

**Highlights from the 2007 CHAPS Campaign**  
**C.M. Berkowitz and L. K. Berg**  
**Pacific Northwest National Laboratory**  
**September 25, 2007**

Between June 4 and June 25, twelve research flights using a total of 33 hours of G-1 flying were conducted as part of the ASP CHAPS campaign in the vicinity of Oklahoma City, OK. The project was designed to examine the influence of anthropogenic aerosols from a mid-size urban area on the microphysics of cumuliiform clouds, and the effects of these clouds on urban aerosols that pass through fields of fair weather cumulus (FWC). More than 30 scientists from 7 institutions were in the field to make:

- Extensive chemical and cloud microphysical measurements from the DOE Gulfstream-1 Research Aircraft
- Profiles of aerosol backscatter and extinction in the vicinity of clouds from the NASA Langley Research Center Beech King Air 200 Aircraft, and
- Meteorological and aerosol measurements at a surface site just north of Oklahoma City
- Intercomparison flights for evaluation of satellite platforms

Despite record breaking rainfall and regions of intense convection, we have a number of preliminary results including:

- Liz Alexander's PTR-MS observations of isoprene (M69) and several related species suggest a strong signal downwind of Oklahoma City and at concentrations well in excess of what would be expected from a biogenic source. Although other biogenic compounds were seen, they were at much lower concentrations which also makes it hard to understand how this could be a biogenic source.
- Jason Olfert's first look at measurements by the TSEMS, FIMS and PCASP found good agreement between all three instruments, although the PCASP was somewhat outside the range of the other instruments, possibly due to how the bins are defined for the smaller sizes. The group consensus on these observations was articulated by John Ogren who said "The agreement above 200nm is remarkable."
- Larry Berg has identified clear evidence that the Oklahoma City plume was identified on several flights as evidenced by elevated CO levels. This has the implication that cloud and interstitial aerosols samples from both within and outside the urban plume have been collected.
- Yin-Nan Lee and Liz Alexander found that during cloud passages, when the aerosol mass spectrometer was sampling particles that were dried from cloud droplets collected using a counter-flow virtual impactor (CVI) sampler, that:
  - The aerosol mass concentrations were typically below 10 microgram per cubic meter,
  - They were dominated by organics and sulfate.
  - Ammonium was often less than required for complete neutralization of sulfate.
  - Aerosol nitrate levels were very low
  - Organic to sulfate ratios appeared to be lower in cloud droplets than in aerosols, suggesting cloud condensation nuclei properties of aerosol particles might be affected by loading and the nature of the organic components in aerosols.

The following abstracts have been submitted for presentation at the Fall 2007 American Geophysical Union meeting, Session A38: Cloud Effects on Aerosols (<http://www.agu.org/meetings/fm07/?content=search&show=detail&sessid=530>).

- Alexander, L.M., Newburn, M., Hubbe, J., Berg, L., Berkowitz C.M., Springston, S.R., Senum, G.I. Lee, Y-N., Andrews, E., *Measurement of the VOC Environment from an Aircraft Platform during an Aerosol-Cloud Interaction Study Near Oklahoma City*
- Andrews, E., Lee, Y-N., Alexander, L., Ogren, J.A., Hubbe, J.M. , *Aerosol optical and chemical properties within and without clouds during an airborne field campaign in central Oklahoma*
- Berkowitz, C. M., Berg, L.K., Ogren, J.A, Hostetler, C.A., Ferrare, R., Hubbe, J., *An Overview of the Cumulus Humilis Aerosol Processing Study*

- Lee, Y.-N., Alexander, L., Newburn, M., Jayne, J., Hubbe, J., Springston, S., Senum, G., Andrews, E., Ogren, J., Kleinman, L., Daum, P., Berg, L. and Berkowitz, C. M. , *Aerosol Chemical Composition and its Effects on Cloud-Aerosol Interactions during the 2007 CHAPS Experiment*
- Nussbaum, N., Dubey, M.K., Mazzoleni, C., Gramann, J., Feingold, G., Schmidt, S., Hubbe, J., Springston, S., Arnott, P., McCubbin, I., Alexander, L., Seinfeld, J. and Berkowitz, C., *Aerosol Optical Properties during GoMACCS and CLASIC: Evidence of Cloud Processing and Scavenging*
- Obland, M.D., Cook, A.L., Ferrare, R.A., Hair, J.W., Harper, D.B., Hostetler, C.A., Rogers, R.R., *Initial High Spectral Resolution Lidar Results From the Cumulus Humilis Aerosol Processing Study (CHAPS) and Cloud and Land Surface Interaction Campaign (CLASIC)*