

Simple Models for Estimating Evapotranspiration Fraction by Interpreting Trapezoid Space of NDVI/Albedo and Day-night LST Difference: A Comparison Study¹

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Abstract: Four simple models were proposed for estimating evapotranspiration fraction based on an interpretation of the trapezoid space of normalized difference vegetation index (NDVI) (or broadband surface Albedo) and radiometric surface temperature. Day-night land surface temperature differences (ΔT s) were used instead of land surface temperature (T s) to improve the estimating precision of evaporative fraction (EF). Two models were based on an extension of the Priestley-Taylor equation and the relationship between ΔT s and NDVI or broadband Albedo, and the other two models were directly based on an interpretation of the trapezoid space of NDVI (or broadband surface Albedo) and ΔT s. For comparison, a simple model based on the ΔT s and K.C. Wang's model were also used. The results by using realistic remote sensing data over the southern Great Plains, US are presented to demonstrate the performance of these methods. Ground-based measurements collected by Energy Balance Bowen Ratio system at the 11 enhanced facilities located at the Southern Great Plains of US from April 2001 to May 2005 were analyzed to identify parameterization of EF. The result of five models all performed well for an operative monitoring of the surface water deficit, showing reasonable errors after validation with field data. The best results were achieved by a model with extension of Priestley-Taylor equation and one based on the relationship between ΔT s and NDVI, with correlate coefficient of 0.618 and relative error around 20% (Fig. 1).

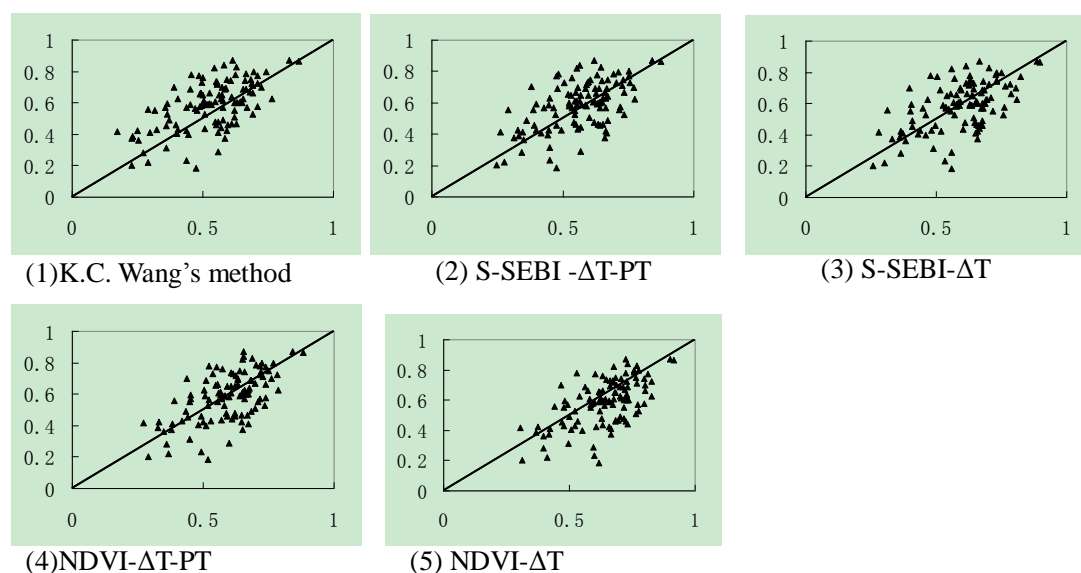


Fig. 1 Scatter plots of calculated EF and Ground-based measured EF by K.C. Wang's model and four proposed models in the Southern Great Plains, USA

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