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Monitoring of flood irrigation for the characterization of irrigation practices of grassland fields in the Crau region (South of France)

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Surface irrigation (flooding and furrow) is the main irrigation technic in the world. This irrigation system is known as having poor water efficiency and that results in very large water losses through drainage and runoff out the field. Although these unused water amounts can generate positive externalities (wetlands and groundwater recharge), a decreased of water volume used in surface irrigation is sought in a context of limited water resource.
In the Crau area (South of France), more than 12,500 ha of grassland are irrigated by flooding. There, at the regional scale, it is estimated that the water volumes brought into the field are very high; and ranges from 15,000; up to 20,000 m3.h-1.year-1; more than 78% of these amounts recharges the Crau aquifer (Saos, 2006).
However, the actual volumes which are injected to the plot surface (the " irrigation dose ") are insufficiently known, because of the diversity of encountered agricultural practices and fields topography. For better characterizing these practices, a campaign of irrigation monitoring has been carried out during an irrigation season (March to September 2014) on a set of representative plots of soil variability, practices, and different stages of hay grow. Each grassland field has been also characterized from a topographical and pedological view point.
A mobile device for measurements (soil moisture and water level probes, photographic monitoring, soil sampling, ..) was deployed for each irrigation. A total of 35 irrigation events were followed.
The data obtained allow describing accurately and quantitatively the variability in encountered irrigation practices. Combined with a flood irrigation model (Model CALHY, Bader et al., 2010, Hydrol. Sci. J., 55, 177-191), these data will be used to calculate the water balance at the field scale: amounts of injected, infiltrated and lost water by runoff or drainage. They will also offer different ways for optimizing the irrigation efficiency.