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Operational evapotranspiration based on Earth observation satellites

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Geostationary satellites have the potential to follow fast evolving atmospheric and Earth surface phenomena such those related to cloud cover evolution and diurnal cycle. Since about 15 years, EUMETSAT has set up a network named 'Satellite Application Facility' (SAF, http://www.eumetsat.int/website/home/Satellites/GroundSegment/Safs/index.html) to complement its ground segment. The Land Surface Analysis (LSA) SAF (http://landsaf.meteo.pt/) is devoted to the development of operational products derived from the European meteorological satellites. In particular, an evapotranspiration (ET) product has been developed by the Royal Meteorological Institute of Belgium. Instantaneous and daily integrated results are produced in near real time and are freely available respectively since the end of 2009 and 2010. The products cover Europe, Africa and the Eastern part of South America with the spatial resolution of the SEVIRI sensor on-board Meteosat Second Generation (MSG) satellites. The ET product algorithm (Ghilain et al., 2011) is based on a simplified Soil-Vegetation-Atmosphere transfer (SVAT) scheme, forced with MSG derived radiative products (LSA SAF short and longwave surface fluxes, albedo). It has been extensively validated against in-situ validation data, mainly FLUXNET observations, demonstrating its good performances except in some arid or semi-arid areas. Research has then been pursued to develop an improved version for those areas. Solutions have been found in reviewing some of the model parameterizations and in assimilating additional satellite products (mainly vegetation indices and land surface temperature) into the model. The ET products will be complemented with related latent and sensible heat fluxes, to allow the monitoring of land surface energy partitioning. The new algorithm version should be tested in the LSA-SAF operational computer system in 2016 and results should become accessible to beta-users/regular users by the end of 2016/early 2017.
In parallel, research has been started to investigate ET downscaling to a finer spatial scale. A first step is focusing on the assimilation into the algorithm of vegetation products derived from polar satellites. MODIS and SPOT-VEG products have been investigated to prepare the exploitation of the new Proba-V derived vegetation products that should become part the Copernicus Land Monitoring Service portfolio. Furthermore, an ongoing specific project is dedicated to the study of ET in wetlands allowing to concentrate research on relationship between ET, vegetation characteristics and ecosystem health. In the future, the launch of the Meteosat Third Generation satellite will motivate new developments in the framework of LSA-SAF.
The present contribution will give an overview of above mentioned operational products and related ongoing research activities.

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