeastern Spain, where surface heterogeneity has grown due landscape changes mainly owing to increases in agricultural activity and dramatically enlarged irrigated areas. An Intensive Observation Period (IOP) has been defined from early April through September 2020. A network of surface energy budget (SEB) observing stations will be installed within an approximately 10 km radius centered over the Pla d'Urgell county (Lleida, Catalonia) in the Eastern Ebro basin. This area is selected since it encompasses several representative Mediterranean land cover types. The land sites will also include soil moisture, temperature and vegetation monitoring data. This location benefits from the dense local meteorological station and radar data from the Spanish (AEMET) and Catalan (SMC) Meteorological Services, along with the weighing lysimeters of IRTA. A 15-day Special Observation Period (SOP) is planned for mid July 2020, when contrasts between irrigated and natural surfaces are at their maximum, during which additional extensive measurements of the lowest 4 km of the atmosphere will be made, using remote sensing devices, radiosondes and instrumented aircraft. High-resolution LST and surface soil moisture estimates from both aircraft and state-of-the-art soil moisture products will be combined with in situ soil moisture observations from an existing network for use in assimilation into the LSMs and/or for evaluation.

The resulting database will form the basis for a number of international modeling experiments that will cut across many areas of interest to GEWEX, ranging from the ability of LSMs to capture soil moisture dry down, the representation of heterogeneity and how this interacts with the atmospheric boundary layer, the impacts of human influence on land surface fluxes and land/atmosphere interactions and the impact of human influence of the terrestrial water cycle of semi-arid environments.