



## **The ESA WACMOS-ET project: advancing in the production of evapotranspiration from satellite observations**

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Evapotranspiration (ET) is an essential component of the water and energy cycles. It is highly variable in both space and time, across climates and ecosystems, and difficult to estimate as it does not produce either absorption or emission of electromagnetic signals, which precludes a direct estimation from remote sensing techniques. Therefore global observations related to atmospheric and surface parameters have to be combined with an interpretive model to derive an observational ET product at the global scale.

Recent comparisons of satellite-based ET products (e.g., within the LandFlux initiative of the Global Energy and Water Cycle Experiment, GEWEX) have been very useful in providing a first measure of product differences, but not very conclusive in terms of understanding the sources of uncertainty. To further advance in this direction a systematic ET inter-comparison is needed whereby the different ET algorithms are run using (to the greatest possible extent) the same driving data and model protocols. In response to this need, ESA has initiated the WACMOS-ET project, a follow on of the first WACMOS project. While the first WACMOS addressed several components of the water and energy cycle, WACMOS- ET focuses on ET production by different methodologies, and it is aimed at advancing towards the development of ET estimates at global and regional scales. The main objectives are to develop a Reference Input Data Set (RIDS) to derive and validate ET estimates, and to perform a cross-comparison, error characterization, and validation exercise of a group of selected ET algorithms driven by the RIDS.

Compared with previous efforts primarily based on combining off-the-shelf input products, the preparation of the RIDS with a large degree of internal consistency is considered essential to (1) evaluate the skill of present algorithms in producing ET, (2) facilitate the attribution of the observed differences to model and driving data limitations, and (3) set up a solid scientific basis for the development of global long-term consistent ET products that may exploit existing and coming European EO assets (e.g., Envisat AATSR, MERIS, and the coming Sentinel series). Therefore, the project is internally generating bespoke versions of albedo (<http://www.GlobAlbedo.org>), LAI, FAPAR and land surface temperature, maximising the use of European EO assets, which are combined with an adapted radiation and surface meteorology product to complete the inputs required to drive the ET algorithms.

The production has been initiated for 3 years (2005-2007), over four continents at a spatial resolution of  $\sim 25$  km adequate for climatological studies, and over some selected regions at a finer resolution of  $\sim 1$ -2 km, to test the algorithms for agricultural and water management applications. The project is expected to be completed by the end of 2014, where the RIDS, the produced ET estimates, and their evaluation will be made publically available. Progress can be followed at the project website (<http://wacmoset.estellus.eu>).