**Towards observation-based land evaporation data records: final results from the ESA WACMOS-ET project**

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Terrestrial evaporation (ET) links the continental water, energy and carbon cycles. Understanding the magnitude and variability of ET at the global scale is an essential step towards reducing uncertainties in our projections of climatic conditions and water availability for the future. However, the requirement of global observational data of ET can neither be satisfied with our sparse global in situ networks, nor with direct satellite observations. This situation has led to the recent rise of algorithms dedicated to deriving ET fields from satellite data indirectly, based on combining satellite-observable ET drivers within predictive models

Up to date, and despite the efforts from different initiatives like GEWEX LandFlux (hydrology.kaust.edu.sa/Pages/GEWEX\_Landflux.aspx), the uncertainties inherent in the resulting global ET datasets have remained largely unexplored, partly due to a lack of inter-product consistency in forcing data. In response to this need, the ESA WACMOS-ET project ([wacmoset.estellus.eu](http://wacmoset.estellus.eu)) has contributed to LandFlux efforts by (a) developing a reference input dataset to derive and validate ET estimates, and (b) performing a cross-comparison, error characterization and validation exercise of four selected ET algorithms driven by this reference input dataset and by in situ forcing data.

In this presentation we will highlight the main conclusions of the ESA WACMOS-ET project. Overall, two of the ET algorithms (the Priestley and Taylor JPL model and the Global Land Evaporation Amsterdam Model, GLEAM) yield estimates that are closer to independent ET retrievals at multiple spatial and temporal scales. Based on precipitation and runoff measurements, all four algorithms demonstrate some skill to close the water balance over the multiple catchments. Nonetheless, analyses of the global ET fields reveal significant differences amongst the four models, particularly in regards to the partitioning of ET into different components (transpiration, soil evaporation, interception) and the representation of sub-daily ET variability.

Overall, WACMOS-ET has led to significant progress in assessing ET algorithm performance and contributed to activities that has resulted in the release of a new 3-hourly 1987-2007 global ET product by LandFlux. However, numerous questions remain in our goal to generate accurate datasets of ET from remote sensing data. Since certain algorithms work better under certain circumstances, a better characterization of forcing uncertainties and algorithm structural deficiencies will enable the generation of multi-product ensembles that may outperform the individual products. Ongoing activities strive towards this direction.