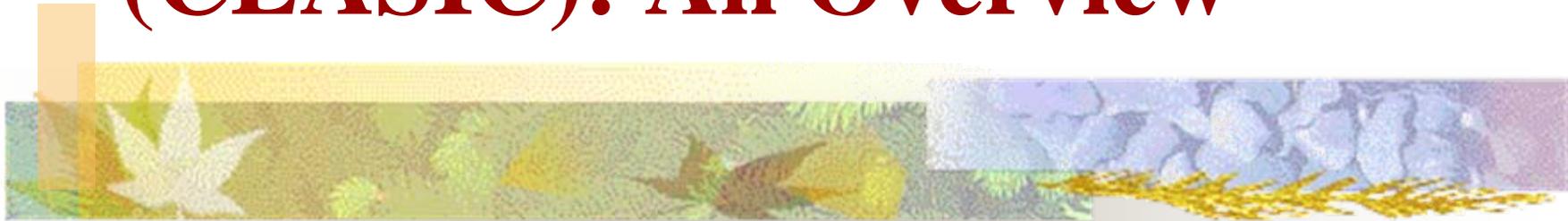


# Cloud and Land Surface Interaction Experiment (CLASIC): An Overview



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# Experiment Foci

- Measurements of microphysical, aerosol, and cloud-scale dynamics in early stage of cumulus convection as a function of soil moisture, land-use, and thermodynamic profile.
  - Aircraft
  - Three flux super-sites
    - ARM SGP Central Facility
- Radiation focus on the interplay between surface and cloud albedo
- Aerosol focus on anthropogenic plumes
- Proper characterization of large scale dynamical forcing (advection)



# Science Questions

- What is the role of cumulus convection and spatial variations in land cover in depleting low-level water vapor as it is advected to the SGP from the Gulf of Mexico?
- How do cumulus clouds & aerosols impact carbon flux, evapotranspiration & coupling between carbon flux & transpiration, and how does this impact feed back to cloud processes?
- How does the winter wheat harvest and land use at the SGP impact surface fluxes, boundary layer structure, cloud structure and aerosol loading?
- What is the role of aerosol loading & chemistry in varying microphysical & macrophysical properties of cloud fields and how is this related to land surface properties?
- What role does soil moisture play in surface moisture flux and cloud formation?



# Overview

- June 9-30, 2007 at SGP ACRF
- Dedicated Aircraft
  - CIRPAS Twin Otter (CLASIC)
    - Aerosols SDs, scattering & absorption, CCN, cloud measurements
  - NASA ER-2 (AAVP)
    - Remote measurements of clouds, precipitation & surface moisture
- Participating Aircraft
  - PNNL DOE G1 (ASP)
    - Atmospheric Chemistry and Aerosols
  - Duke Helicopter?
    - Low altitude flux measurements & soil moisture sensor data
  - Dynamic Aviation King Air (AAVP/NASA)
    - Raman Airborne Spectroscopic Lidar for water vapor profiles and aerosol backscatter/extinction/depolarization
  - Cessna
    - Aerosol properties and CO<sub>2</sub>

# NASA-ER2



Cloud Physics Lidar  
MODIS Airborne Simulator  
ER-2 Doppler Radar  
Cloud Radar System  
Polarimetric Scanning  
Radiometer



NASA Dryden Flight Research Center Photo Collection  
<http://www.dfrc.nasa.gov/gallery/photo/index.html>  
NASA Photo: EC99-45225-2 Date: October 1999 Photo by: Jim Ross

Lockheed ER-2 #809 high altitude research aircraft in flight

**65 Flight hours over 23 day period**

**Based in Ponca City, OK**

**CIRPAS staff: 2 Pilots, 1 Mechanic, 2 Scientists**

**Platform Scientist: Beat Schmid (BAER Inst.)**

**CIRPAS Twin Otter:**



**Aerosol concentrations & size distributions**

**Aerosol scattering & absorption**

**Cloud particle size distributions**

**CCN saturation spectrum, size distribution & hygroscopicity**



# Ground-based Observations

- 3 surface super sites: CF, Little Washita, EF-21
  - Carbon fluxes, latent & sensible heat fluxes
  - Soil moisture, albedo, ground water at one site
- CIRPAS X-band scanning radar (10-s volume scan)
- Enhanced radiosonde network (4 times/day)