UPSCALING ENERGY BALANCE MODELS FOR IRRIGATED AGRICULTURE FROM AIRBORNE AHS/INTA TO ASTER (BARRAX, SPAIN, SPARC 2004)

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Objective
The study aims at improving the performance of energy balance models in estimating water cycle components of irrigated areas, through a detailed study of upscaling from high resolution (2 m) to lower resolution imagery (90m).

Materials and Methods
An intensive field campaign (SPARC, 2004) was conducted in Barrax, Spain during the summer of 2004. Here we concentrate on the application of Energy Balance Models through the use of multi-spectral ASTER and hyperspectral AHS/INTA data. Recently an ASTER comparison was made (French et al., 2005) for several energy balance models in an agricultural area (Iowa, USA). In this US study all images were resampled to 90 m, the resolution of the ASTER TIR bands 10-14. Here a more detailed analysis is possible because of the additional availability of AHS/INTA airborne hyperspectral imagery.

An ASTER data set, consisting of level 1b data with a full set of products (VNIR band reflectances and surface kinetic temperature with emissivities), is available for July 18, 2004. Airborne AHS/INTA data, comprising 21 VNIR and SWIR bands and 10 TIR bands, is available for July 15 and 18, 2004. Two flight altitudes, 975m and 2745m above ground level, produced images with pixel size resp. 2.1 and 5.8 m. After radiometric and geometric processing, corrections were made for atmospheric effects, using project atmospheric data, complemented by ECMWF (MARS) data.

Results
The energy balance of the irrigated pivots and surrounding area was determined by means of SEBS (Su, 2002) SEBAL (Bastiaanssen et al., 1998) and TSEB (Kustas and Norman, 1999). Because these models differ in their approach to incorporation of fractional vegetation cover, special attention was paid to the model sensitivities in the so-called mixed pixels at the pivot edges, where well-watered areas are combined with dry land. Improvements are suggested for upscaling and aggregation of energy balance components.