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Application of a crop model forced with remote sensing data at high spatio-temporal resolution to estimate evaporation and yields of irrigated grasslands in the South Eastern France

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This study focused on the feasibility of using remote sensing data acquired at high spatial and temporal resolution (FORMOSAT-2 images(http://www.spotimage.fr/web/en/977–formosat-2-images.php) for crop monitoring at regional scale. The monitoring of agricultural practices such as grassland mowing and irrigation is essential to simulate accurately all processes related to crop system. This information is needed for example in crop simulation models to estimate production, water and fertilizer consumption and can thus serve to better understand the interactions between agriculture and climate. The analysis of these interactions is especially important in Mediterranean region where the effects of climate changes and crop management modifications are increasingly marked. In this context, an experiment was conducted in 2006 in Crau region in the South-Eastern France. In this area, permanent grassland represents 67 % of the usable agricultural area, and it is often used with irrigation (47 % of the permanent grassland). A time series of 36 FORMOSAT-2 images was acquired with a three days frequency from March to October 2006. Information concerning grassland mowing and irrigation was collected through a survey over 120 fields. The high FORMOSAT-2 revisit frequency allowed replicating the dynamics of Leaf Area index (LAI), and detecting to some extents cultural practices like vegetation cut. Simple automatic algorithms were developed to obtain daily values of LAI for each grasslands field linked with the main agricultural practices performed (cut and irrigation dates). This information was then used in a crop model called STICS (http://147.100.66.194/stics/) to estimate the spatial variability of evapotranspiration and drainage associated with the aerial biomass productions. Comparisons between simulated and observed yields gave satisfactory results. The great spatial variations of evapotranspiration were strongly related to the crop and water management. Such methodologies can be used in the future in the climatic change context to simulate scenario for saving water while developing a sustainable agriculture.