NOAA/ATDD Quarterly Activity Report

January 2010 – March 2010

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CLIMATE

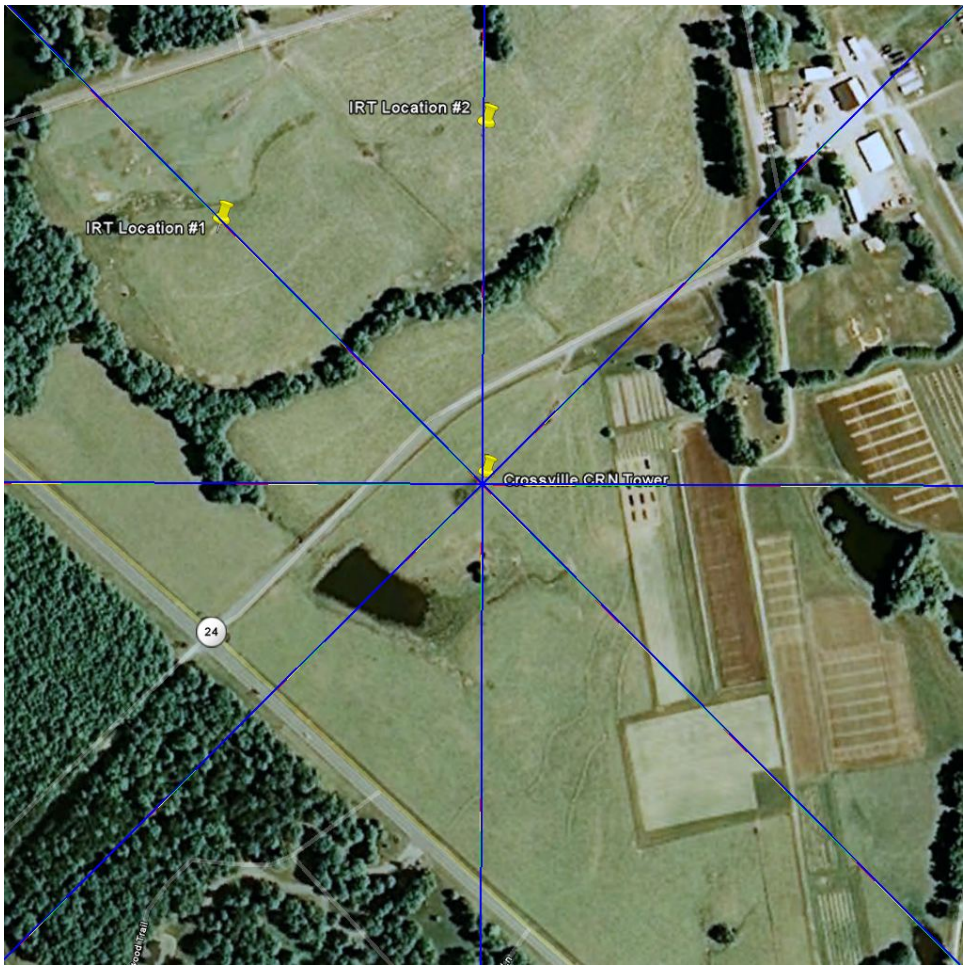
Local Meteorological Support
Data reduction for January, February, and March was completed without problems The monthly data (a summary file and precipitation table files for each month) have been downloaded to ftp.atdd.noaa.gov/ (anonymous FTP, change directory to pub/data/ormet). The archived data are located in the sub-folder "archive". lynne.satterfield@noaa.gov

U.S. Climate Reference Network
In January, February, and March, NCDC retrieved 56 data files from CRN sites through the server ftp.atdd.noaa.gov. Data are passed to NCDC by this path when retrieved episodically by ATDD from individual sites to fill data gaps. A record is maintained of the number of missing hours of retrievable data over the past 12 months. Instruments' characteristics for each site are maintained in the database ISIS (Integrated Station Information System) on NCDC's server, along with a record of events which affect data quality. New events are identified from ATDD's field crews, NCDC's Anomaly Tracking System (ATS), and email messages. lynne.satterfield@noaa.gov

Thirty-seven CRN annual maintenance visits were completed in the southern and southwestern US in January – March 2010. Four HCN-M sites were installed in Arizona, and two unscheduled maintenance visits were made to existing sites. A team from ARL's Field Research Division (FRD) was trained to perform maintenance on HCN-M sites by accompanying ATDD's maintenance team to five such sites in Alabama. mark.e.hall@noaa.gov

University of Tennessee Space Institute Collaboration
NOAA/ATDD's collaboration with the University of Tennessee Space Institute's (UTSI) Aviation Systems and Flight Research Department in Tullahoma, TN, is on schedule. All instruments have been acquired and installed on the UTSI Piper Navajo aircraft. The first test flights will occur during the second week of April 2010. The first operational flights over the Crossville, TN, CRN site and the Chestnut Ridge Environmental Study Site (CHESS) will occur on or after May 3, 2010.

Prior to the UTSI overflights, four additional Apogee SI-311 infrared temperature (IRT) sensors will be installed, two at the Crossville CRN site and two at the CHESS site to provide higher- frequency temperature data to correlate with those obtained from the aircraft. These sensors were procured with custom calibration coefficients. The map below shows the deployment at Crossville.



The blue lines represent the flight paths of the aircraft over the site. IRT Location #1 will be 269 meters, bearing 313 degrees from the CRN tower, while IRT Location #2 will be 255 meters, bearing 360 degrees from the CRN tower. The remaining two Apogee temperature sensors will be placed at the CHESS site on a boom extending from the tower. Data from these sensors will be collected at 1 Hz, averaged, and stored at one-minute intervals. ed.dumas@noaa.gov, Bruce Baker.

Harvard University Collaboration

Collaboration continues between the airborne turbulence capability at ATDD and the trace-gas capability of the Anderson Group at Harvard University. The Anderson group has developed a high-sample-rate cavity-ringdown spectrometer capable of measuring atmospheric CO_2 and CH_4 to the point of discerning individual carbon isotopes. They

are developing an airborne implementation of these instruments for deployment in the Arctic. ATDD's collaboration adds BAT-Probe measurements of turbulent wind and temperature. The combination extends eddy-correlation flux sampling to atmospheric species not previously tractable in flight. The trace-gas samples require a flow rate of 10 L s^{-1} through inlet tubes protruding several centimeters outward from a cylindrical fairing about 0.2 m behind the BAT Probe's hemisphere. Wind-tunnel test and calibration of this configuration is in progress. ron.dobosy@noaa.gov, Ed Dumas, Dave Senn, with collaborators from Harvard.

As part of the collaboration with Harvard University, NOAA/ATDD completed functional testing of the BAT probe this quarter. Preparations are being made for a wind tunnel test of the BAT probe at the Massachusetts Institute of Technology's Wright Brothers' wind tunnel in late April 2010.

The Wright Brothers' wind tunnel (http://web.mit.edu/aeroastro/labs/wbwt/index.html) has a 7x10 foot elliptical cross-section and can produce flow up to 150 knots. Direct tests of the BAT probe's ability to measure angles of attack, sideslip, and wind velocity will be made, in addition to smoke tests to determine the character of the airflow around the probe at speeds from 70 knots to 150 knots. If time permits, simulated bugs will be added to the leading surface of the sphere to see their effect on the probe's performance.

Following the wind tunnel test, work to integrate the probe on the aircraft will begin. This will be in conjunction with Aurora Flight Sciences and Harvard. The first flight is expected by August, 2010. ed.dumas@noaa.gov

AIR QUALITY

Manuscripts

The following paper was published: Dommergue, A, F Sprovieri, N Pirrone, R Ebinghaus, S Brooks, J Courteaud, and C Ferrari (2010) Overview of mercury measurements in the Antarctic troposphere. Atmos. Chem. Phys., vol. 10, 3309–3319. As the title suggests, this is a review paper for all the atmospheric mercury measurements conducted within Antarctica. This paper compares the results, along with our best estimates of the accuracies and precisions, of the various measurement campaigns. It concludes with our best estimates of the mercury dynamics within the coastal and polar plateau environments, and lists a number of unknowns which warrant further investigation. steve.brooks@noaa.gov

Presentations

The presentation "Mercury speciation measurements during the 2009 TEXAQS SHARP study" was given at the TEXAQS Study of Houston Atmospheric Radical Precursors (SHARP) session of the annual AMS meeting, January 2010 in Atlanta. In spring/summer 2009 the mercury speciation at the western edge of the Ship-Channel industrial complex was monitored to determine local mercury emissions. In general, enhancement of all mercury species was observed during light wind conditions when the site was downwind of the Ship-Channel industrial complex. In comparison to other measured trace gases, the oxidized mercury species were most closely correlated to NOx. steve.brooks@noaa.gov

The presentation “Mercury deposition, photoreduction, and gaseous elemental mercury emissions from the seasonal snow surface at Canaan Valley, WV” was given at the 2010 Geological Society of America annual meeting in Baltimore, March 13-16, 2010. Our abstract was also published in GSA Abstracts Vol. 42, No. 1. Mercury speciation and flux results from the Canaan Valley site show nearly zero net deposition of mercury during the snow-covered season, which averages 135 days per year. The snow cover acts to isolate the deposited Hg(II) from binding with the soil/litter organics. This mercury is then primarily photoreduced within the surface snow and re-emitted to the atmosphere as Hg. steve.brooks@noaa.gov

DISPERSION

Dispersion/Boundary Layer Study

The added value of surface-layer measurements to short-term forecasting is being assessed for wind generation of electricity. Such input is expected to provide improved estimates of wind profiles near the surface, and hence at the height of the wind turbine's hub, given a short-term forecast from a mesoscale model. For the modeling component of this test, the WRF model’s Version 3.1 has been implemented by ATDD over central Texas, the location of a collaborating wind farm. Part of the assessment will include selection of optimal approaches to initialization, fluid-model resolution, and supporting physical models. ron.dobosy@noaa.gov

Manuscripts

A paper entitled “2010: Observations and Analyses of Turbulent Flow within an Urban Roughness Sublayer” by C.A. Vogel and W.R. Pendergrass will be presented at the Fifth International Symposium on Computational Wind Engineering, International Association of Wind Engineering, May 23-27, 2010.

Presentations

Five abstracts detailing research findings from the joint ARL/ATDD and Jackson State University Mississippi Coastal Atmospheric Dispersion Study (MCADS) were presented during the technical program of the 2010 American Meteorological Society Annual Meeting in Atlanta, GA, January 17-22. 2010.

> *‘Evaluation of PM2.5 source regions over the Mississippi Gulf Coast using WRF/HYSPLIT modeling approach’ - L. Myles, W. Pendergrass, C. A. Vogel, Y. Anjaneyulu, V. B. R. Dodla, H. P. Dasari, C. V. Srinivas, F. Tuluri, J. M. Baham, R. Hughes, C. Patrick, J. Young, and S. Swanier.*
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> *‘Observation, analysis, and modeling of the sea breeze circulation during the NOAA/ARL-JSU meteorological field experiment summer 2009’ - W. Pendergrass, L. Myles, C. A. Vogel, Y. Anjaneyulu, V. B. R. Dodla, H. P. Dasari, J. M. Baham, R. Hughes, C. Patrick, J. Young, and S. Swanier.*
>
> *‘Analysis and prediction of the atmospheric boundary layer characteristics during the NOAA/ARL-JSU meteorological field experiment, summer-2009’ - W. Pendergrass, L. Myles, C. A. Vogel, H. P. Dasari, V. B. R. Dodla, Y. Anjaneyulu, J. M. Baham, R. Hughes, C. Patrick, J. Young, and S. Swanier.*

'Numerical prediction of atmospheric mixed layer variations over the Gulf Coast region during NOAA/ARL-JSU meteorological field experiment summer 2009—sensitivity to vertical resolution and parameterization of surface and boundary layer processes' - W. Pendergrass, L. Myles, C. A. Vogel, Y. Anjaneyulu, V. B. R. Dodla, H. P. Dasari, J. M. Baham, R. Hughes, C. Patrick, J. H. Young, and S. Swanier.

'Short range numerical weather prediction for the Gulf Coast region during the NOAA/ARL-JSU meteorological field experiment of summer 2009' - W. Pendergrass, L. Myles, C. A. Vogel, V. B. R. Dodla, H. P. Dasari, Y. Anjaneyulu, J. M. Baham, R. Hughes, C. Patrick, J. H. Young, and S. Swanier.

Two abstracts detailing research findings in the NOAA DCNet study were presented at the 2010 American Meteorological Society Annual Meeting. Title and authors, with presenting authors underlined, are listed below.

"Comparison of co-located DCNet and AWS/Weatherbug urgan temperature observations' – W. Pendergrass, C. A. Vogel, W. Callahan, and B. B. Hicks...

'On the behavior of the nondimensional wind shear in an urban roughness sublayer' – C. A. Vogel and W. Pendergrass.

Two abstracts detailing experience with implementation of mesoscale modeling in the complex terrain of East Tennessee were presented at the 2010 American Meteorological Society Annual Meeting, 16th Conference on Air Pollution Meteology

10.2 'Emergency dispersion forecasts for East Tennessee: How best to utilize WRF?' -Ronald Dobosy and David John Gagne.

12.1 'An evaluation of WRF model output statistics techniques in eastern Tennessee'- David John Gagne; and R. J. Dobosy

MISCELLANEOUS

Outreach: Tennessee Science Olympiad
A challenging test of meteorology knowledge was prepared by several members of ATDD's scientific staff for the middle-school division in the Tennessee-Wesleyan-College Region of the Tennessee Science Olympiad. Entrants from the Oak Ridge and Knoxville areas competed for participation in the state competition at the University of Tennessee at Knoxville. The feedback on the test was very positive.
ron.Dobosy@noaa.gov, Ed Dumas, John Kochenforfer, Grant Goodge, Will Pendergrass, Chris Vogel, LaToya Myles

TRAVEL

Dumas, E., Tullahoma, TN, January 11, 2010, to bring an IR temperature sensor from UTSI back to ATDD for calibration.

Boice, M. and Hamby, T., Atlanta, GA; Gadsden, AL; Montgomery, AL; Mobile, AL; Newton, MS; Lafayette, LA; Monroe, LA and Holly Springs, LA, January 13-23, 2010, to make annual maintenance visits to USCRN sites.

Baker, B., Brooks, S., Dobosy, R., Dumas, E, Kochendorder, J., Pendergrass, W. and Vogel, C., Atlanta, GA, January 17-22, 2010, to attend the American Meteorological Society 2010 Annual Meeting.

Edgemon, T. and Jordan, J., Newton, GA; Titusville, FL; Everglades, FL; Brunswick, GA and Blackville, SC, January 18-29, 2010, to conduct CRN annual maintenance visits.

Hall, M. and Johnson, K., Tuscaloosa, AL; Pelham, AL; Troy, AL and Evergreen, AL, January 25 – January 31, 2010, to perform annual maintenance at HCN-M sites.

Haire, D. and Hamby, T. Lonoke, AR; Moriarty, NM; Beatty, NV; Temecula, CA; Carlsbad, CA; Yuma, AZ; Tucson, AZ; Tombstone, AZ; Las Cruces, NM and El Paso, TX, February 1-12, 2010, to conduct CRN maintenance visits.

Meyer, R. and White, R., Gulfport, MS, February 2-5, 2010, to install and remove equipment in Gulfport, MS (Jackson State/Urbanet).

Pendergrass, W., Jackson, MS, February 10-11, 2010, to attend meetings at Jackson State University.

Bryant, D. and Burris, J., Little Rock, AR; Tucumcari, NM; Flatstaff, AZ; Coolidge, AZ; Camp Verde, AZ; Bowie, AZ; Mills, NM; Clayton, NM and Oklahoma City, OK, February 15-26, 2010, to install HCN-M weather stations.

Galloway, K. and Randolph B., Fort Stockton, TX; Monahans, TX; San Angelo, TX; Austin, TX; Corpus Christi, TX; Endinburg, TX and Palestine, TX, February 16-27, 2010, to conduct annual maintenance visits.

French, B. and Rutherford, M., Hope, AR; Midland, TX; Willcox, AZ, Casa Grande, AZ; Phoenix, AZ; Holbrook, AZ, Limon, CO and Mt. Vernon, IL, February 23 – March 5, 2010, to install HCN-M hardware.

Meyer, R., and White, R., Washington, DC, February 28 – March 6, 2010, to conduct maintenance at the following Urbanet sites: RFK Stadium, Howard University, National Academy of Sciences, Arboretum, and the Hoover Building and made measurements at the CSPAN building.

Meyer, T., Washington, DC, March 2-3, 2010, at attend the COM Logic Model Meeting.

Johnson, K., Tuscaloosa, AL, March 3 – 5, 2010, to conduct unscheduled maintenance at eight AL-HCN sites.

Wilson, T., Washington, DC, March 4 – 6, 2010, to attend the SAMP Algorithms Workshop.

Land, G., Vienna, VA, March 7-13, 2010, to attend “Introduction to Federal Contracting” training at Management Concepts.

Brooks, S., Oak Ridge, TN, March 8-12, 2010, for fabrication of samplers at ATDD.

Pendergrass, W., Los Angeles, CA, March 9-11, 2010, to attend CalNex meeting.

Pendergrass, W., Charlotte, NC, March 14-15, to attend meeting for Duke Energy/Renewable Energy.

Brooks, S., Baltimore, MD, March 14-17, 2010, to attend and present mercury research results at the Geological Society of America annual meeting.

Kochendorfer, J., Champaign, IL, March 16-27, 2010, to conduct an unscheduled maintenance visit at the Bondville site.

Baker, B., Boulder, CO, March 22-25, 2010, to attend NexGen weather research review.

Hamby, T. and Jordan, J., Kingdom City, MO; Brookfield, MO; Marshfield, MO; Chillicothe, MO and Willow Springs, MO, March 25-31, 2010, to conduct annual maintenance on CRN sites.

cc:

Abelquist, E.
Artz, R.
Bach, W. D.
Baldocchi, D.D.
Berlinrut, D.
Cunningham, D.C.
Dahlman, R. C.
Fine, S.
Hanna, S.R.
Hicks, B.B.
Hildebrand, S.G.
Holland, M.
Hosker, R.P.
Jacobs, G.
Mann, R.
Michalsky, J.
Mills, D.
Mills, G.A.
Page, A.
Petty, R.
Radcliffe, L.

Randerson, D.
Riches, M.R.
Roberts, S.
Roddye, L.C.M.
Wilson, K.B.
Womack, J.