A Remote Sensing Based ET Algorithm for an Australian Agro-Ecosystem: SAM-ET

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On Australian continent, approximately 90% of the precipitation that falls on the land is returned back to the atmosphere through actual evapotranspiration (ET) process. However, it is almost impossible to measure it directly at a meaningful scale in space and time through traditional methods. Since late 1990's, numerous algorithms have been developed to estimate ET using remote sensing (RS) data. However, Australian environmental conditions are unique which needs full adaptation of the overseas developed RS based ET algorithms before its use in Australia. A Spatial Algorithm for Mapping ET (SAM-ET) is being implemented within Australian irrigation systems initially, where ET is a crucial part of the water ordering decision-making.

SAM-ET is a two source energy balance algorithm which is being constantly developed and evaluated on water related projects for several years. This article concentrates on the Murrumbidgee catchment, where ground truth data has been collected on a fortnightly basis since 2007 using leaf area index meter, crop reflectance data from CROPScan and two Eddy Covariance Systems and two Large Aperture Scintillometers in the heterogeneous landscapes to measure ET fluxes. UAV drone equipped with multispectral scanner and thermal imager was used to get very high spatial resolution NDVI and surface temperature maps over the selected farms. The ground truth data was collected to develop new empirical and semi-empirical relationship for improving a SAM-ET algorithm dedicated to Australian agro-ecosystems. The next frontier is to integrate it with a decision support system for coordinating water supply and demand in near real time environment.