Analysis of the crop functioning at the scale of a small agricultural region using remote sensing data and a crop model.

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Water monitoring at the scale of a small agricultural region is a key point to insure a good crop development, particularly in the South-east of France, where the climatic conditions are often extreme, with long dry periods in spring, irregular precipitations and strong North cold wind ("mistral") which can occur at crucial periods for the crops (growing, harvest). So the management of the technical practices such as the choice of the variety, of the sowing date, the irrigation dates and quantities... are determinant to obtain good yields. The aim of our study is to model the functioning of a small region "La Crau-Camargue", which presents various crops and practices (winter wheat, irrigated meadow, corn, rice), using a crop model (STICS, 3w/avignon.inra.fr/stics) and remote sensing data. Since 1996, several weather stations have been set up in various environments of this region. A sensitivity analysis of the spatial climatic variability has been made on the main outputs of the crop model. The results showed that it was very important to know with accuracy the climatic input data which are very dependent on the main cultural practices performed on the fields. The irrigation for example induced the greatest variations for the air temperature. A specific experiment has been conducted in 2006 with numerous ground and airborne measurements in order to control better the different model variables (LAI, biomass, surface flux). Remote sensing data were acquired at different spatial and spectral resolutions. Thus, 32 FOR-

MOSAT@SPOT images taken from March to October (at a spatial resolution of 8m) allowed to give accurate information of the vegetation structure (LAI, fcover) and to detect the main cultural practices such as the cut dates of the irrigated meadows. This information was used as input data in the crop model and has improved the model performances. The simulations performed on the main crops (wheat and meadow) are presented and compared to the measurements. The results were satisfactory and they outlined the importance to know with accuracy the climate and the agricultural practices because of the feedback between practices and climate and their impact on the agricultural production. Remote sensing appears as a useful tool to improve crop modeling and the spatialisation of main land properties.