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**REMOTE SENSING METHODS FOR MANAGING SPATIALLY AND TEMPORALLY
VARIABLE CROP WATER USE AND STRESS IN ARID IRRIGATED AGRICULTURE**

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ABSTRACT: Effective and practical management of water for irrigated lands requires knowledge about spatially distributed evapotranspiration (ET) across wide ranges, spanning plot, farm and regional spatial scales, because of strong heterogeneities and the inadequacies of representing water requirements at point locations. The need for remote sensing (RS) data for ET estimation is evident: process-based models can provide physically and physiologically meaningful estimates of plant water use, but by themselves do not provide spatially distributed information vital for measuring water use in heterogeneous landscapes. The objective of this paper is to present a review of several RS-based ET approaches being developed by the USDA-ARS, Arid Land Agricultural Research Center, in Maricopa, Arizona. These include 1) the radiation and advective energy approach of FAO-56, modified by remotely-sensed vegetation indices; 2) surface energy balance approaches that incorporate land surface temperature data into the analyses, e.g., single-source and two-source energy balance models; and 3) an approach that combines RS estimates of vegetative cover with the predictive capabilities of process-based cropping simulation models. Examples of the application of these methods will be presented utilizing field observations from a cotton irrigation and water use experiment conducted in large, level basins in Maricopa. Spatial ET estimates for each method will be evaluated for agreement with ground-based data collected in the field experiment.

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