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Land surface Interactions with the Atmosphere over the Iberian Semi-arid Environment (LIAISE) Project: Overview of the Field Campaign intense phase

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It is known that irrigation can impact the local atmospheric boundary layer characteristics, thereby modifying near surface atmospheric conditions within and downwind of irrigated areas and potentially the recycling of precipitation. The understanding of the impact of anthropization and its representation in models have been inhibited due to a lack of consistent and extensive observations, but in recent years, land surface and atmospheric observation capabilities have advanced. The overall objective of the Land surface Interactions with the Atmosphere over the Iberian Semi-arid Environment (LIAISE) project is to improve the understanding and prediction of land-atmosphere-hydrology interactions in a semi-arid region characterized by strong surface heterogeneity between the natural landscape and intensive agriculture. The study region is located over the Pla d'Urgell region within the Ebro basin in NE Spain. This area was selected since it is a breadbasket region: there are discussions underway to further expand this irrigated zone owing to its economic importance, but consensus of current climate projections predicts a significant warming and drying over this region in upcoming years. Thus there is an urgent need to improve the prediction of the potential changes to the regional water cycle since water resources are limited.

Here we present an overview of the intense phase of the LIAISE observational campaign, which is part of the HYdrological cycles in the Mediterranean Experiment (HyMeX) phase 2, that took place in July, 2021 when land surface heterogeneity was at a maximum. A network of 7 stations provided continuous measurements of the surface energy and water budget components for multiple

representative land cover types, including irrigated surfaces, along with detailed surface biophysical measurements from the leaf to field scale. Surface fluxes at the field scale were made using scintillometer configurations over 3 of the sites. Lower atmospheric measurements were obtained from tethered balloons, lidar, UHF profilers, frequent radio-sounding releases, UAVs and several aircraft. Finally, airborne instruments measured solar induced florescence, surface temperature over several spectral bands and soil moisture over a transect cutting across the rain-fed and irrigated areas. The main outcome of this project is to provide the underpinnings for improved models leading to better water resource impact studies for both the present and under future climate change.