



NOAA ARL Monthly Activity Report



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**Bruce B. Hicks, Director
Air Resources Laboratory**

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1. Highlight -- Passing the baton. After 16 hectic years as Director of the Air Resources Laboratory, Bruce Hicks is about to let somebody else take the helm. He is leaving with supreme confidence in the future of the laboratory, and in the leadership team (led by Rick Artz) that will take over while a new Director is sought. He does not intend to drop completely out of sight, and so it is still too early to celebrate.

2. Highlight -- Leadership of the OFCM for the Joint Urban Test Beds Action Group. The rubber is about to hit the road. Following resounding multi-agency endorsement for the concept of urban test beds, building upon the NOAA/ARL exploratory venture in Washington, DC ("DCNet"), Will Pendergrass of ARL/ATDD will be co-chairing the new Joint Action Group on Urban Test Beds being set up by the Office of the Federal Coordinator for Meteorology. It is intended that this group will take the lead in defining what test beds are needed, and for what purposes. The program is intended to address a variety of issues affecting urban populations, including cold spells, flooding and severe weather as well as dispersion. bruce.hicks@noaa.gov

Silver Spring

3. HYSPLIT-CMAQ Interface. CMAQ is the mainstream air quality model developed by ARL, now used for both assessment (by EPA) and forecasting (by NOAA) activities. For some time, it has been intended to integrate HYSPLIT with CMAQ. The requisite interface programs have now been developed, to convert CMAQ meteorological data files to the HYSPLIT compatible format. HYSPLIT trajectory endpoint files, including the meteorological data along the trajectory, can now be exported in the format used by CMAQ,

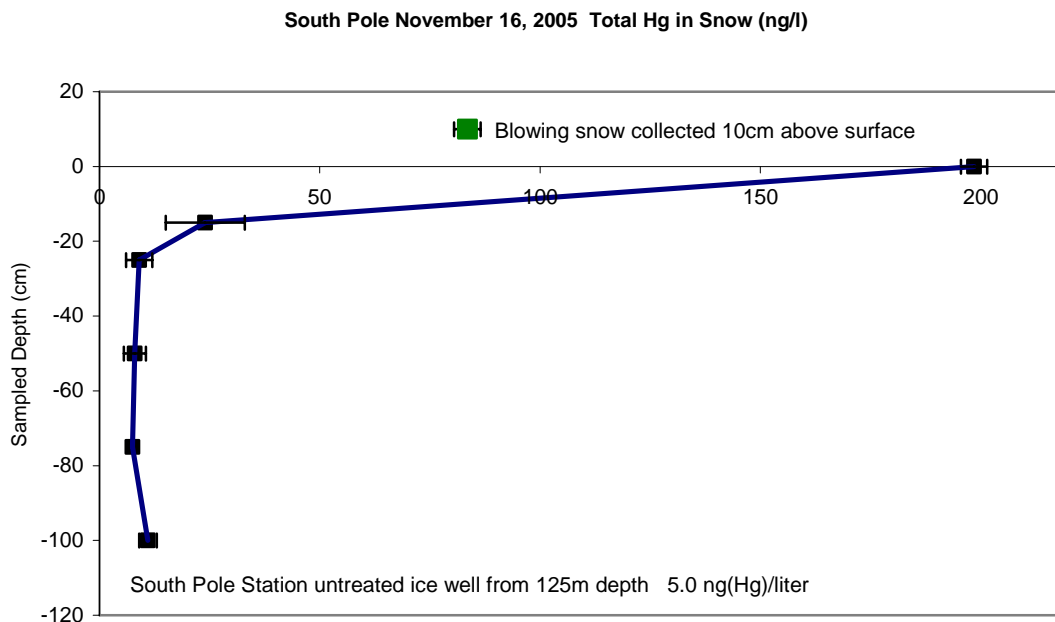
along with HYSPLIT binary concentration files, for multiple levels, species, and time periods. roland.draxler@noaa.gov

4. HYSPLIT Development. HYSPLIT particle plots can now be delivered in GIS format. The development was prompted by a request from NIH scientists using HYSPLIT to assess the radioactive dose received by populations distant from the nuclear weapons tests of the 1950s. It will be formally included in the next HYSPLIT release. barbara.stunder@noaa.gov

5. National Volcanic Ash Plan. The “National Volcanic Ash Operations Plan for Aviation” is under development by the OFCM Working Group on Volcanic Ash. Barbara Stunder represents ARL on the working group. Language has been included in the Plan to reinforce ARL’s role in research, stating the ARL goal to support improved dispersion guidance and then transfer the improvements into operations at NCEP. A Plan draft for wider review should be available early in 2006. barbara.stunder@noaa.gov

Oak Ridge

6. Antarctica Tropospheric Chemistry Investigation (ANTCI). Oxidized mercury found at very high concentration in the near-surface air at South Pole Station in 2003 motivated a return last month for further measurements. The recent measurements showed the sunlit snow surface to be an effective substrate for deposition of oxidized atmospheric mercury, which then undergoes photoreduction and returns to the air as gaseous elemental mercury. The peak concentration of gaseous elemental mercury within the interstitial air of the snow pack occurred about 3 cm below the surface, the depth influenced by wind speed. Total mercury in the snowpack, plotted in the figure as a function of depth, clearly peaks at the surface (198 ngL⁻¹). By 1 m below the surface the total mercury concentration decreased to ~10ngL⁻¹. The water-supply well for the South Pole Station had around 5 ngL⁻¹ of total mercury at 125 m depth. Thus, a small fraction of the deposited mercury is buried long-term. Blowing snow collected 10 cm above the surface averaged 84 ngL⁻¹.



Extrapolation to the whole Antarctic Polar Plateau, if valid, is impressive. Each year 60 Tonnes of Hg are sequestered. This is 10% of the Southern Hemisphere's Hg emission, or an amount equal to the total Hg emission from coal fired power plants in North America. Each year (assuming 6 months of sunlight) nearly 500 Tonnes of oxidized atmospheric mercury converts to elemental mercury. steve.brooks@noaa.gov

7. East Tennessee Ozone Study (ETOS). Invitations to serve on the steering committee for the 2006 ETOS Science Workshop were offered to representatives from government (federal, state, and local), academia, and public interest groups that are concerned with air quality in the East Tennessee region. The steering committee members will hold their first meeting in early December. latoya.myles@noaa.gov

8. Mobile Flux Platform Development. NOAA's P3s have carried ARL's Best Atmospheric Turbulence (BAT) probes episodically in hurricane research for the past few years. They will now have a permanent capability to carry BAT probes whenever turbulence measurement is required. An important feature of the BAT system is its direct measurement of the probe's own motion along with that of the air relative to it, all contained in a small package. Such a probe can be mounted at the end of a long boom extended forward from the airplane's nose into undisturbed air. It sends only digital signals back down the long boom; there are no pneumatic tubes or analog signals. The design, however, leaves little room for the large-diameter tubes normally used with turbulence sensors in large radomes to deflect any rain or spray away from fouling the pressure lines. Rather, the lines are mechanically flushed. For this purpose a small box containing a pump and solenoid valves has been developed to ride in the collar behind the probe's head. (P. Hall and Senn)

Research Triangle Park

9. CMAQ - Air Quality Forecast Version. Upgrades to the air quality forecasting version of the Community Multiscale Air Quality (CMAQ) model, CMAQ-F, to be in line with the recent improvements to the public release version of CMAQ-4.5, have been completed and tested. Also, the development to upgrade CMAQ-F to include the integrated process rates component of the process analysis diagnostics is still in progress. Testing is also underway to develop a proof-of-concept coupled PREMAQ/CMAQ-F. PREMAQ is the preprocessor that combines the functionality of the Meteorology-Chemistry Interface Processor and parts of the Sparse Matrix Operator Kernel Emissions modeling system for CMAQ-F. PREMAQ was specifically designed to link NCEP's Eta model with CMAQ. It uses meteorological fields that are specific to the Eta model output suite. The idea is to overlap CMAQ-F computation with data availability from PREMAQ with a view toward reducing the end-to-end cpu time. In the long term, the coupling overlap will engage the NCEP NAM forecast meteorology model (*e.g.*, WRF-NMM), and ultimately enable CMAQ feedbacks in an on-line configuration. jeff.young@noaa.gov

10. North American Mercury Model Intercomparison Study. The North American Mercury Model Intercomparison Study (NAMMIS) has now completed all of the initial condition and boundary condition (IC/BC) data sets. The Community Multiscale Air Quality (CMAQ) model has been run with all of these three IC/BC cases and the model output data have been sent to the New York State Department of Environmental Conservation (NYSDEC) for analysis. The REMSAD model is currently being run for the final (GEOS-Chem) IC/BC case. The TEAM model has yet to be run for this final case. russell.bullock@noaa.gov

11. Emissions for Air Quality Forecasting. To improve emission estimates from electric generating units (EGUs) for air quality forecasting, we have derived statistical relationships between several meteorological parameters and emissions from the EGU sector using actual Continuous Emission Monitoring (CEM) data from 2003 on a state-by-state basis. We are currently applying this approach to both 2004 and 2005 in a retrospective fashion in preparation for incorporating into the operational air quality forecast system for 2006. Currently, we have developed software that uses the meteorological data from the Eta/CMAQ system and which calculates daily adjustment factors by state to be applied to the ozone season average daily emissions to create meteorological adjusted emission estimates for the EGU sources. george.pouliot@noaa.gov, rohit.mathur@noaa.gov

12. Meeting with California Air Resources Board. Kenneth Schere (NOAA/ARL) and Paula Davidson (NOAA/NWS) met with representatives of the California Air Resources Board (CARB) meteorology and air quality groups on December 2, 2005, in Sacramento. Discussions were held on how best to collaborate on

national air quality forecasting efforts between NOAA's national scale model forecast guidance activities and California state level interests. CARB scientists will be making available to NOAA the best estimates of current and projected source emissions data to use in air quality forecasting. In addition, CARB and local air quality control districts will help to evaluate the air quality forecasts for particular regions of interest. kenneth.schere@noaa.gov

Idaho Falls

13. Smart Balloon. A miniature drip counting rain gage has been developed for the smart balloon in an effort to improve the accuracy and decrease the weight of the precipitation sensor. The collection funnel is a 1.9-inch diameter plastic lab funnel with a water screen and filter that feeds a small orifice from which a water droplet is formed. About 0.3 inches below the point where the droplets form is an infrared light emitting diode and sensor. As the droplet passes between the emitter and sensor it refracts the beam causing one or more pulses from the sensor. The pulses are then shaped and counted by a pulse input on the data collection system. Tests indicate that droplet volume formed in this manner varies by only about 3% for precipitation rates ranging from 0.1 to 10 inches per hour. randy.johnson@noaa.gov, and Shane Beard

14. Transport and Dispersion Modeling. There is increasing interest in a new upgrading of the dispersion capability used by the Idaho National Laboratory in support of its reactor development research. FRD is investigating the use of the latest version of the NOAA/ARL HYSPLIT model. HYSPLIT has several attractive technical features not found in other models, including deposition and radioactive decay. Moreover, it can directly use the output from FRD's MM5 modeling to create mesoscale dispersion forecasts. The use of this model would also continue to benefit NOAA in that any improvements and research stemming from its use at FRD would feed back to the larger NOAA community using HYSPLIT. richard.eckman@noaa.gov

Las Vegas

15. Urban Air Quality Study. Marc Pitchford and Darryl Randerson participated in the "Workshop on Regional Ozone Transport in the Southwestern United States" held at the Desert Research Institute facility in Las Vegas, NV. Dr. Pitchford presented a technical paper entitled "A Review of Ozone Modeling for the Southwestern United States" and Dr. Randerson gave a brief report on initial comparisons between upwind pristine areas and the Las Vegas urban area. Preliminary analysis has indicated transport of ozone from southern California into the Mojave Desert based on backward trajectory calculations from HYSPLIT. darryl.randerson@noaa.gov

16. DOE Meteorological Coordinating Council (DMCC). ARL provides the leadership of the DMCC for DOE. The goal is to coordinate among the various dispersion programs at DOE facilities. Darryl Randerson chairs the DMCC. In November, he attended meetings at DOE HQ to provide an annual summary of FY 05 activities of the DMCC and to review plans for FY 06. He also attended a meeting of the Interdepartmental Committee for Meteorological Services and Supporting Research, where a proposed update to the DOE technical document entitled Atmospheric Science and Power Production was discussed. The previous edition of this document was published in 1984, with Randerson as the Editor. darryl.randerson@noaa.gov