



## **An Evaluation of Operational Evapotranspiration Estimates from Earth Observation Data at a Range of European Ecosystems**

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Evapotranspiration (ET) is the second largest flow of water on the planet, and in a time of global climate change it has never been more important to understand every aspect of the Earth cycles, especially when they affect anthropogenic activity as much as water.

Earth Observation (EO) has played a significant role in extending our capability to study the spatio-temporal variations of key state variables characterising Earth's physical processes including estimates of ET rates. EO technology is especially useful when measuring and predicting on larger scales, across regions and nations; conversely field sites favour the older point-data/in situ methods.

The present study aimed at evaluating operationally distributed ET estimates derived from SEVIRI, a radiometer on-board the Meteosat-2/3 platform in different ecosystems in Europe. SEVIRI nowadays is one of the few operationally distributed ET products available globally providing estimates of ET at 3km special resolution every 15 minutes. In our study co-orbital ET in-situ acquired from selected sites belonging to the CarboEurope IP ground observational network representative of different climatic, environmental, biome and topographical conditions in Europe were used. The study sites were located in the UK, The Netherlands, Spain, Italy and Portugal. These were chosen as they differ in physical characteristics such as climate, topography and land cover, but also they differ in proposed future water security, influencing future water management decisions. Comparisons were performed for selected days of year 2011 for which cloud-free days with satisfactory Energy Balance Ratio were previously identified. The agreement between the predictions and observations was thoroughly evaluated by computing a series of statistical parameters. The variability of site characteristics included in our study as a result to biomes and topography differences was also examined.

Overall, comparisons showed a generally reasonable agreement between the SEVIRI ET product and the corresponding ground measurements of ET rates for the different biome types. Results were largely comparable to previous analogous validation studies of the product, underlying the potential value of the SEVIRI ET product at regional to meso-scale studies.

Keywords: Evapotranspiration, Earth Observation, Europe, SEVIRI, Water Security