NOAA ARL Monthly Activities Report
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Highlights

1. Fourth NOAA/EPA Scientist-to-Scientist Meeting. The objective of the fourth meeting is to identify areas for improved and new collaboration between NOAA and the EPA to advance the application and development of multi-media measurement capabilities and modeling tools for ecosystem-based management linked to air quality. Planning started immediately following the third meeting on atmospheric deposition. The main efforts have been to establish and focus the agenda and obtain speakers for the sessions. The fourth meeting will be held at the Patuxent Research Refuge National Wildlife Visitor Center in Laurel, Maryland, on June 1–3, 2005. (Robin Dennis, 919 541 2870)

2. Unmanned Aerial Vehicles. As a part of the continuing effort to address areal averages of air-surface exchange, ARL is beginning to use small UAV's. A developing link with NASA's Ames Research Center (ARC) and two private companies brings together people experienced in airborne flux measurement, aircraft construction, and UAV operation. The collaboration promises good-quality measurement of air-surface exchange in environments inaccessible to manned aircraft. Staff from ATDD visited ARC in April to examine several potential aircraft

and to discuss instrumentation. A white paper has been prepared, describing a vision for carbon cycle science over the Southern Ocean. Equipment requirements have been assembled, with cost estimates. The candidate UAV currently most readily available is the "Sierra," a pusher aircraft designed by the Naval Research Laboratory with a 6.4-m wingspan and a payload of about 30 kg. (Dobosy, Hall, Dumas)

3. Workshop on Chemical Data Assimilation, June 20–22, 2005. A Workshop on Chemical Data Assimilation and Data Needs for Air Quality Modeling is being planned for June 20–22, 2005, in Silver Spring, Maryland. The Workshop conveners are Ken Schere (ARL/ASMD), Georg Grell (FSL), and Greg Carmichael (University of Iowa). The Workshop is intended to bring together representatives of the research and operational modeling communities to discuss the current state of knowledge in assimilating trace gas and particle data into air quality simulation forecast models, to provide better chemical initialization and overall accuracy of the forecasts. Data needs and data availability of real-time monitoring data from surface-based, sounding, and satellite platforms will also be discussed. The goal is to identify promising techniques that may be capable of being transitioned to an operational forecasting system, and to identify needed research to improve the state of knowledge in this emerging field. (Kenneth Schere, 919 541 3795)

Silver Spring

4. METREX Data Re-Analysis. About 35 full-year HYSPLIT dispersion model runs have been completed for 1984 to simulate tracer concentrations from METREX. Each simulation actually consisted of two model runs, one for each tracer released, primarily using 4-km data fields created earlier this year. Statistical programs were revised to focus the model evaluation toward emergency response applications. A report describing the results is currently in preparation. roland.draxler@noaa.gov

5. Experimental Smoke Forecast Update. For the last 2 years NOAA ARL has been developing a smoke forecasting demonstration project in collaboration with NOAA NESDIS and making the results available via the READY website at http://www.arl.noaa.gov/smoke/index.html. Smoke forecasts are produced with the ARL HYSPLIT model, which is preconfigured to run over the entire country once-a-day, using the daily NOAA NCEP NAM meteorological forecast data. Three-hour average regional output maps of primary particles (PM2.5) air concentration are produced using the actual fire locations from the previous day. The dispersion simulation consists of two parts: 1) a 24 h analysis simulation run for the previous day, and 2) a 48 h forecast simulation, which assumes that yesterday's fires will continue to burn for the next two days. The smoke particle positions at the end of each analysis period are used to initialize the next day's analysis simulation. A rotating 31 day archive of analysis simulations and the 24-48 hour forecasts is maintained on the server. Recently, a verification page (http://www.arl.noaa.gov/smoke/verify.html) has been developed which utilizes Scalable Vector Graphics (SVG) to display the model forecasts and analyzed smoke plumes. SVG is a relatively new method of displaying vector graphics within a web browser. Within the SVG graphic, the HYSPLIT forecasts of smoke particles are overlaid with the NESDIS analyzed fire and smoke locations onto a map of North America. The user can

zoom, pan, and turn on and off the individual layers that are displayed on the image. An SVG Viewer plug-in must be installed in the browser and presently, Internet Explorer is the preferred browser for SVG display. More quantitative verification statistics will soon be added to the page. glenn.rolph@noaa.gov

6. Wildfire Smoke Forecasts. The HYSPLIT wildfire smoke forecast demonstration system using fire locations derived from NESDIS satellite products was upgraded to use the USFS BlueSky's emission algorithm to estimate PM2.5 emission rates. The BlueSky system was converted to a system compatible with the NCEP/HYSPLIT file format by Leonor Hernandez (CEAM, Valencia, Spain; for the results, see http://www.arl.noaa.gov/smoke/forecast). A real-time verification system (see above) is under development, to permit viewing GIS like layers on a web browser to compare model predictions with smoke patterns observed by satellite (http://www.arl.noaa.gov/smoke/verify). A more quantitative area overlap scheme (contact Albion Taylor, albion.taylor@noaa.gov) should be ready soon. roland.draxler@noaa.gov

Boulder

7. SURFRAD/ISIS. The seventh annual instrument exchange was conducted at the Desert Rock, Nevada SURFRAD station on April 5, 2005 and the tenth instrument exchange was conducted at the Goodwin Creek, Mississippi SURFRAD station on April 21, 2005. Likewise, the annual maintenance and instrument exchange was conducted at the Albuquerque, New Mexico ISIS station. john.augustine@noaa.gov, Hodges, Cornwall)

A general program has been written and tested to produce monthly files of one-hour averages of ISIS data for submission to NOAA's National Climatic Data Center (NCDC) in Asheville, NC. NCDC will reformat the data and forward them to the World Radiation Data Center in St. Petersburg, Russia. john.augustine@noaa.gov

8. Houston Aircraft Validation Experiment. All data taken during the Houston Aircraft Validation Experiment (AVE) mission in October – November, 2004, have been re-processed, after correcting the Actinic Flux Spectroradiometer measurements for instrumental offsets. The derived data were used to verify ozone column estimates derived from the Ozone Monitoring Instrument on the Aura satellite. The updated data are in the NASA archive, and should be available to the public on May 16, 2005. irina.petro@noaa.gov

Oak Ridge

9. New York City -- Urban Dispersion Study. The initial planning meeting for a Summer 2005 tracer dispersion study in New York City was held on April 14 – 15 at Stevens Institute of Technology in Hoboken, NJ, just across the Hudson River from central Manhattan. Initial results from the March 2005 pilot dispersion study near Madison Square Garden were presented. The summer study is tentatively scheduled for August 2005 in mid-town. Much of the discussion of the planned summer study revolved around budgets, which are very tight. A large contingent of potential collaborators was on hand, as well as representatives of the City of New York. The net meeting is planned for early June. ATDD, Brookhaven National Lab, Pacific NW

National Lab, and several NY area organizations including NWS are collaborating on a permanent meteorological network to supplement the existing NYC area observations. ray.hosker@noaa.gov

10. *U.S. Climate Reference Network.* A USCRN meeting was held at NCDC on April 12 – 13. Network status and future plans for installations and maintenance were discussed, as well as the USCRN collaboration with GCOS, to install systems in locations outside the CONUS. Several states have also expressed interest in having additional USCRN sites within their borders, and Alabama has provided funding for two such sites. A quarterly briefing was provided for Tom Karl, the USCRN director. ray.hosker@noaa.gov and Hall

Research Triangle Park

11. *CMAQ Model -- Atmospheric Mercury.* Environment Canada completed its global-scale simulation of atmospheric mercury for the calendar year 2001 using the Global and Regional Atmospheric Heavy Metal (GRAHM) model. These global-scale model results will be used to develop initial condition and boundary condition (IC/BC) input files for the regional-scale models being tested in the North American Mercury Model Intercomparisons Study (NAMMIS) now being organized. Similar modeling results derived from the Chemical Transport Model (CTM) of Atmospheric and Environmental Research, Inc. have already been obtained.

New monitoring data from Steubenville, Ohio, suggest that about 70% of the mercury being deposited in rain and snow at that location is attributable to coal combustion. In contrast, various EPA web pages related to the Clean Air Mercury Rule (CAMR) state that EPA modeling using CMAQ found much lower fractions of mercury deposition attributable to coal-fired electric power plants, with values of less than 10% suggested. This apparent discrepancy between CMAQ results and actual observations has been investigated. First, the fractions of mercury deposition attributable to coal-fired power plants that were published by EPA are national-average values and are not specific to any one location. For the Steubenville grid cell, the CMAQ results (for 2001) show that 44% of mercury wet deposition is attributable to coal-fired power plants. Second, this 44% figure accounts for only the coal combustion by power plants, not coal combustion by all sources. A CMAQ modeling assessment of all sources of mercury associated with coal combustion would likely find a considerably higher fraction. Overall, the new monitoring data from Steubenville and CMAQ modeling performed for CAMR appear to agree quite well. (Russell Bullock, 919 541 1349)

12. *Air Quality Forecast Model Development, Testing, and Evaluation.* In preparation for the 2005 forecast season, testing of the enhancements to the Eta-CMAQ forecast system were continued through a variety of sensitivity simulations for two periods in July and August 2004, and one in August 2002. Final versions of CMAQ and PREMAQ source codes are undergoing parallel testing at NCEP. It is expected that these codes will become operational in the Air Quality Forecast (AQF) system in early May 2005. Comparisons of distributions of gaseous and particulate species, which are derived from both the operational O_3 and developmental PM model forecast runs for the summer of 2004, are being compared against measurements collected onboard the NOAA P3 and NASA DC8 aircrafts during the 2004 International Consortium for

Atmospheric Research on Transport and Transformation (ICARTT) field study. (Rohit Mathur, 919 541 1483; Jonathan Pleim, 919 541 1336)

13. *Simulating the Wet Deposition of Ammonium and Precipitation*. Work is under way to ascertain how well CMAQ simulates the wet deposition of ammonium and precipitation. Relevant simulations have been examined in light of recently revised ammonia emissions estimates. This procedure may help assess the importance of the accuracy of the precipitation simulations; however, it is not possible to say definitively whether predictive errors in ammonium wet deposition can be attributed to faulty precipitation simulations or faulty emissions data. (Jerry M. Davis, 919 541 0833; Jenise Swall, 919 541 7655)

Idaho Falls

14. *New York City Urban Dispersion Program*. A planning meeting for the UDP was held at Stevens Institute of Technology in Hoboken, NJ on April 14 and 15. Several participants and potential participants attended. A background SF_6 study in the test area is planned for sometime in May or June. Some air samples were collected during the planning meeting. These were analyzed at FRD for SF_6 concentrations and for possible perfluorocarbon interferants near the UDP test bed. Sulfur hexafluoride concentrations were elevated near the area of concern, as expected, due to close sampling upwind and downwind of the 49th Street electrical substation that is known to be leaking SF_6. The elevated concentrations reached only into the 1,000 ppt levels, however, and dropped off dramatically with distance. There did not appear to be an abundance of perfluorocarbon interferants, as expected. The data are being reviewed to substantiate this conclusion. The data were sent to the UDP program directors for their review. (Kirk Clawson, 208 526 2742, Debbie Lacroix, 208 526 9997)

Established FRD quality control practices are being considered by colleagues at the Environmental Measurements Laboratory, who will be making quality assurance recommendations for the overall New York program. Copies have been provided on quality control sections of the preliminary Joint URBAN 2003 report. It is assumed that these documents will be the foundation for developing overall project quality control procedures. (Debbie Lacroix, 208 526 9997, Roger Carter)

15. *Extreme Turbulence Probe*. A presentation on the ET probe 2004 hurricane data was given at a workshop in Miami in early April. Useful discussions were held with other attendees at the workshop, including some discussion about using the ET probe data along with other ground-based instruments to study the structure of organized rolls that are often observed in the hurricane boundary layer. Shortly before the workshop, the Office of Naval Research announced a two-year extension of the CBLAST program. (Richard Eckman, 208 526 2740)

Multiple Tracer Analysis System. A major upgrade to the Automated Tracer Gas Analysis System (ATGAS) was completed this month. The change allows the ATGAS to simultaneously analyze multiple tracer gases such as perfluorocarbon tracers (PFTs) and potential new tracers to replace SF_6. The upgrade included some important analysis features such as a printout of the

entire chromatogram for all peaks including analyte labeling and colored markers for better targeting of the retention time windows. (Roger Carter, 208 5262745, Debbie Lacroix)

Las Vegas

16. Cloud to Ground Lightning. A new effort was initiated in response to questions from the Defense Nuclear Facilities Safety Board (DNFSB) regarding lightning safety and warnings at the Nevade Test Site. The issue concerns the need to improve the provision of lightning warnings. Relevant data bases have been prepared and analyzed and a draft report has been prepared. darryl.randerson@noaa.gov

17. DOE Meteorological Coordinating Council. As an outcome of NOAA leadership of the DOE Meteorological Coordinating Council, data from eight DOE facilities where meteorological data are collected by organizations other than NOAA are soon to be integrated into the national surface observations system, by inputting the data into the Meteorological Assimilation Data Ingest System (MADIS). Primary points of contact for the eight DOE facilities that have meso-scale meteorological data collection networks have been identified. darryl.randerson@noaa.gov