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Towards operational estimation of Evapotranspiration from Remote Sensing – A case study applying MODIS data for Kyeamba Creek, New South Wales, Australia.

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Spatial estimates of evapotranspiration provide essential information for water management systems which is traditionally not available. This study evaluates an application of the triangle approach using MODIS data for an area close to Wagga Wagga, New South Wales, Australia. The area is relatively dry with mean yearly precipitation of between approx. 330 mm (at Griffth 2000-2010) and 570 mm (at Wagga Wagga, 1981-2000). Near Griffith, the Murrumbidgee Irrigation Area is a large agricultural area supported by an extensive irrigation system, while the area south of Wagga Wagga is used for cattle and sheep grazing as well as smaller areas with irrigated crops. Regional estimates of the daily evapotranspiration were made using a modified version of the "triangle-approach", applying the temperature change between night-time and daytime MODIS Aqua overpass. Firstly, the evaporative fraction is estimated directly from the vegetation index-temperature difference space. Combined with an estimate of the daily net radiation (from a combination of station-based and satellite data), the daily evapotranspiration is estimated. The method is designed to require only standard meteorological station-based data as well as operational MODIS products on surface reflectance, albedo, temperature and emissivity to ease implementation over data-sparse areas. The obtained daily evapotranspiration rates are compared with in situ measurements from an Eddy Covariance tower located within the study area. The results show good agreement between satellite estimates and in situ measurements on the daily scale, but with a tendency for the satellites values to be lower. Preliminary analysis show that this is can, at least partly, be attributed to inaccuracies in the estimation of both the incoming and outgoing long-wave radiation used for the calculation of the net available energy for evapotranspiration. Regression analysis of in situ versus satellite data results in an coefficient of determination of 0.68 and a mean bias of 1.18mm/day. Furthermore, the effect of changing the size of the spatial domain, and the input data on land surface temperature was evaluated.