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From crops to boundary layer and back: The ARM/LBNL Carbon Project in the Southern Great Plains

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AGU 2002 Fall Meeting Abstract

Title: From crops to boundary layer and back: The ARM/LBNL Carbon Project in the Southern Great Plains

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Abstract

One of the challenges in carbon cycle research is the vast range of scales, from plants to continents, which must be bridged by measurements and models. A second major challenge is coupling carbon, water and energy fluxes, for both natural and agricultural systems. The ARM/LBNL Carbon project is making a coordinated suite of carbon concentration, isotope, and flux measurements to support a range of scaling and integration exercises, including those proposed for the North American Carbon Project. The Southern Great Plains testbed, a GCM-grid sized area centered in Northern Oklahoma, has been the locus of these efforts for the past two and a half years under Atmospheric Radiation Measurement program (ARM) support. Precise CO₂ concentrations from the central tower and flask sampling from the central tower and from weekly plane flights above the planetary boundary layer, both linked to the NOAA-CMDL network, tie the ARM region into the global atmospheric measurement networks. CO₂ concentrations are higher than global average for the latitude, reflecting continental sources. We compare the NOAA-CMDL flask data, which are collected weekly at 60m, with more finely resolved precise CO₂ and ¹³C data collected diurnally at 4 heights. We are measuring carbon, water, and energy fluxes at nested scales, from the 60 m tower and from portable eddy flux systems deployed in crop fields of different management in the ARM region. These efforts provide data to drive and constrain land-surface modeling at the plot and regional scales. Regional-scale estimates of carbon and isotopic fluxes based on "bottom up" (distributed modeling tested at eddy flux sites) and "top-down"

(atmospheric profiling of CO₂ and water vapor concentrations) approaches are in progress. ARM Data are available from the ARM data archive at www.arm.gov.