



# NOAA ARL Monthly Activity Report



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## Contents

1. *Highlight -- Increased International Reliance on HYSPLIT*
2. *Highlight -- Dale Gillette Receives Distinguished Career Award*
3. *Highlight -- Special Issue of Atmospheric Environment (August 2006)*
4. *Highlight -- Atmospheric Mercury, Measurements and Modeling*
5. *Tracer Data Archive Update*
6. *Dust Transport to the Southern Atlantic Ocean*
7. *NOAA Report to Congress on Mercury in the Great Lakes*
8. *Air-Surface Exchange Measurement Network – GEWEX*
9. *UrbaNet Progress*
10. *NOAA/EPA Mercury site at Beltsville, Maryland*
11. *Prognostic Model Outputs as Inputs to AERMOD*
12. *Climate Impact on Regional Air Quality (CIRAQ)*
13. *Watershed Deposition Tool Out for Beta Testing*
14. *UrbaNet/Urban Dispersion Program*
15. *TexAQS -- Smart Balloon*
16. *Atmospheric Tracer Chemical Analysis Upgrade*
17. *Mesoscale Modeling for Idaho*
18. *Urban Air Quality Study – Las Vegas (UrbaNet)*
19. *Mesoscale Modeling for Nevada*
20. *WRF Model Installation – Las Vegas*

**1. Highlight -- Increased International Reliance on HYSPLIT.** The HYSPLIT dispersion model is widely used by member nations of the WMO. HYSPLIT is already compatible with most mesoscale models. Recently, HIRLAM has been added to the list of HYSPLIT-compatible codes. The High Resolution Limited Area Model (HIRLAM), is a cooperative program among the meteorological services of Denmark, Finland, Iceland, Ireland, the Netherlands, Norway, Spain, and Sweden. A decoder was developed to convert HIRLAM text based output files to HYSPLIT compatible format. The format is simple enough to suggest that it could be the basis of a generic meteorological interface for HYSPLIT. The HIRLAM data will be tested with HYSPLIT by the Radiological Protection Institute of Ireland. [roland.draxler@noaa.gov](mailto:roland.draxler@noaa.gov)

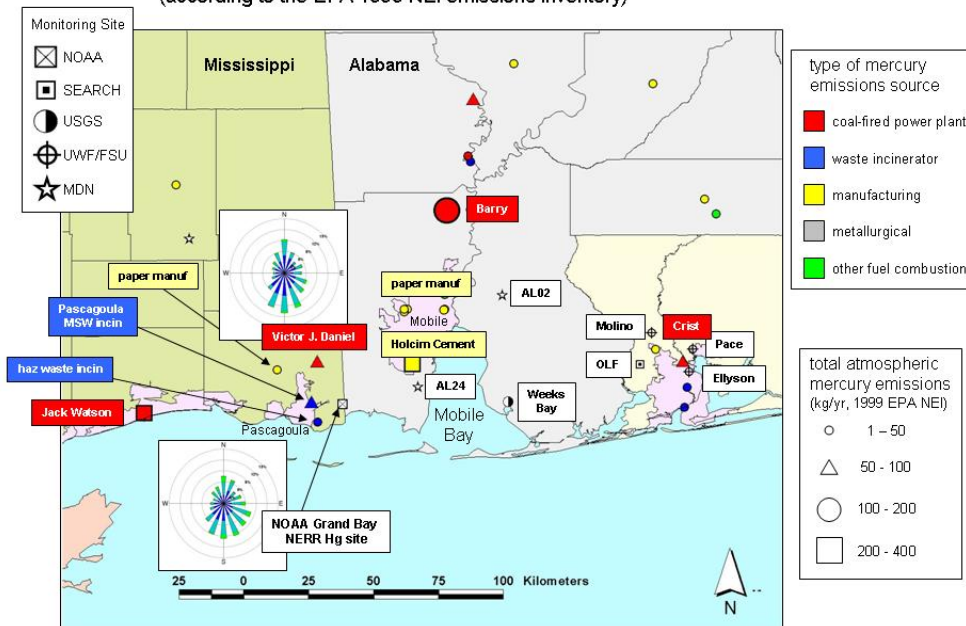
**2. Highlight -- Dale Gillette Receives Distinguished Career Award.** Dr. Dale Gillette has received a Distinguished Career Award for Outstanding Theoretical and Empirical Contributions to the field of wind-blown dust. The award was made on July 27, 2006, at the *6th International Conference on Aeolian Research, Guelph, Ontario, Canada*. Approximately 190 international scientists and researchers

attended the conference, which was dedicated to Dale. It was noted that Dale's work over the past 30 years has influenced nearly all research on dust and sand production. [evelyn.poole-kober@noaa.gov](mailto:evelyn.poole-kober@noaa.gov)

**3. Highlight -- Special Issue of Atmospheric Environment (August 2006).** This special issue contains 21 peer-reviewed papers based on the presentations made at the *Third Annual Community Modeling and Analysis System (CMAS) Conference, October 18–20, 2004, the Friday Center at the University of North Carolina at Chapel Hill*. This issue of *Atmospheric Environment* highlights the significance of information presented and ideas exchanged during the CMAS Conference. The next CMAS Conference will be held October 16-18, 2006, in Chapel Hill, NC. Eleven of the 21 articles were co-authored by ARL scientists. [william.benjey@noaa.gov](mailto:william.benjey@noaa.gov)

**4. Highlight -- Atmospheric Mercury, Measurements and Modeling.** Questions persist about the importance of local *versus* distant mercury emissions into the atmosphere. Three ARL Divisions are working on the issue. To help resolve the central question, for the Gulf of Mexico region, a station to measure atmospheric mercury is being established at the Grand Bay National Estuarine Research Reserve (NERR) near Moss Point, MS. The location of the site in relation to sources and other measurement sites in the region is shown in the figure below. Measurements are scheduled to start in Fall 2006. The measurements are designed to (a) generate a long-term record of speciated measurements at a background coastal location to aid in the elucidation of mercury source-receptor relationships; (b) provide a data set for model evaluation; (c) derive dry deposition estimates; (d) provide a long-term, publicly available data record; (e) establish correlations with meteorology and ancillary trace species to better understand the emission, transport, transformations, and fate of mercury in the atmosphere; and (f) discern trends in atmospheric mercury concentrations. A memorandum of understanding between NOAA ARL, the Grand Bay NERR, and the U.S. Fish and Wildlife Service (FWS) has been drafted. FWS is involved because they own the property at the preferred measurement site.

Location of the new NOAA Grand Bay NERR Atmospheric Mercury monitoring site, other atmospheric Hg monitoring sites, and major Hg point sources in the region (according to the EPA 1999 NEI emissions inventory)



In related work, ARL is collaborating with the Clean Air Markets Division of the Environmental Protection Agency on a new ambient mercury measurement site at Beltsville, Maryland, in an extension of an existing Interagency Agreement. The Beltsville site will be collocated with several existing monitoring activities. It is planned that speciated ambient mercury measurements will begin in Fall-Winter 2006. The objectives of the measurements are similar to those for the Grand Bay site described above.

Selection of sites has been guided by recent results derived from ARL measurements of atmospheric mercury at the Oxford MD (NOAA/NOS) Laboratory during the summer of 2004 -- the highest concentrations of reactive gaseous mercury observed occurred when the wind was blowing from the direction of major mercury point sources in the region. These have been summarized in a presentation now available at [http://www.arl.noaa.gov/data/web/reports/cohen/46\\_madison.ppt](http://www.arl.noaa.gov/data/web/reports/cohen/46_madison.ppt)  
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## **Silver Spring**

**5. *Tracer Data Archive Update.*** The process of updating ARL's Data Archive of Tracer Experiments and Meteorology (DATEM) with NCEP's 32 km North America Regional Reanalysis (NARR) has begun. The original DATEM consisted of several ARL long-range tracer experiments (ACURATE, CAPTEX, ANATEX, OKC80, and INEL74), an extract of the 2.5 degree NCEP/NCAR global reanalysis, and statistical programs for model verification. All data are in a common format to simplify dispersion model simulations and evaluations. The long-term plan is to have interactive model verification available through the web. [roland.draxler@noaa.gov](mailto:roland.draxler@noaa.gov)

**6. *Dust Transport to the Southern Atlantic Ocean.*** Transport of dust from Patagonia in Southern Argentina to the Southern Atlantic Ocean (SAO) is suspected to influence phytoplankton activity. To test this hypothesis, a combination of surface visibility, satellite measurements and transport model (HYSPLIT) predictions has been used to track and report occasions when dust events originating in Patagonia could affect the South Atlantic.

It has been shown that HYSPLIT can capture the main features of the dust plume horizontal and vertical distributions as observed by the satellites, supporting the hypothesis that dust emitted from Patagonia can reach the Sub-Antarctic Atlantic Ocean. A manuscript has been prepared and submitted to Geophysical Research Letters in collaboration with Dr. Santiago Gasso from Goddard Earth Science and Technology Center, University of Maryland, Baltimore County. [ariel.stein@noaa.gov](mailto:ariel.stein@noaa.gov)

**7. *NOAA Report to Congress on Mercury in the Great Lakes.*** NOAA ARL is the primary author of a Report to Congress on mercury contamination in the Great Lakes. The report is undergoing intra- and inter-agency review. On July 26, 2006 the report was submitted by the Department of Commerce to the Office of Management and Budget (OMB) for review. Mark Cohen, Roland Draxler and Richard Artz are the primary authors of the report. [mark.cohen@noaa.gov](mailto:mark.cohen@noaa.gov)

## **Oak Ridge**

**8. *Air-Surface Exchange Measurement Network -- GEWEX.*** New Hydra soil moisture probes are being deployed at GEWEX sites around the country. Currently, sites in TN, MT, MS, and IL have them installed. The new probes provide more accurate soil moisture measurements as well as replicated

measurements, for an improved understanding of spatial/time variability. [tilden.meyers@noaa.gov](mailto:tilden.meyers@noaa.gov), Heuer, Wilson, Meyer, Randolph, and Bryant

The spectrometer at Bondville is collecting hourly samples of the spectral reflectance of a soybean field. A second spectrometer will be deployed in August over a corn field. [tilden.meyers@noaa.gov](mailto:tilden.meyers@noaa.gov), Wilson, Heuer, and Senn

**9. *UrbaNet Progress.*** A procedure for extracting turbulence-related data from the AWS, Inc., network is reaching completion. This will enable ARL researchers to obtain real-time surface observations from the AWS data system in Germantown, MD. A focus on Las Vegas as a second urban test bed (the Washington, DC Capital Region is the first) is gathering momentum. Once established, use of these test beds by other members of the research community will be encouraged. [will.pendergrass@noaa.gov](mailto:will.pendergrass@noaa.gov)

**10. *NOAA/EPA Mercury site at Beltsville, Maryland.*** In preparation for the establishment of the joint mercury site in Beltsville, operations and quality assurance manuals have been prepared. These operational and QA procedures will be implemented at all present and future ARL mercury monitoring sites. The National Atmospheric Deposition Program (NADP) will also evaluate the procedures for possible national implementation. [steve.brooks@noaa.gov](mailto:steve.brooks@noaa.gov)

## **Research Triangle Park**

**11. *Prognostic Model Outputs as Inputs to AERMOD.*** Meteorological data are a key component of air quality dispersion models being used by the Environmental Protection Agency (EPA) and other agencies to assess strategies to reduce the impacts of air pollution on human health and the environment. Division scientists have been investigating how meteorological data from prognostic models can provide inputs to air quality models. This study is a result of collaboration among Atmospheric Sciences Modeling Division, Office of Air Quality Planning and Standards, and EPA Regional Offices 3 and 7. Average annual concentrations for benzene were simulated for a large urban area (Philadelphia) based on meteorological information generated by MM5. Results were compared with simulations based on the use of hourly meteorological observations from the Philadelphia International Airport National Weather Service Station, processed from AERMOD's meteorological processor (AERMET) using standard practices. Although MM5 results show promise in the application, further investigations are needed before data from MM5 or WRF can be used routinely with the AERMOD dispersion model. [vlad.isakov@noaa.gov](mailto:vlad.isakov@noaa.gov)

**12. *Climate Impact on Regional Air Quality (CIRAQ).*** Outputs from a global circulation model have been used to provide boundary conditions for the Community Multiscale Air Quality (CMAQ) model in the simulations of two five-year periods representing current (1999-2003) and future (2048-2052) air quality. For these simulations, anthropogenic emissions are held constant at 2001 levels to isolate the effect of climate change from the effect of changing emissions. Analysis of the air quality results has focused on peak 1-hour (1-h) and maximum 8-hour (8-h) average ozone concentrations, as well as PM<sub>2.5</sub> concentrations. Model results show increases in both 1-h and 8-h ozone in the future climate scenario relative to the current scenario, but the spatial extent and magnitude of these increases are not uniform. By contrast, modeled PM<sub>2.5</sub> concentrations show a more uniform decrease for all seasons and all regions of the United States. Current research efforts include applying principal components analysis (PCA) to characterize differences between current and future regional ozone concentrations and to relate those differences to climate parameters. [chris.nolte@noaa.gov](mailto:chris.nolte@noaa.gov)

**13. Watershed Deposition Tool Out for Beta Testing.** A new version of the Watershed Deposition Tool (WDT) was received from Argonne National Laboratory for beta testing. The objective of this software tool is to take gridded atmospheric deposition (wet and dry) estimates from the Community Multiscale Air Quality (CMAQ) model, and allocate them to 8-digit HUC's (hydrologic cataloging units of rivers and streams) within a State or Region watershed. WDT can also export Geographical Information System (GIS) Shape files of the CMAQ gridded outputs for experienced GIS users. The purpose of the WDT is to aid the linkage of air and water for TMDL (Total Maximum Daily Load) nonpoint-source watershed analyses. WDT will calculate the average change in air deposition across a HUC due to Clean Air Act regulations, given base simulation year air deposition and deposition for a future year that incorporates estimated reductions in air emissions due to regulations. Currently, the capability is designed for wet and dry deposition of nitrogen and sulfur over the continental domain at the 36-km grid resolution. All of the problems that had been identified by the Division internal review were addressed in this new version. WDT was subsequently sent to three external groups for beta testing: water researchers at the University of Connecticut and the Connecticut Department of Environmental Protection, State water quality modelers at the Maryland Department of the Environment, and water quality researchers at the EPA Region 3 Office. We are currently waiting for feedback. [robin.dennis@noaa.gov](mailto:robin.dennis@noaa.gov)

## **Idaho Falls**

**14. UrbaNet/Urban Dispersion Program.** Preliminary analysis of plume spread during the New York City MID05 experiment suggests that the plumes initially spread very rapidly and then only very slowly after that. It is conjectured that this feature is due to flow blockage by buildings resulting in a large crosswind spread and then street canyon channeling in the along-wind direction. The real-time TGA data exhibits sharp peak-to-mean excursions and periodicity reminiscent of that observed in the Joint Urban 2003 data. [dennis.finn@noaa.gov](mailto:dennis.finn@noaa.gov)

**15. TexAQS -- Smart Balloon.** Battery packs and solar panels have been completed and tested for the upcoming Texas Air Quality Study II (TexAQS II). Testing on the transponders and communications is finished and packing of equipment has started. Departure for Houston will be in late August with the first launch date expected on the 29 August. The study is expected to continue through mid-September. [randy.johnson@noaa.gov](mailto:randy.johnson@noaa.gov)

**16. Atmospheric Tracer Chemical Analysis Upgrade.** Laboratory systems to analyze perfluorocarbon tracer samples are being finalized. "Fine tuning" of the system has resulted in a reduction in dead volume, which should help increase the sharpness of the peaks and improve the reliability of the data analysis. [debbie.lacroix@noaa.gov](mailto:debbie.lacroix@noaa.gov)

**17. Mesoscale Modeling for Idaho.** During July some initial testing of the Weather Research and Forecasting (WRF) mesoscale model was performed at FRD. A two-domain configuration similar to the existing MM5 system at FRD was designed. The coarse domain uses a 20 km horizontal grid spacing and covers Idaho together with parts of the surrounding states. A 4 km nested grid covers the Eastern Snake River Plain and nearby mountains. Currently, WRF is being initialized using the Rapid Update Cycle (RUC).

WRF is easier to configure than MM5 because it includes a graphical user interface for setting up the domains. One problem that came up is that WRF currently doesn't fully support the newer GRIB 2 format. The RUC files are quite large, but the GRIB 2 files are only half the size of the older GRIB 1 files. Since ftp downloads can take considerable time, the GRIB 2 files are being downloaded and then

locally converted back to GRIB 1 format for use in WRF. The initial test runs of WRF were somewhat disappointing, in that WRF seems to be running at about the same speed as MM5 even though the WRF computer is much faster. This might be partly due to the WRF configuration using more complex parameterizations for air-surface interactions and cloud microphysics. Still, it appears that WRF is not yet as well optimized as MM5. [richard.eckman@noaa.gov](mailto:richard.eckman@noaa.gov)

## **Las Vegas**

**18. Urban Air Quality Study – Las Vegas (UrbaNet).** As the Las Vegas UrbaNet program evolves, local interactions are expected to involve fire stations and their personnel. Local University (UNLV) personnel are already working on this, and a close association with the university is expected. The locations of 68 fire stations in southern Nevada have been documented. Station elevations were also identified. These data will be available of the August UrbaNet meeting. A map is also available of locations where AWS has installed weather towers. [walter.schalk@noaa.gov](mailto:walter.schalk@noaa.gov), D. Randerson

**19. Mesoscale Modeling for Nevada.** To take advantage of new modeling capabilities, the SORD Dispersion Modeling team met to develop specifications for computer hardware and software needed to implement the NOAA WRF hydrodynamic model at SORD. The team identified the resources required to achieve a 24-30 hr, high-resolution, weather forecast package for dispersion forecasting use. Model outputs will be used to drive the NOAA HYSPLIT dispersion model as well as other model capabilities in the SORD inventory. The necessary computer systems have been ordered and are expected to be delivered in late September. [walter.schalk@noaa.gov](mailto:walter.schalk@noaa.gov), K. Smith, P. Abbott, D. Randerson

**20. WRF Model Installation – Las Vegas.** Installation of WRF and accompanying software was completed on the lakemead Itanium cluster at NSCEE on the UNLV campus. Compiling of the programs has been delayed while NSCEE decides whether or not to update the Fortran compiler. Until about the middle of July the time to download NCEP model output (used to initialize and provide boundary conditions for WRF) was relatively short. Since then the time to download has been about 8 times as long. A search for the cause of this abrupt change has been unsuccessful. [kip.smith@noaa.gov](mailto:kip.smith@noaa.gov)