

Biomass Burning Observation Project

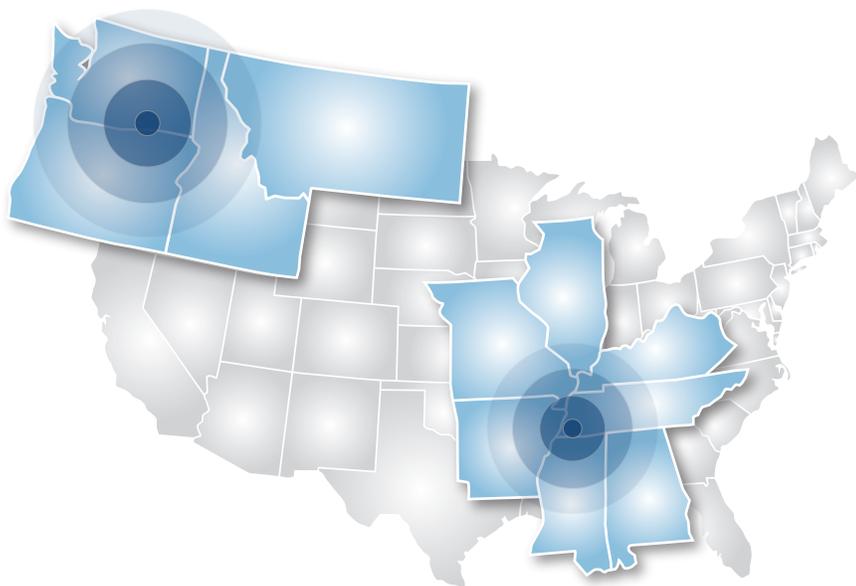
Throughout the summer of 2013, the U.S. Department of Energy's Atmospheric Radiation Measurement (ARM) Climate Research Facility is deploying a Gulfstream-1 (G-1) research aircraft above wildfires in the U.S. Pacific Northwest region and in the vicinity of Memphis, Tennessee, as part of the Biomass Burning Observation Project (BBOP). The aircraft will fly through smoke plumes from forest fires and agricultural field burns—types of “burning biomasses”—to measure various properties of aerosol particles soon after they form and as they change over time. Scientists will use these data to study the impact of burning biomasses from North America on regional atmospheric processes in relation to the global climate.

Science Objective

Biomass burning is estimated to produce 40% of microscopic airborne carbon particles. Previous airborne research efforts have largely focused on seasonal fires in tropical regions because of their predictable nature. Few such campaigns have been conducted in the United States because of the relative infrequency of biomass burning events. The timing and location of research flights during BBOP were planned to optimize opportunities to sample a wide range of fuel sources.



Specifically, the aircraft will obtain measurements of the microphysical, chemical, hygroscopic, and optical properties of aerosols. Data captured during BBOP will help scientists better understand how aerosols combine and change at a variety of distances and burn times.



Locations

Pasco, Washington. From July through September, the G-1 will be based out of its home base in Washington. From this location, it can intercept and measure smoke plumes from naturally occurring uncontrolled fires across Washington, Oregon, Idaho, Northern California, and Western Montana. Smoke plumes aged 0-5 hours are the primary targets for this phase of the campaign.

Memphis, Tennessee. In October, the plane moves to Tennessee to sample prescribed agricultural burns in that vicinity. Measurements will be acquired from varied distances and plume ages to establish a clearer picture of the evolution of aerosol in primarily agricultural plumes.

Instrumentation

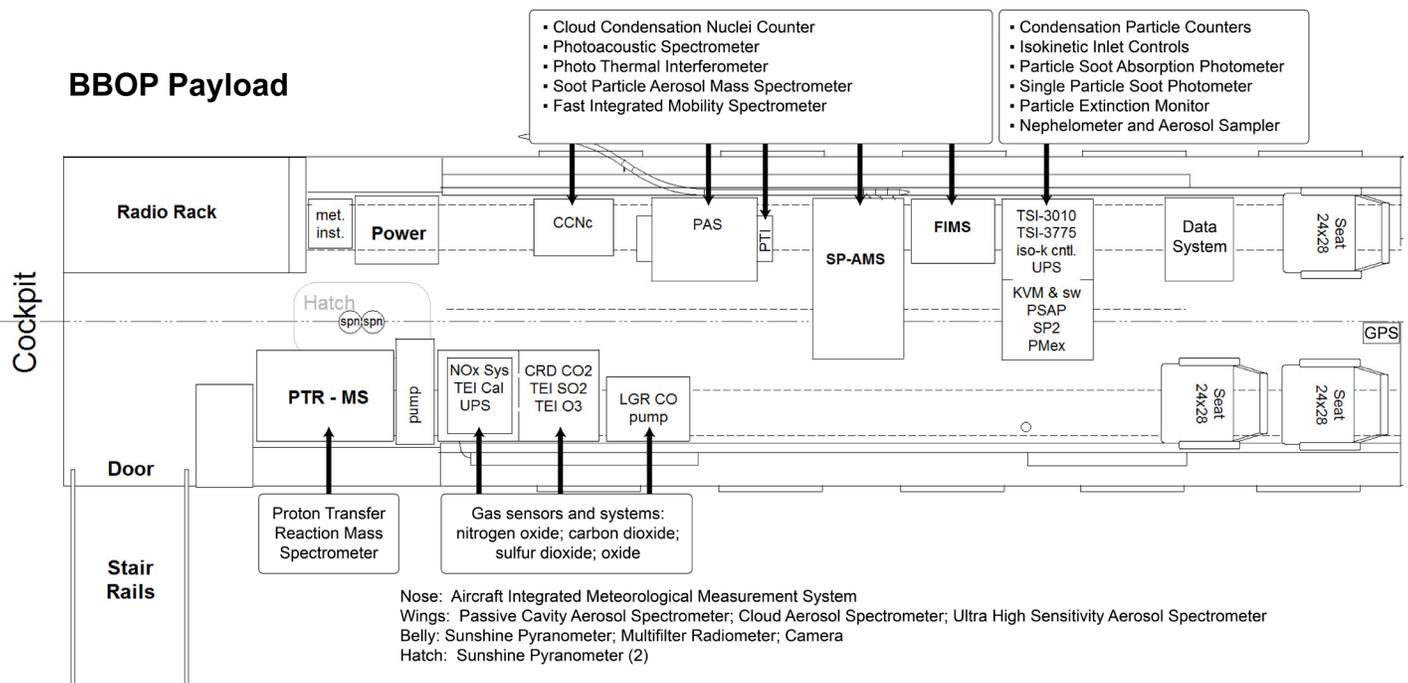
For BBOP, the G-1 aircraft will be equipped with 35 instruments for measuring various atmospheric components, including nearly a dozen new instruments not previously used in airborne research. The instrument suite will measure the following:

- aerosol concentration and size distribution
- aerosol composition and gas chemistry
- aerosol optical properties, such as reflectance, scattering, and absorption
- energy (radiation) coming from the sun and Earth, and
- temperature, pressure, humidity, wind speed, and direction.



The ARM Aerial Facility maintains and operates the G-1 research aircraft, plus a large inventory of probes and sensors ideally suited for atmospheric research.

BBOP Website: <http://campaign.arm.gov/bbop>



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