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Land surface hydrology in the cloud land surface interaction campaign (CLASIC)

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A fundamental objective of the Cloud Land Surface Interaction Campaign (CLASIC) was to contribute to our understanding of the interactions between the atmosphere and the land surface. It has been observed that land surface characteristics influence the timing and evolution of cumulus convection. The Southern Great Plains (SGP) of the U.S. was selected as the focus of CLASIC due to the significance of this process in the region and the existing resources. It was hypothesized that the land surface properties in the SGP influence cumulus convection and that the effect is modulated by human activities, particularly agriculture. For the SGP, the harvest of winter wheat is particularly interesting. During the harvest, much of the region is typically converted from waist-high winter wheat to bare soil/stubble in a matter of a few days. This occurs within a short period in early June, therefore, this period was selected for CLASIC.

CLASIC was a very broad multidisciplinary campaign. Of the numerous scientific objectives, the land surface hydrology team focused on two: how does the winter wheat harvest in the SGP impact the surface fluxes, boundary layer structure, cloud structure, and aerosol loading and what role does soil moisture play in influencing the latent heat flux and cloud formation, either through increased transpiration by plants or by direct conduction? Changes in surface energy balance and moisture transport to the boundary layer will influence cloud processes, thus potentially creating a feedback loop.

Land surface observations and monitoring included soil moisture and surface flux at intensively characterized super sites, selected fields, watershed units, and over the re-

gional domain (50,000 km2). The most intensively studied soil moisture sites were located in the Little Washita and Fort Cobb watersheds. Each of these watersheds is monitored by USDA in situ networks that record soil moisture and meteorological data. In addition, ground teams recorded high density measurements within selected field scale plots for scaling to the remote sensing footprints. Two aircraft based instruments were used to provide microwave observations and soil moisture products. The Passive-Active L-Band System (PALS) was flown at low altitudes over the intensively sampled fields. The Polarimetric Scanning Radiometer (PSR), which operates at X and C-band, was flown at higher altitudes to provide synoptic soil moisture for the entire CLASIC domain. Obtaining concurrent soil moisture, vegetation, and cloud information over the domain was a key element of the experiment objectives.

The month of June 2007 was one of the wettest on record resulting in extensive and frequent flooding throughout the region. These conditions were not what had been hoped for in the experiment design. However, the soil moisture observations provide valuable information on the spatial characteristics of flooding over the period. Results from the PALS and PSR will be presented and discussed.