Evolving Water Resources Systems: Understanding, Predicting and Managing Water–Society Interactions
Proceedings of ICWRS2014, Bologna, Italy, June 2014 (IAHS Publ. 364, 2014, 398-403).

Using the Priestley-Taylor expression for estimating actual evapotranspiration from satellite Landsat ETM + data

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Abstract The quantification of evapotranspiration from irrigated areas is important for agriculture water management, especially in arid and semi-arid regions where water deficiency is becoming a major constraint in economic welfare and sustainable development. Conventional methods that use point measurements to estimate evapotranspiration are representative only of local areas and cannot be extended to large areas because of landscape heterogeneity. Remote sensing-based energy balance models are presently most suited for estimating evapotranspiration at both field and regional scales. In this study, we aim to develop a methodology based on the triangle concept, allowing estimation of evapotranspiration through the classical equation of Priestley and Taylor (1972) where the proportional coefficient α in this equation is ranged using a linear interpolation between surface temperature and Normalized Difference Vegetation Index (NDVI) values. Preliminary results using remotely sensed data sets from Landsat ETM+ over the Habra Plains in west Algeria are in good agreement with ground measurements. The proposed approach appears to be more reliable and easily applicable for operational estimation of evapotranspiration over large areas.

Key words remote sensing; triangle concept; energy balance; evapotranspiration; vegetation index; surface temperature; Priestley-Taylor