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Using MSG-SEVIRI derived vegetation parameters in an energy balance model: methodology and impact on surface heat fluxes

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In the framework of the EUMETSAT Land Surface Analysis (LSA) - Satellite Application Facility (SAF), models have been developed to retrieve from the MSG SEVIRI imager, surface variables like albedo, short- and long-wave radiation fluxes and vegetation parameters (Leaf Area Index, LAI, and Fraction of Vegetation Cover, FVC). An energy balance model is also being elaborated to produce actual evapotranspiration (ET) estimates as one of the end products of the LSA-SAF. The model is a simplified Soil-Vegetation-Atmosphere (SVAT) scheme adopting the tile approach, i.e. a sub-pixel computation of surface fluxes. The atmospheric forcings are 30 minutes full spatial resolution MSG derived surface radiative fluxes complemented by the ECMWF screen-level meteorological variables (air temperature and humidity, wind speed, ...). Important factors that strongly influence ET estimates are the time-dependent vegetation characteristics. In SVAT schemes, the influence of vegetation on energy partition is parameterized using key phenological factors, such as FVC and LAI. This contribution is prospecting the impact of detailing the spatial and temporal vegetation characterization on the partitioning of surface fluxes and the optimal way to use remote sensed vegetation parameters derived from SEVIRI in the LSA-SAF ET model.

Three different characterizations of vegetation are compared: fixed vegetation parameters, monthly varying and daily varying. At first, many SVAT schemes are using constant parameters for standardized types of vegetation (e.g. croplands, evergreen needleleaf forest ...), corresponding -more or less- to the mean estimates of the vegetation characteristics and calibrated for modelling purposes. Secondly, Masson et al. (2003) have developed ECOCLIMAP, a detailed soil-vegetation parameters database with a spatial resolution of 1 km, including the temporal evolution of vegetation char-

acteristics down to 10 days and different spatial characteristics between same vegetation types but in different regions. This database supports the ‘tile’ approach: each grid point, corresponding to a specific ecosystem, is decomposed into 11 ‘elementary’ vegetation types. Finally, within LSA-SAF, daily FVC and LAI are produced at SEVIRI spatial resolution for Europe, Africa, and part of South America (Garcia de Haro et al., 2005). The use of these new products can provide an advantage of detecting interannual variability and a more accurate description of vegetation growth characteristics. However, the evolution of FVC and LAI is not given for each ‘tile’ composing the pixel but for the whole pixel. A methodology to retrieve ’tiled’ information on vegetation changes has been developed to use LSA-SAF vegetation parameters in the ET model.

This contribution will first shortly describe the methodology chosen to use LSA-SAF vegetation products for energy partitioning. Effects of detailing vegetation phenology on surface fluxes will then be discussed on example basis, showing both temporal and spatial aspects.

References:

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