

## IT'S A BIRD, IT'S A PLANE, IT'S A – HELICOPTER?

Last week, scientists from across the country met in Ponca City, Oklahoma, to simulate flight and mission planning scenarios in preparation for two simultaneous field campaigns that will occur in June at the ARM Climate Research Facility's Southern Great Plains (SGP) site. Their combined research efforts will bring eight scientific aircraft and dozens of temporary instruments to the area, not to mention more than 100 scientists and operations support personnel.

"The weather around here may be calming down, but things are going to be pretty crazy – from an operations perspective – for the next month or so," said Brad Orr, SGP Site Manager. "Activities at the site are really ramping up, and by June we'll definitely be in full swing to support the enhanced operations related to these field campaigns."



## Cloud and Land Surface Interaction Campaign (CLASIC)

As part of CLASIC, six aircraft – including one helicopter – will be making coordinated flights over the SGP domain. A helicopter will fly as low as 30 feet above ground, and an ER-2 will fly near the stratosphere, at around 55,000 feet. The other four aircraft – two Twin Otters, a Jetstream-31, and the site's regular Cessna 206 – will fly between these, taking measurement of clouds and aerosol properties just below, in and above the clouds.

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From the ground, weather balloon launches will increase to eight per day at the boundary facilities (Hillsboro, Vici, Morris, and Purcell – which will move to a location near Chickasha for the campaign). Also, a sophisticated mobile phased-array radar—for mapping the 3D structure of precipitation—will be located at the Central Facility.

New eddy flux towers and other soil moisture instrumentation will be added at Okmulgee, Little Washita, and Fort Cobb extended facilities. Fort Cobb will also host two tethersondes – “anchored” weather balloons – that will make hourly ascensions up to 2,200 feet from sunrise to sunset throughout the campaign, taking continuous measurements of wind, temperature, and pressure in the atmospheric boundary.

“The combination of ground-based and aircraft measurements will enable the CLASIC science team to capture the full breadth of fluctuations in carbon dioxide, moisture, aerosol, cloud properties, and radiative energy from the surface to the top of the boundary layer,” said Mark Miller, principal investigator for CLASIC.

### **Cumulus Humilis Aerosol Processing Study (CHAPS)**

For CHAPS, two aircraft will fly primarily in the plume emanating from Oklahoma City, and will focus on obtaining measurements of aerosol composition and related chemistry. CHAPS scientist will also establish a surface site just north of Oklahoma City to continuously characterize aerosol and chemical features within the boundary layer.

“Our study will examine the influence of anthropogenic (manmade) aerosols from a mid-size urban area on the microphysics of cumulus clouds, and vice versa – the effects of these clouds on urban aerosols that pass through fields of fair weather clouds,” said Carl Berkowitz, principal investigator for CHAPS.

Scientists onboard a King Air flying at 28,000 feet will scout the area each morning to identify cloud formations and the location of the plume of aerosols coming from Oklahoma City. With this information, a heavily instrumented Gulfstream-1 aircraft will fly within the plume to make in situ observations, while the King Air flies above it to obtain additional samples.



*The Gulfstream-1 payload for CHAPS includes more than 20 different scientific instruments.*

On the ground site near Oklahoma City, CHAPS scientists will be launching daily weather balloons to monitor the temperature and moisture conditions of the lower atmosphere. They will also make continuous measurements of climate-

related properties of the aerosols coming from Oklahoma City. These properties include measuring how much solar energy aerosols absorb and reflect, and also their ability to serve as surfaces on which moisture condenses to form clouds.

### **Coordination is Key**

Most of the aircraft for the two campaigns will be based in Ponca City, Oklahoma; the high-flying ER-2 will be based out of Houston, and one of the two Twin Otters will be based out of Oklahoma City. Coordination of all the aircraft and flight plans are being managed by the ARM Aerial Vehicles Program—the ARM Climate Research Facility’s “site in the sky.”

By having the two campaigns co-located in Oklahoma, scientists from each campaign can use observations from the other to extrapolate their results to broader geographical areas. Both campaigns are sponsored by the Department of Energy, and involve the contributions and participation of many other agencies, national laboratories, and universities.

For more information about CLASIC, see <http://science.arm.gov/clasic>

For more information about CHAPS, see <http://asp.labworks.org/index.stm>