



NOAA ARL Monthly Activity Report



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Highlights

1. World Trade Center Activities. Wind tunnel studies of the World Trade Center (WTC) site will be conducted to assist with assessments of the impact of the WTC disaster on the surrounding area. A scale model of lower Manhattan will be constructed, and a series of experiments will be performed in the Fluid Modeling Facility to characterize the flow and dispersion of pollutants emitted from the WTC disaster and to provide a database suitable for the Computational Fluid Dynamics (CFD) model. The work is in collaboration with health effects researchers at Rutgers University/EOSHI (Environmental and Occupational Health Sciences Institute). (Roger Thompson, 919 541 1895)

A set of remote probing instrumentation continues to operate on Pier 25 near ground zero in lower Manhattan. Data obtained are being used to supplement routine meteorological observations and model applications for the surrounding New York City Area in the ongoing assessments of the environmental impact of emissions from ground zero. Refined modeling, including the application of a computational fluid dynamics model, is being developed to support an understanding of the detailed emissions and local impact within the complex urban environment surrounding ground zero. A full detailed digital model (basic building information provided from VEXCEL Corporation) of the buildings in lower Manhattan has been constructed to support this effort. (Alan Huber, 919 541 1338)

2. Highlight – Airborne Environmental Research. The first workshop of the Network of Airborne Environmental Research Scientists (NAERS) was held at Idaho Falls ID, sponsored by NOAA/FRD. NAERS is an interest group for operators of Small Environmental Research Aircraft (SERA), typically two-place craft single-engine having a mass less than 1000 kg. Participants came from Sweden, Germany, Italy, Japan, Australia, and the US. The Agenda covered the wide and growing range of *in-situ* and remote sensing capabilities of these aircraft, which can be operated at a fraction of the cost per hour of typical research aircraft. There was a sense at the meeting of a developing critical mass of operators and a maturity of technology which will help move SERA into mainstream environmental science. (See item 36 below for more details) (Ron Dobosy, 865 576 1250, Tim Crawford, Ed Dumas, Jerry Crescenti)

3. Highlight – Joint Action Group on Atmospheric Transport and Diffusion Models. Several ARL representatives are participating in the activities of the JAG/SEATD established by the Office of the Federal Coordinator for Meteorology. The first meeting was held at Silver Spring, Maryland, January 29-30, 2002. Bruce Hicks chairs the JAG; John Irwin (representing EPA) and Darryl Randerson (representing DOE) also participate. The purpose is to examine available models and to recommend a process for assessing their suitability for application in a variety of possible terrorist attack scenarios. The need for thorough model evaluation will be a central consideration. The results of this group will be communicated to the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) through the Working Group for Environmental Support to Homeland Security. The scenarios were reviewed and several new scenarios were added to better reflect the diversity of possible emergencies that might occur through terrorist activities. An initial listing was made to summarize all the transport and diffusion processes identified in reviewing the individual scenarios. (John Irwin, 919 541 5682; Darryl Randerson, Bruce Hicks)

4. US-Italy Discussions. A U.S.-Italy Joint Climate Change Research Meeting was held in Rome, Italy on January 22 - 23, to discuss potential collaborative research projects related to climate, global carbon cycle, and climate modeling. The U.S. chairs were Dr. Harlan Watson, Senior Climate Negotiator and Special Representative for the Department of State, and Dr. Paul Anastas, Acting Department Head for Environmental and International Affairs of the White House Office of Science and Technology Policy. The Italian chairs were Dott. Corrado Clini, Director General of the Ministry for Environment and Territory, and Dott. Luciano Criscuoli, Director General of the Ministry of Education and Research. ATDD has two on-going collaborative research projects with Italian scientists, namely the carbon flux measurement program (FluxNet) and the airborne flux measurements program (SkyArrow).

Extensions of these programs were suggested. A formal report on the meeting is being drafted. (Ray Hosker, 865 576 1248)

Silver Spring

5. *HYSPLIT Installations.* The most recent HYSPLIT update was installed at AFTAC and the University of Houston. Through support by WMO, the model was also provided to the Chinese Meteorological Administration for use by their emergency response unit to support their role as a Regional Specialized Meteorological Center. The model was installed on a dedicated workstation with data converters to permit the use of their MM5 and Global Spectral Model output fields. Scripts were developed to automate the data extraction and archiving procedures. The RSMC and standard HYSPLIT graphical interfaces were integrated and training was provided to CMA staff on RSMC procedures. A real-time test was conducted with NOAA-NCEP and Australia's BoM. Several HYSPLIT seminars were presented at CMA. roland.draxler@noaa.gov

6. *Potential Intensity of Hurricanes.* Potential intensity of hurricanes has been computed from radiosonde and SST data for 12 tropical island stations. Preliminary results from 7 of these show widely varying trends, with predominantly decreasing potential intensity. These results, along with time series for 5 other stations not considered suitable for trend analysis, will be compared to potential intensity calculated from NCEP reanalysis data. melissa.free@noaa.gov

7. *Diurnal Upper-Air Temperature Variations.* One of the many challenges in creating homogeneous records of upper-air temperature using MSU satellite data is to adjust the data for the drift in the local equatorial crossing times of the NOAA polar orbiters. This drift contributes to an aliasing of the diurnal variation of temperature, since the satellite samples different regions at different times of day during its lifetime. To better characterize the actual diurnal temperature wave in the upper-air, we will use high frequency radiosonde data from the historical archive. First steps in this effort have been to identify useful radiosonde stations where soundings were made at least four times daily over a sufficiently long period to allow us to discern the seasonal variations of the diurnal cycle. dian.seidel@noaa.gov

8. *Comparison of Radiosonde and Satellite Temperature Trends.* Temperature trends estimated from a 63-station network after exclusion of anomalous tropical stations have been compared with other radiosonde trends for periods 1958-2000 and 1979-2000, and with satellite-MSU trends for the period 1979-2000. In general, the agreement is surprisingly good. The 63-station-network-after-exclusions overestimates the stratospheric cooling in the Southern Hemisphere, partly due to the distribution of stations in this network. The most disturbing discrepancy is in the tropical stratosphere where the radiosonde data in general, and the 63-station-network-after-exclusions in particular, show at least twice the cooling the MSU data do. This is a problem that must be resolved. In the tropics all data agree that the troposphere has warmed slightly more than the surface during 1958-2000, and with one exception, that there has been a substantial warming of the surface relative to the troposphere during 1979-2000. Globally, all data agree that the warming of surface and troposphere are essentially the same during 1958-2000, but that during 1979-2000 the surface warmed more than the troposphere. (Jim Angell, 301 713 0295, x127)

Boulder

9. *Radiometer Diffuser Degradation.* In an effort to obtain information on the stability of Teflon (PTFE) diffusers, of the type used in the UltraViolet Multi Filter Rotating Shadow Radiometer, sample diffusers were obtained to investigate changes in the spectral response during field operation. The diffusers were placed at selected sites for the spring and summer (Table Mountain, El Centro, and Big Bend). Measurement of the spectral response occurred when they were new, before deployment to the field, after they were returned from the field (as received), and again after they were rinsed to remove any surface contamination (e.g. dust.) The results indicate that, even over a span as short as six months, there is notable change, typically a loss in transmission, and the change exceeds the uncertainty in measurement. The change varies considerably from site to site. Surface contamination is only a minor

contributor to the transmission changes. The diffuser placed at Big Bend was the only diffuser to show no statistically measurable change in transmission. (The raw measurement of the Big Bend diffuser, in the as received condition, showed no real change in transmission. After the rinse the raw measurement actually showed a slight increase in transmission.) Ideally, the CUCF would have liked to have three diffusers to be used at each site to give information on the variation of the degradation between individual diffusers, but 9 diffusers were not available. As a next step, the three diffusers will be sent to a single site for six months and their spectral response measured when they return. (Charles Wilson, 303 497 7314; Patrick Disterhoft)

10. Security. John Parker from FSL is approaching NCIRT to teach a Security Essentials class in Boulder, CO. This could offer a good opportunity for non-HQ people to interact with, and learn from, NOAA Computer Incident Response Team people. Please email Chris Cornwall and provide him with the number of people from your site who might be interested in attending either of these classes. christopher.r.cornwall@noaa.gov

Oak Ridge.

11. Terrestrial Carbon Program. The new ground fault electrical service at Walker Branch Watershed, which replaced the system damaged in the Fall wind storm, was completed during January. Most measurement systems on the tower and the ground based systems are now being powered from the new 20 circuit system. Other individuals that are doing joint research with ATDD are making plans to reinstall their equipment now that tower and electrical repairs have been completed. Hopefully, all researchers will again be back to normal operations by the end of February. white@atdd.noaa.gov (Bellis, Wilson, Lew, Hall, Randolph, Brewer, Matt)

12. Urban Dispersion. An analysis of the micro barograph data for the five Long-EZ flight nights (18, 19, 20, 25, and 26 October) over the Salt Lake City valley is underway. Wavelet analysis is being used to determine periods of coherent pressure disturbances (CPDs). In some cases, the disturbances appear wave-like, and estimates of speed and direction across the sampling array are being calculated using beamsteering and lag analysis. RMS values of pressure perturbations over 90-minute periods are being calculated. These values are being used to distinguish CPD activity during the experimental nights. nappo@atdd.noaa.gov

13. Canaan Valley. Proposals are being prepared for submission to the U. S. Fish and Wildlife Service to locate SURFRAD and Climate Reference Network sites on the Canaan Valley National Wildlife Refuge. Deployment is planned for later this year. Routine monitoring of wet and dry deposition to the Canaan Valley is continuing. Monthly-average atmospheric concentration and wet deposition have now been calculated from the Canaan Valley site's data up to December 2001 for multiple chemical species. vogel@atdd.noaa.gov

14. CASES-99. Several nights have been selected for a comparative study of techniques for estimating gravity wave characteristics. Because almost all such techniques are based on the linear theory, they are limited by how well the actual atmospheric conditions approximate the ideal. By applying the analysis techniques to nights with contrasting stability and gravity wave types, the utility of the relative utilities of the techniques can be estimated. This work is being done in collaboration with Rob Newsome (CIRA) and Bob Banta (NOAA/ETL) nappo@atdd.noaa.gov

15. Climate Reference Network. The two Nebraska sites did not have AC power to the site at the time of equipment installation. The power issues were resolved and both sites were turned on in January. Michael Black did an extensive study on calibrating the Geonor precipitation gauge. The results show that with specially designed weights, precipitation calibrations can use weights instead of water. The test also shows the variability between successive calibrations of the same sensors. hall@atdd.noaa.gov (Black)

A meeting was held at NCDC in Asheville, NC on January 10 to present results of two independent CRN site density studies. The required number of geographic locations varies by about a factor of three, depending on the scale of the grid used. The researchers plan to repeat their calculations, using scales closer to each other. A meeting was held afterward with the CRN Program Manager to discuss problems, potential solutions, budgets, and other matters associated with ATDD's work on implementing the CRN field sites. hosker@atdd.noaa.gov

16. Dynamical/Photochemical Modeling. Development work continued on applying the coupled LESchem model to study near-source ozone production potential of petrochemical flare stack emissions in the Houston area. CBM-IV, the condensed form of CBM-EX, will be used as the chemistry mechanism for future simulations based on its use in previous studies with other air quality models, the computational time required, and the necessary trace gas detail needed for the current project. Initial tests of the CBM-IV mechanism were successfully performed on the stand-alone version of chemistry model SMVGEAR II before integration into LESchem. Results from the initial LESchem simulation were encouraging. By using CBM-IV instead of CBM-EX, LESchem's computation time has been reduced by 40%, which during a 2-hr simulation with 3 sec time steps saves over 24 hours in computing time. decker@atdd.noaa.gov (Herwehe)

In support of the TNRCC project, the contents of a tape sent by Alpine Geophysics were transferred to ATDD's Alpha workstation after its disk space was upgraded. The tape contained more than 6 GB of files from CAMx simulations of 1993 upset emissions cases near the Houston Ship Channel. These data should provide a basis for trace gas initial conditions and emission sources for the LESchem simulations around the Houston area. herwehe@atdd.noaa.gov (Wood)

17. Emergency Management/Homeland Security. ATDD has begun the process of porting the NOAA/ARL HARM (Hazardous Atmospheric Release Model) model to both Linux and Windows operating environments; previous versions of the transport and dispersion model were fed to HP workstation environments. Additional work is also underway to provide a GIS framework for the model's output concentrations and exposure predictions. Due to necessary modifications to the modeling system, a parallel effort is providing a review of the current state of dispersion modeling at the HARM scale, source to 25 km or 6 - 12 hours, and a review of the embedded transport and dispersion routines within HARM. HARM is intended to provide a local to regional scale interface between NOAA's CAMEO/ALOHA first responder system and the HYSPLIT4 regional modeling system. A verified modeling system should be available to meet the March 2002 time line. pendergrass@atdd.noaa.gov (Dobosy, and Dumas)

International Technical Panel 9 met on January 28 - 21 at Lawrence Livermore National Laboratory to review the past year's progress in urban dispersion modeling, laboratory (wind tunnel and water channel) studies, and field studies. Representatives from the U.S., UK, Australia, and Canada participated. The Urban Dispersion Modeling Working Group met on January 31. Updates were provided on model improvements, and on planned support for the multi-day exploration of Oklahoma City, and preliminary suggestions for instrument sites for a major urban dispersion study to be held in July 2003. hosker@atdd.noaa.gov

18. Italian National Research Council Sky Arrow. Discussions took place with several participants at the Network of Airborne Environmental Research Scientists conference in Idaho Falls, ID. These resulted in a proposal to test a new NovAtel BDS (Black Diamond System) for use on the Sky Arrow MFP system. The BDS system uses a Honeywell inertial measurement unit (laser-ring gyros) and a dual-frequency GPS receiver to provide 100 Hz position, velocity, and attitude angle output. The Italian IATA/CNR has offered their Sky Arrow for a system test to be performed in the near future in Italy. dumas@atdd.noaa.gov

19. Mercury in the Arctic. A recent paper by Foster *et al.* (*Science* Nov. 2001) described a photochemical mechanism which produces bromine and chlorine gases from the Arctic snowpack. These gases are precursors to reactive gaseous mercury formation. Therefore, we propose this photochemical mechanism as a likely initiator of atmospheric mercury deposition in the Arctic. Photochemistry in snow depends strongly on multiple reflections within the upper layer of snow crystals. As the air temperature rises toward zero Celsius, this reflectivity drops off sharply. Analysis of the snowmelt periods during 2000 and 2001 in Barrow showed a strong anticorrelation between the production of reactive gaseous mercury and the temperature of the air, as the air temperature hovered around zero Celsius. This strong anticorrelation was absent during both uniformly colder and uniformly warmer temperatures. Furthermore, we have observed reactive gaseous mercury to be formed only in the daytime above a snow-covered surface. These results fit the photochemical mechanism of Foster *et al.* brooks@atdd.noaa.gov

20. Extreme Turbulence Probe. New circuit boards have been completed for the Extreme Turbulence Probe. One board was assembled at ATDD and tested; no problems were found. The circuit boards and prototype sphere were sent to NOAA's Field Research Division for further assembly and testing. able@atdd.noaa.gov

21. SURFRAD and ISIS. ISIS Level 1 operational responsibility will be transferred to SRRB on February 1, 2002 with nine sites currently operating. Radiometers recently returned from the yearly swap from the field were shipped to SRRB for future cycling. All equipment associated with normal operations were shipped, including solar trackers, spare parts, and spare radiometers (very few and very old). Rotating shadowband data is no longer recorded and will be removed from all data sets transferred to NCDC, etc. matt@atdd.noaa.gov

Transfer proceeded with documentation of site characteristics (including any problems associated with current sites), deployed instruments, etc. The Oak Ridge site, ORT, is again on line measuring all components. January data only contained global shortwave because of power limitations until the Walker Branch Watershed tower wind damage was repaired. Software is being written to generate monthly data sets for ISIS Level 1 sites from the SURFRAD protocol that will be used by SRRB to process Level 1 data. matt@atdd.noaa.gov

Research Triangle Park

22. SOS/Nashville 1999 Field Study Model Simulations. Model simulations of the SOS/Nashville 1999 field study are in progress. Meteorology is being simulated by MM5 with three nested grids at 32/8/2 km horizontal grid resolution. An important feature of this modeling is the use of the Pleim/Xiu Land Surface Model (PX LSM) in MM5. Comparison of model results to surface observations of temperature, humidity, and winds has been extremely valuable for evaluation and further model development. The soil moisture nudging scheme has been improved and the surface heat and moisture flux algorithm has been modified. Evaluation against an independent observation data set is ongoing. MM5 output is being processed by a new version of the Meteorology Chemistry Interface Processor (MCIPv2). MCIPv2 has the advantage, over previous versions, of maintaining the integrity of MM5 PBL and surface flux parameters while reformatting for input into the chemical transport model. Another feature of MCIPv2 is the inclusion of a new dry deposition model, known as M3dry, that uses several common parameters with the PX LSM in MM5. The Asymmetric Convective Model, which is the PBL scheme included in the PX LSM, has been added to the CMAQ model. Thus, PBL and surface flux processes are now entirely consistent across the meteorology and chemistry transport models. Emissions are being processed through the Sparse Matrix Operating Kernel for Emissions (SMOKE), including a new version of the biogenic emission model (BEIS3). CMAQ runs for the coarse grid (32 km) domain over the entire continental United States are proceeding. (Jonathan Pleim, 919 541 1336)

23. CMAQ Developments. The CMAQ Meteorology-Chemistry Interface Processor (MCIP) is getting the final touches before the official public release as part of the CMAQ system. The scientific upgrades to MCIP include a direct compatibility with MM5 Version 3 output, the capability to take advantage of special fields generated by PX LSM in MM5, a new dry deposition scheme (M3Dry), dry deposition velocities for three new photochemical species, and a pass-through option for PBL and radiation variables. MCIP was also completely rewritten and restructured to be a fully dynamically allocatable Fortran 90 program to enhance usability and application across several hardware architectures including Sun, IBM, Linux, SGI, and Windows NT. MCIP now contains 89 Fortran routines and modules, two Makefiles, and two scripts, which collectively account for more than 20,000 lines of code. (Tanya Otte, 919 541 7533)

The CMAQ plume-in-grid (PinG) model has been extended with the incorporation of an aerosol module, which will allow for concurrent simulations of both gas and particulate/aerosol species in the pollutant plumes from selected large point sources. In preparation for an upcoming public release of the CMAQ modeling system, extensive test simulations have been underway. For an on-going CMAQ model sensitivity effort, the CTM/PinG model is being exercised on the eastern United States 36 km gridded domain and the 12 km SOS domain. (James Godowitch, 919 541 4802)

Diagnostic evaluation of CMAQ using the sulfate tracking model continued. Two versions of the model were prepared, one using the RADM2 mechanism, the other using the CB-IV mechanism. Both models were run for the month of January 1990 for the eastern United States. These tests are being conducted to examine whether the pathways for sulfate production differ between the two chemical mechanisms. As another part of the evaluation, diurnal variations in SO₂ were examined and compared against AIRS data. SO₂ is being examined in detail because of the over-prediction shown in monthly average values, and because of the availability of hourly observational data. The results show that the model tends to slightly under-predict daytime concentrations but significantly over-predicts nighttime values. This behavior is consistent with results from earlier work with RADM and NAPAP. (Shawn Roselle, 919 541 7699 and Robin Dennis)

24. Mercury CMAQ Model. Various tasks were performed to allow the CMAQ mercury (CMAQ-Hg) model to be applied using a European modeling domain. The CMAQ-Hg model will be applied as part of an international mercury model intercomparison study organized by the Meteorological Synthesizing Center - East (MSC-East) in Moscow. The CMAQ-Hg model will be used to simulate atmospheric mercury emission, transport, and wet and dry deposition for approximately two weeks in the summer of 1995 and two weeks in the autumn of 1999. For this to occur, necessary terrain, meteorology, and emissions data must be collected and formatted for input to the modeling process. The necessary MM5 modeling domain for meteorological inputs was defined and the process was begun of collecting the required initial/boundary condition information for MM5 simulations. Information on emissions of mercury, NO_x and VOCs over the study region of western and central Europe was previously provided by MSC-East. Information on emissions of SO₂, CO and elemental carbon aerosol was obtained from the Global Emissions Inventory Activities web site and from the Emission Database for Global Atmospheric Research web site. These data are being processed for input to the CMAQ-Hg model by making some assumptions about source stack characteristics and plume rise. (Russ Bullock, 919 541 1349)

25. Dioxins CMAQ Modeling. Effort in this area focused on model development and applications. Model development maintained a prototype of CMAQ/Dioxins by executing and evaluating the model on the Cray T3E. Development examined a contribution to deposition velocities of dioxins from absorption into leaf cuticle lipids. Based on literature surveys, the contribution is believed to divide into two parts: a leaf to air partitioning coefficient and a transport/elimination rate within the cuticle. Tests evaluated different theoretical and empirical formulas for each part by using MCIP and spreadsheet calculations. (William Hutzell, 919 541 4325)

26. Multimedia Integration Modeling System. The MIMS software framework is being designed to comprehensively simulate the cross-media transport and fate of nutrients and chemical stressors over multiple and disparate scales. This system will provide a computer-based problem solving environment for studying multimedia (atmosphere, land, water) environmental problems. (Steve Fine, 919 541 0757)

Work continues on bringing the various deposition models, including the Multilayer Model and the Multilayer Biochemical Model, into the MIMS framework, allowing scientists to run these models more easily, examine effects of using different algorithms, and visualize the output. The models are being examined to identify processes that these deposition models have in common with models for other media (*e.g.*, plant and soil models). (Donna Schwede, 919 541 3255)

The MIMS framework is being specifically designed to facilitate exploratory model building, process science and scenario-based research. The requirements have required substantial “thinking outside the box” on the part of the Argonne framework scientists and system design team. We are making extensive use of “lessons learned” from earlier modeling building experiences while ensuring maximum compatibility with ongoing CMAQ model development and implementation. Primary focus of the first proto-type is air/water exchange. We are following a parallel track with air/vegetation surface exchange research described elsewhere, and will take advantage of its results when they become available. Delivery of the first proto-type is expected in mid-February. (Ellen Cooter, 919 541 1334)

27. *Resuspension of Particles.* Analysis of a set of experiments done on the 1 x 1 square meter cross-section wind tunnel of the Fluid Modeling Facility was completed. The experiments concerned the resuspension of particles that had been deposited on a natural wheat grass stalk. The analysis consisted of developing time series of fluxes of tracer particles (that had been deposited on the grass stalk) using laser-optical particle counting. The experiment was designed to find the resuspension effect of mechanical tapping of the grass stalk and how it compares with resuspension by fluid forces alone. The experiment measured the kinetic energy flux of a grass stalk hitting a stationary object. The experiment also measured the mean wind speed and turbulent intensity of the wind experienced by the grass stalk. (Dale Gillette, 919 541 1883)

28. *Biogenic Emissions Inventory.* A prototype of the third generation of the Biogenic Emissions Inventory System (BEIS3) has been made available to the user community for testing. During January 2002, preliminary tests were performed with BEIS3.10. BEIS3.10 includes a 1-km vegetation database, emission factors for 34 chemical species, and a soil NO algorithm that considers the effect of soil moisture, crop growth, and fertilizer schedule. The preliminary tests suggest that soil NO emissions can be as much as 50% lower than for BEIS2 during hot, dry conditions, while biogenic VOC emissions may be as much as 25% higher than BEIS2 because of the inclusion of methanol to the emission factor database. Quality assurance and sensitivity testing of BEIS3.10 in the CMAQ system will continue during the winter 2002, with the anticipation that BEIS3.10 will be included as part of a summer 2002 CMAQ release. (Tom Pierce, 919 541 1375)

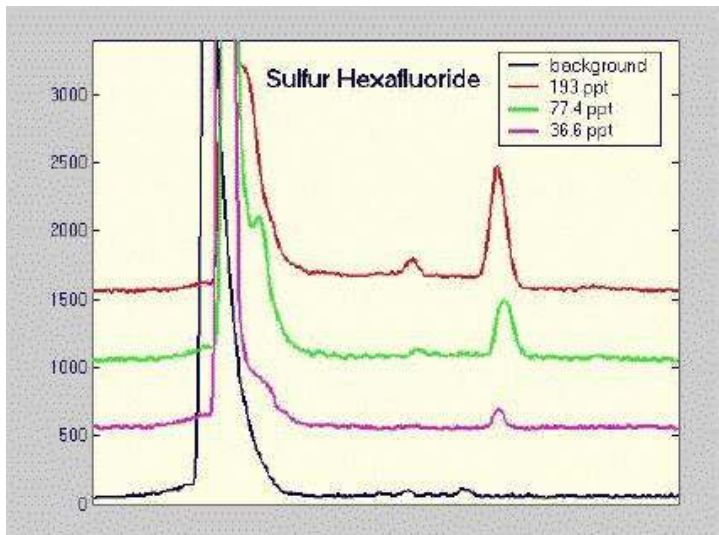
29. *Model Evaluation Team (MET) Meetings.* The January 3 meeting was a round table discussion to address goals for the ASMD Model Evaluation Team. Robin Dennis provided a review of the diagnostic evaluations that have been and will be conducted on the CMAQ model. John Irwin was appointed as the team facilitator to coordinate future team meetings. An ultimate goal is to produce a framework that outlines general principles regarding air quality model evaluations. The team will be in the Applied Modeling Research Branch under Bill Petersen, and will focus on the performance of CMAQ in particular and model evaluation in general. (William Petersen, 919 541 1376 and John Irwin)

30. *NARSTO Quality Systems Science Center.* All measurement data collected as part of the Supersite air quality research program is being permanently archived at the NARSTO Quality Systems Science Center (QSSC) in a standard format, of known quality, and complete metadata associated with each file, greatly enhancing its value to the research community. Much of the data is from unique or state-of-the-art instrumentation requiring extensive coordination between the Supersite data managers and the directors of the NARSTO permanent data archive. The Supersite data management workgroup, chaired by the NARSTO QSSC, has addressed standardization and consensus issues, including validation flagging, file naming conventions, metadata standards, and chemical and non-chemical variable naming. In addition to the Supersite data, data from Texas 2000, Pacific 2001, Pacific NW 2001, 1999 Atlanta, and 1999 Nashville are scheduled to be archived. (Jeffrey West, 919 541 4635)

Idaho Falls

31. *New Tracer Detection Technology for Homeland Security.* Atmospheric tracers are finding increasing use for threat assessment and dispersion model evaluation in urban environments. Real-time sensors are necessary to assess acute exposure predictions. Unfortunately, FRD's older real-time sensors are large and bulky which limits use. Small sensors, which have greater deployment flexibility, are needed. Ion Mobility Spectrometry (IMS) appears to be the solution.

Working with FRD, Dr. David Atkinson of the INEEL conducted a sulfur hexafluoride (SF_6) sensitivity study on a bench-top IMS. Figure 1 shows the instrument's spectra for three concentrations of SF_6 down to 37 parts per trillion (ppt). The peak for the 37 ppt sample is well above the instrument noise. The limit of detection for our current continuous SF_6 analyzers is 20 to 30 ppt. From these results, IMS systems would appear capable of matching the performance of our current continuous analyzers. The use of IMS technology represents a significant step forward in developing technology needed to support required homeland defense research. IMS systems offer several potential advantages over other technologies including lower costs, operation without the compressed gases required by our current analyzers, and the potential for a very small instrument allowing deployment in a wide variety of vehicles and locations. roger.carter@noaa.gov (Debbie Lacroix, Shane Beard)



Whole-air samplers are also being refined. Three new Automated Trace Gas Analysis Systems (ATGAS) have been completely redesigned and rebuilt. A fourth is being assembled. The new ATGAS demonstrates slightly less than one ppt SF_6 detection limit. debbie.lacroix@noaa.gov (Roger Carter, and Shane Beard)

32. CBLAST-Low. Analysis has begun on the CBLAST-Low pilot field study data. The LongEZ research aircraft, flying over the waters south of Martha's Vineyard, acquired a total of 48 profiles of the vertical structure of the marine atmospheric boundary layer (MABL) at various locations offshore. In most cases, the lowest levels of the MABL were very stable. However, the structure of the MABL is anything but simple. For example, on August 8, 2001 in the early morning a pronounced 7 m s^{-1} jet from the west-northwest was found a mere 50 m above the ocean surface. The weather was hazy, very hot, and humid in Martha's Vineyard with very light northwesterly winds observed at the airport ahead of a stalled cold front. The 10-m surface winds were light ($\sim 3 \text{ m s}^{-1}$) from the west. The air temperature profile shows a very strong inversion of 5° C over that vertical distance of 50 m. This is a common feature seen in other LongEZ profiles under very stable conditions – a low-level jet near the top of the strong surface-based inversion. jerry.crescenti@noaa.gov

33. Urban Dispersion. Work continues on our urban homeland security effort. A statement of work is being developed for completion of URBAN 2002 data analysis and to prepare for the upcoming URBAN 2003 project. A reconnaissance trip is being planned for 26-28 February to Oklahoma City to determine sampler locations, etc. The area will also be surveyed for sources of fugitive SF_6 . kirk.clawson@noaa.gov

34. Hurricane Balloon. Presently there is significant resistance within the ranks of NOAA AOC and the 53rd Weather Reconnaissance Squadron (53rd WRS) to fly an unproven platform such as the Hurricane Balloon in an actual hurricane. This is especially true since we are going to be unable to meet or even come close to the 20 meter per second descent rate necessary to ensure that we can bring the balloon down in a hurricane with significant updraft conditions. From test data, it looks as though 3 to 5 meters per second balloon descent rates are about as fast as we can expect due to of the shape of the balloon as it deflates.

Early in January, we had hopes that we could get a very significant decrease in descent rate requirements from AOC and the 53rd WRS that would allow us to fly in a storm with their flights this hurricane season. This was discussed with Phil Kenul at AOC, John Gaynor at NOAA (USWRP), and Frank Marks at NOAA HRD. Frank Marks suggested that we prove the operation, controllability, and research value of the data gathered by the hurricane balloon before we ask AOC and the 53rd to fly in a hurricane with it.

Considering these constraints, the most promising and easiest logistical option discussed (other than the eastern USA) was to launch the balloon from the west coast of southern Mexico. Frank suggested that Dave Raymond could be very valuable in helping us determine the feasibility of getting permission to do this and help us with some of the difficulties we may encounter. randy.johnson@noaa.gov

35. INEEL Support. In late 2001, INEEL requested that FRD perform a multi-year study of diffusion at the site using the MDIFF model. The basic idea is to run a long sequence of consecutive pollutant releases using several years of archived Mesonet data to drive MDIFF. Upon completion, one will have an ensemble of total integrated concentrations (TIC) at each grid (or receptor) point in the model domain. Statistics (*e.g.*, medians, 95th percentiles) can then be generated from the ensembles. INEEL uses these statistics in hazard assessments. Although FRD has operated a Mesonet at INEEL for decades, the current incarnation has been in operation since 1993. Hence, the multi-year diffusion study will be based on data from 1993-2001. January was spent in organizing the archived Mesonet data and in modifying the MDIFF model so that it can generate the TIC ensembles at each grid point. richard.eckman@noaa.gov

Improvements have been made to the MM5 forecast products that are displayed on FRD's web page <http://www.noaa.inel.gov/personnel/Eckman/MM5/>. Hourly forecast time series are now available on this web page for both Idaho Falls and INEEL. Separate time series are provided for the northern and southern ends of INEEL, because it is known from tower measurements that the meteorological conditions at the northern end of the site are often quite different from the southern end. Preliminary evaluations are now underway to determine the skill of the MM5 forecasts using observations from FRD's tower network. richard.eckman@noaa.gov (Neil Hukari)

36. ARMS Review. Representatives from the Interagency Committee on Aviation Policy (ICAP) visited FRD on January 30 and 31 to conduct an Aviation Resource Management Survey (ARMS) and safety review. The focus was on the use of the LongEZ aircraft in ARL research programs. The review was requested by Rear Admiral Evelyn Fields. The review committee will publish their findings within a few weeks. tim.crawford@noaa.gov

37. NAERS Workshop. FRD staff hosted the First International Workshop of the new organization *Network of Airborne Environmental Research Scientists (NAERS)*. This international network of scientists will cooperate in the use of Small Environmental Research Aircraft (SERA), airborne instrumentation, and airborne data to investigate and solve various environmental problems.

The twenty-seven charter member scientists represent the operation of seven different SERAs and two lighter-than-air platforms in seven countries. Within the next few weeks, the NAERS web page and list server will become operational. Considering the high enthusiasm at the first meeting, we expect this organization to rapidly grow.

The NAERS first workshop and membership meeting took place January 28-29, 2002 in Idaho Falls, Idaho. During the two-day workshop, six sessions focused on improving the safety and effectiveness of airborne research efforts and the utility of the resulting science. The agenda with an attendance list can be viewed at <http://www.noaa.inel.gov/docs/workshop.pdf>. The membership proposed that the next meeting take place April, 2003, in Italy. A synopsis of the meeting will be written and submitted to the Bulletin of the American Meteorological Society. tim.crawford@noaa.gov (Jerry Crescenti, and Jeff French)

Las Vegas

38. Local Climatic Change. The prediction of maximum and minimum temperatures for the NTS utilizing the morning radiosonde observations from the Desert Rock Meteorological Observatory (DRA) each day continued in January 2002. Unfortunately 13 days were missing during the month, so the resulting statistics for the predictions are not as well defined as could be hoped. The weather during the middle and later part of the month was quite variable. An unusually cold spell developed at the end of the month which showed up as fairly large errors in the predicted maximum temperatures for those days (near 10⁰F). The statistics for all of the stations for the month gave an average absolute error 5.3⁰F and a bias error of 2.6⁰F. There were a few days where the predictions for the

highest locations on the NTS showed obviously poor predictions for those days. This problem may have to do with intermittent receipt of the radiosonde data and/or errors in the data. To address this issue, SORD will start archiving the radiosonde data. (Doug Soule', 702 295 1266)