Abstract and figures excerpted from a recent article:
Title: Sensitivity Analysis Of The Surface Energy Balance Algorithm For Land (Sebal)
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Source: TRANSACTIONS OF THE ASABE Volume: 52 Issue: 3 Pages: 801-811 Published: MAY-JUN 2009

ABSTRACT

New versions of evapotranspiration (ET) algorithms based on the Surface Energy Balance Algorithm for Land (SEBAL) are being published, each containing slightly different equations to calculate the energy balance. It is difficult to determine what impact changing one or more of the equations or coefficients in the series of equations of SEBAL has on the final calculation of ET. The objective of this paper is to conduct a sensitivity analysis of ET estimates in SEBAL to identify the most sensitive variables and equations. A remote sensing ET model based on SEBAL was programmed and validated against eddy-covariance data. A sensitivity analysis was conducted for three contrasting land surface conditions: full, half, and sparse canopy cover in pecan orchards. Results were most sensitive to the selection (according to temperature) of the dry (~zero ET) reference pixel and to *c* (the estimated ratio of soil heat flux to net solar radiation). At all the three degrees of canopy cover, estimated ET changed by 40–270% (1–2 mm day^{-1}) when either variable changed from its baseline value by ±50% of the permissible range. Estimated ET was also sensitive to the selection of the wet (full ET) reference pixel and to *dT* (aerodynamic difference of air and land temperatures). Changes in ET estimates were 47–72% (1.3–3.7 mm day^{-1}) at both the full and half canopy areas under changes from baseline values equal to 50% of the permissible range for either variable. In addition, ET was sensitive to the roughness length in areas of half canopy cover (ET changed by 61% [1.5 mm day^{-1}]) and to the value of the Normalized Difference Vegetation Index (NDVI) in areas of sparse canopy cover (ET changed by 118% [0.35 mm day^{-1}]). Future research on ET algorithm improvement should focus on the above variables and relative equations. The selection of the wet- and dry-spots should be automated to avoid subjective errors from manual selection.

Keywords: evapotranspiration, energy balance algorithm, remote sensing, SEBAL, sensitivity analysis

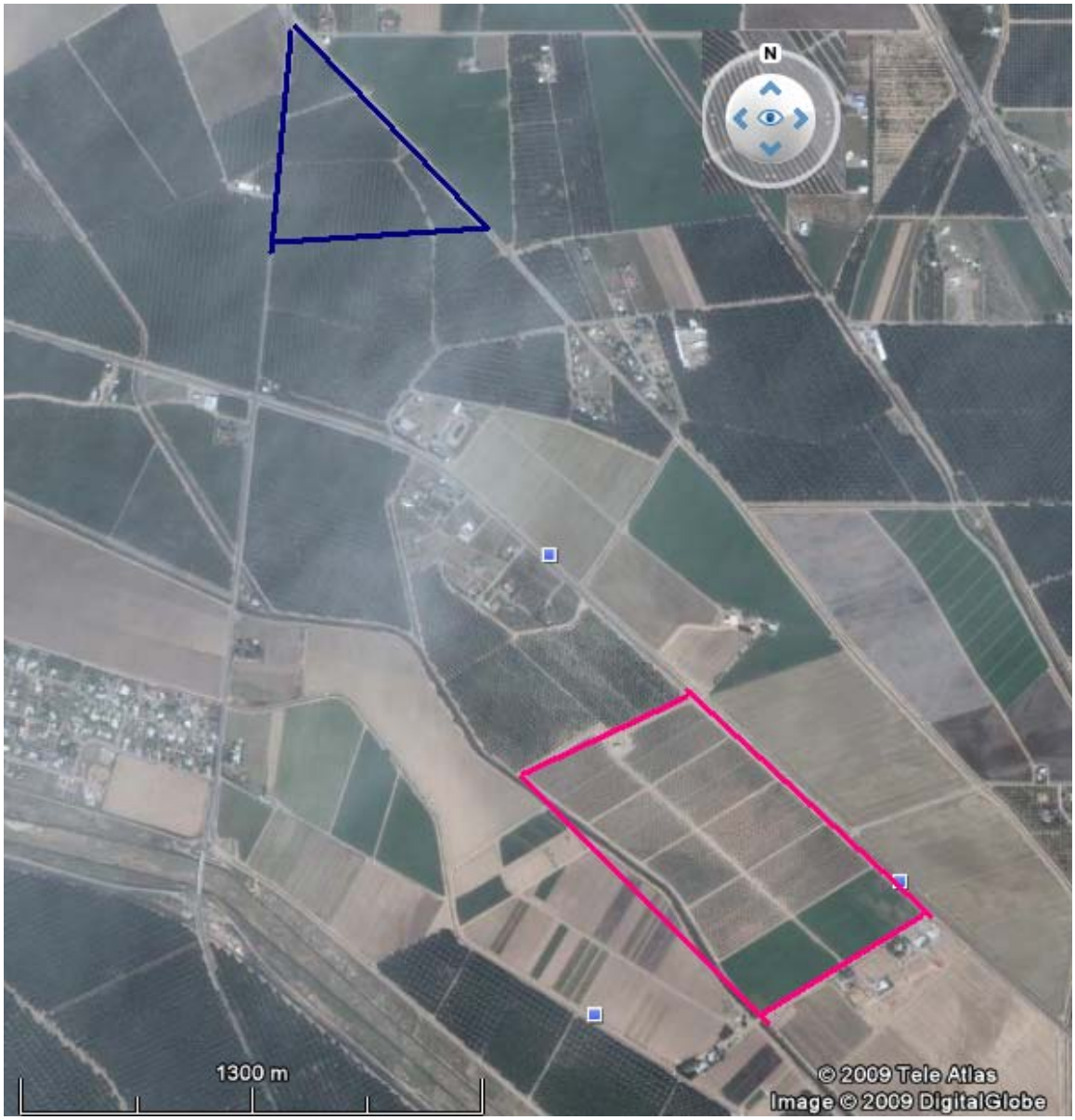

Figure 4. Crop area and the measurement sites in Las Cruces, New Mexico: pecan orchard (blue circled area, 32º 13' 32.45" N, 106º 45' 21.75" W) and alfalfa field (red circled area, 32º 12' 20.46" N, 106º 44' 27.15" W). The picture is from GoogleEarth.

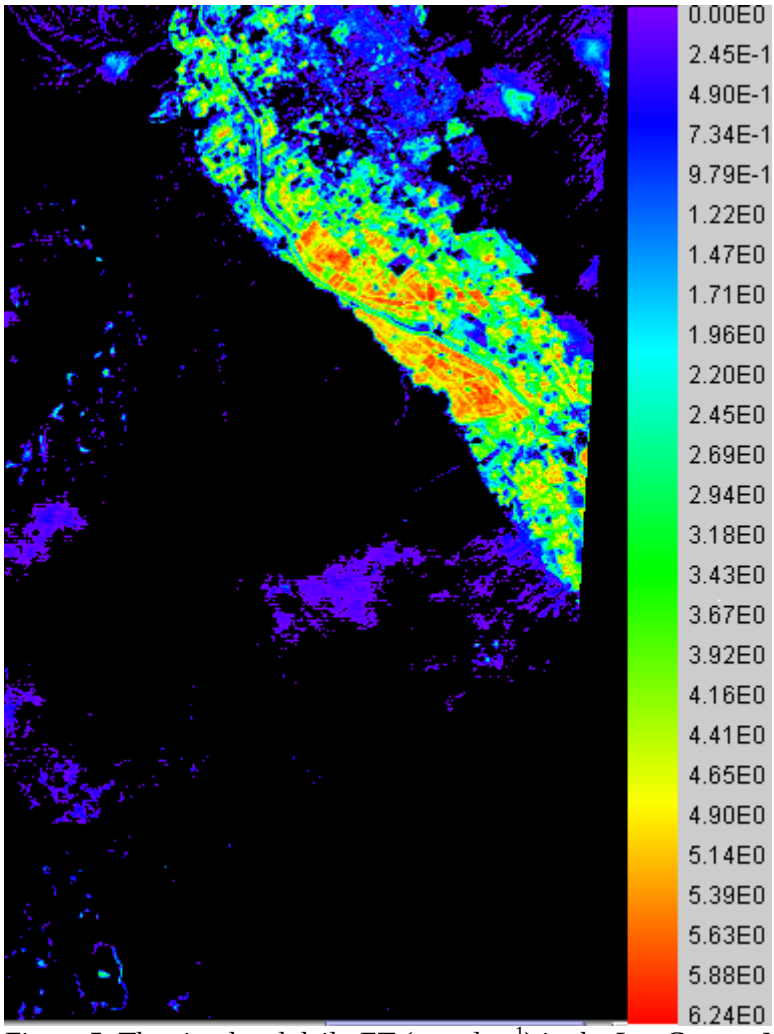

Figure 5. The simulated daily ET (mm day^{-1}) in the Las Cruces, New Mexico, area on September 4, 2002. Resolution: 90 m × 90 m.