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ARM Facilities Newsletter

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Severe Weather Workshop, March 4-6, 2004, Is Open to Public

Weather enthusiasts may attend the Fourth Annual National Severe Weather Workshop on March 4-6, 2004, at the Marriott Convention Center in Norman, Oklahoma. The workshop, which is open to the public, is designed for emergency managers, storm spotters, and other weather watchers. The country's leading severe weather experts will be discussing their latest research and forecasting techniques. Discussion topics will include new radar capabilities, hazardous weather outlooks, emergency operations and safety, severe storm risks, lightning, wind damage, tornadoes, and weather news reporting. Spotter training will also be offered. Speakers will include researchers and forecasters from the National Oceanic and Atmospheric Administration's Weather Partners in Norman. For more information, call 405-579-0771 or visit the workshop's web site (<http://www.norman.noaa.gov/nsww2004>).

Carbon Project Focuses on Global Climate Change

Molecular carbon is abundant on Earth and is the building block of all living things. As carbon dioxide, it is also the focus of global climate change researchers who consider how Earth's climate would change if atmospheric carbon dioxide levels increased. Carbon dioxide is considered a "greenhouse gas," because it affects both the amount of incoming solar radiation Earth receives from the sun and the outgoing longwave energy (heat) radiated from Earth's surface.

The Department of Energy's ARM Program and Lawrence Berkeley National Laboratory (LBNL) have together launched a program, the ARM/LBNL Carbon to measure and track carbon in the environment. The Carbon Project's research goals include improving predictions of the exchange or flux of carbon, water, and energy between the atmosphere and plants, as well as developing computer

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Figure 1. An ARM field technician makes LAI measurements in a wheat field by using a portable LAI sensor. Accuracy is improved in shaded conditions; here shade is provided by an umbrella (ARM photo).

models of these processes. The models will be applied at the global scale to learn more about how land use and climate are linked to the surface fluxes of these components.

Routine daily measurements made by many of the instruments in the SGP array, especially the eddy correlation (ECOR) system, are valuable to carbon researches. To complement the ARM data, LBNL is making several carbon-specific measurements that will complete a data suite designed expressly for the Carbon Project. The additional measurements include fluxes and amounts of carbon dioxide near the ground, plus carbon isotopes.

Vegetation provides the main avenue for converting the carbon dioxide that we exhale to oxygen. This very important process is necessary for sustaining life on Earth. To evaluate this process, scientists determine a quantity called "leaf area index" or LAI, which is the ratio of leaf surface area to the ground area below a plant. This important ratio represents the amount of a plant canopy available to interact with the atmosphere, sunlight, and precipitation. The LAI value aids in understanding interactions of the vegetation surface with solar radiation (photosynthesis), energy, and atmospheric gases such as water vapor and carbon dioxide.

Measurements of LAI are commonly made monthly. The most convenient method for determining LAI in the field uses a hand-held meter with an optical sensor (Figure 1) to take readings above and below the vegetation canopy. This method is subject to inaccuracies due to many factors, including canopy height, size, and structure; foliage size; and sky conditions. The more accurate method for determining LAI requires direct biomass sampling by taking random cuttings of the vegetation canopy. This second method is time-consuming and laborious.

ARM technicians at the central facility near Lamont, Oklahoma, have been making LAI measurements every other week with a hand-held meter and verifying these measurements annually through direct biomass sampling. Once all of the new ECOR systems are deployed, LAI measurements may also be made at the extended facilities. A goal of ARM and the Carbon Project is to provide a complete, valuable data set for carbon research.

On the Internet: For more information on the ARM/LBNL Carbon Project, visit the project's web site (<http://esd.lbl.gov/ARMCARBON>).