MONITORING EVAPOTRANSPIRATION BY ASSIMILATING REMOTE SENSING DATA INTO A DYNAMIC SVAT MODEL OVER THE ALPILLES TEST SITE

A. Olioso¹, V. Rivalland¹, J. Demarty¹, M. Weiss¹, P. Rossello¹, F. Jacob¹, Y. Inoue³, F. Baret¹

1. INRA/CSE, Domaine Saint Paul, Agroparc, F-84914 Avignon Cedex 9, France
2. PURPAN-Ecole superieure d’Agriculture, 75, voie du TOEC, F-31076 Toulouse Cedex 3, France
3. National Institute for Agro-Environmental Sciences, Tsukuba, 305-8604, Japan.

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Objective of the study
The study aimed to use high and low spatial resolution remote sensing data for constraining a soil-vegetation-atmosphere transfer model at the scale of a small agricultural region.

Materials and Methods
The ISBA (Interactions between Soil, Biosphere, and Atmosphere) model is a soil-vegetation-atmosphere transfer (SVAT) scheme able to simulate the energy and water budget with soil and surface characteristics and climate forcing. We used this SVAT model on a 5 ? 5 km² agricultural region in the South-East of France (Alpilles/ReSeDA) with the aim of monitoring surface energy and mass exchange at high spatial resolution (20 m) and low spatial resolution (1 km) from February to October 1997. The land use map was estimated at high resolution from ground survey and classification of SPOT images. Spatial and temporal evolution of surface characteristics like Leaf Area Index (LAI), fraction of vegetation cover or albedo used as forcing input in the model are derived from airborne PolDER multispectral and multidirectional measurements at high and low resolution. At low resolution, remote sensing data were unmixed to the level of each land cover type in each 1km pixel by using the Best Linear Unbiased Predictor statistical concept. Soil physical characteristics are calculated from a soil texture map and pedotransfer functions. In order to validate SVAT simulations, surface energy fluxes and soil moisture evolution simulated by the model are compared to ground measurements in specific fields and to evapotranspiration maps derived from airborne infra-red data.

Results
In a first step, we showed that the standard parameterization of ISBA led to a large underestimation of evapotranspiration. In a second step, the assimilation in the SVAT model of thermal data at airborne acquisition dates made it possible to correct spatial simulations of soil moisture by re-assessing soil hydrodynamic parameters and deriving information on irrigation practices. The use of 1km unmixed data led to results close to high resolution data at the integrated scale, but not at the 20 m scale.