Ensemble Evaporation Predictions from Remote Sensing in the Nile Basin

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Abstract

Water scarcity is increasing globally and is most evident in arid zones. Most rainfall is evaporated and runoff coefficients of 5 to 10% are common in arid zone river basins. Evaporation is the most important hydrological process, not only because of its magnitude, but also because it can be managed and regulated by withdrawals, land use changes and soil treatments. Hence, evaporation can be modified and the looming water crisis prompt us to think more careful on how water is consumed and the services we render on return in terms of agricultural production, ecosystem services, hydropower, leisure etc. Several research groups have developed global evaporation products, at least for the African continent. Most of these products have a pixel size between 1 to 3 km, and this is a reasonable tradeoff between what is technically preferred (get evaporation by land use class) and what can be technically inferred from the newest earth observation satellites. The variability among monthly SSEBop, Alexi, CSIRO, NBI version of MOD16, GLEAM and LandSAF evaporation products for the main land use classes of the Nile will be demonstrated for the period 2005 to 2012. The largest variabilities occur on irrigated land, open water bodies and flood plains. The evaporation predictions are compared against flux tower data, and the water balance of paired catchments in Ethiopia and Southern Sudan. It is proposed to use ensemble averages and spreads of actual evaporation values for applications in water management. Some first thoughts on ensemble averaging will be provided. Ensemble evaporation values will be applied in the Water Accounting Plus (WA+) system, being a new analytical framework for water resources assessment reporting that is under development by IWMI, FAO and UNESCO-IHE (www.wateraccounting.org).