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A COMPARATIVE STUDY OF THE SEBAL ALGORITHM AND SWAP MODEL FOR EVAPOTRANSPIRATION RATE ESTIMATION IN QAZVIN PROVINCE, IRAN

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Abstract

Given the significance of remote sensing for evapotranspiration (ET) estimation on a regional scale, this research seeks to assess actual ET (ETa) data derived from the Surface Energy Balance Algorithm for Land (SEBAL) algorithm, employing ground-based data as a reference point. The study focused on two corn fields in Qazvin province of Iran, where the Soil Water Atmosphere Plant (SWAP) model underwent calibration using observed soil water content data. The performance of SWAP in estimating soil water content was acceptable, with error measures indicating a normalized Root Mean Square Error (nRMSE) of 14.4% for the 0-15 cm soil layer and 12.6% for the 15-30 cm soil layer. ETa estimates extracted from the calibrated SWAP were considered as the benchmark. Comparing SEBAL's ETa estimates with those from SWAP reveals a linear relationship (R^2 = 0.67), and the error associated with SEBAL estimates is interpreted as low, with an RMSE of 2.3 mm/d. However, SEBAL consistently tends to underestimate ETa values. This study demonstrates that ETa data obtained through remote sensing, characterized by superior spatial and temporal resolution compared to ground-based data, can be reliably utilized in the irrigation planning of agricultural fields within the study area.

Key words: evapotranspiration rate, Qazvin province, SEBAL, SWAP

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