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Impact of the variability of atmospheric forcing on the estimation of surface fluxes using remotely sensed surface states.

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The estimation of land surface fluxes requires the knowledge land cover characteristics and near-surface air properties. Remote sensing can provide high-resolution, spatially-distributed estimation of land surface properties, such as radiometric surface temperature (T_s), land cover, canopy density, and soil moisture. Air properties, however, are typically obtained using weather station's observations in locations which are not necessarily representative of the entire study domain, and often assumed constant at the regional scale.

This research contribution investigates the effect that using an inaccurate estimation of wind speed (U) and air temperature (T_a) has on the accuracy of surface fluxes estimation over heterogeneous land cover. The Atmospheric Boundary Layer evolution is simulated by a Large Eddy Simulation (LES) model, where the surface boundary conditions are given by a energy-balance model based on remotely sensed information.

Simulations have been performed for two areas in the United States. (a) Over two days with different wetness conditions for the Southern Great Plain (SGP) region of Oklahoma, an area with a high contrast in surface temperature, canopy cover, and roughness between vegetated and bare soil areas. (b) For two irrigated agricultural locations in the Texas High Plains region, characterized by different length scales of the land cover variability.

The spatial scaling characteristics of the U and T_a fields have been analyzed using a two-dimensional wavelet decomposition technique. Simulations show that the correlation T_a - T_s increases linearly with the logarithm of the spatial scale of the Ts vari-

ability; and that the correlation is significant ($R^2 > 0.8$) for surface features which length is grater than 500 m. Depending on the weather station's location, significant errors in flux estimation can occur in areas under extreme hydrological conditions. Finally, a simple scale-dependent method is proposed to estimate spatially variable T_a and U fields using remotely sensed observations.