A remote sensing based ET algorithm for Australian agro-ecosystems: SAM-ET

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Abstract On the Australian continent, approximately 90% of the precipitation that falls on the land is returned back to the atmosphere through actual evapotranspiration (ET_a). However, it is almost impossible to measure it directly at a meaningful scale in space and time through traditional methods. Since the late 1990s, numerous algorithms have been developed to estimate ET using remote sensing (RS) data. However, Australian environmental conditions are unique and so full adaptation of the overseas-developed RS-based ET algorithms is needed before their use in Australia. A Spatial Algorithm for Mapping ET (SAM-ET) is a two source energy balance algorithm which has been continually developed and evaluated on water-related projects within Australian irrigation systems initially, over several years. This article provides an overview of ground truth data collected using a leaf area index meter, crop reflectance data from CROPSCAN, two Eddy Covariance Systems and two Large Aperture Scintillometers in the heterogeneous landscapes since 2007 to measure ET_a fluxes. The ground truth data were collected to develop new empirical and semi-empirical relationships for improving a SAM-ET algorithm dedicated to Australian agro-ecosystems. Initial results of the SAM-ET model are encouraging and this research work is a stepping stone in the development of an operational ET monitoring system which will be linked with on-going testing and development of a modelling framework for estimation of water productivity across different spatial scales in the Murray-Darling basin.

Key words remote sensing; actual ET; SAM-ET; Australia; irrigation