



NOAA ARL Monthly Activity Report



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Highlights

1. *Review of Dispersion Forecasting Systems.* Under the aegis of the Office of the Federal Coordinator of Meteorology (OFCM), a Joint Action Group (JAG) for the Selection and Evaluation of Atmospheric Transport and Diffusion Models (SEATD) has been set up. The JAG is assessing available operational transport and diffusion models to make recommendations to the Federal Committee for Meteorological Services and Supporting Research through the Working Group for

Environmental Support to Homeland Security. The JAG completed its review of hypothetical scenarios, and then conducted a comparison of modeling needs versus available operational models during its meeting on May 7-8. The focus was then on documenting the results obtained, and developing a draft for the following meeting on May 30-31. The report of the group will be finalized in early July. Three ARL staff members are involved, from three ARL Divisions.

Silver Spring

2. *Volcanic Ash Workshop.* At the Workshop of Operational Implications of Airborne Volcanic Ash in Anchorage, Alaska, airline representatives emphasized their concern for the thousands of passengers a day that traverse the northern Pacific region with its many active (geologically) volcanoes. The workshop was well-attended by interested parties - pilots, flight dispatchers, air traffic controllers, volcanologists, and satellite experts in addition to meteorologists. A presentation on ARL's volcanic ash dispersion modeling was given. barbara.stunder@noaa.gov

3. *Modeling the Atmospheric Fate and Transport of Air Toxics,* Work has begun on a mercury modeling intercomparison project being organized by the Meteorological Synthesizing Center East of the European EMEP. In this phase of the project, two periods (one in 1995, one in 1999) are being simulated. MM5-generated meteorological data are being obtained courtesy of Russ Bullock and colleagues at ARL in Research Triangle Park. Emissions inventory data and ambient monitoring information have been supplied by MSC-East. Final preparations are underway and model runs will be started soon. mark.cohen@noaa.gov

4. *Ozone Forecasting.* Preparations were made to run the HYSPLIT/CB4 model and produce ozone forecasts using the new ARL LINUX cluster, updated to reflect the last two years of accumulated changes to the graphics programs. roland.draxler@noaa.gov

5. *Special Session at Spring 2002 AGU Meeting.* Dian Seidel and Frank Wentz convened a special session on "Upper Air Temperature Data Products for Climate Studies: Methods, Products, and Challenges," held May 30, 2002 in Washington DC. Talks on satellite, radiosonde, and GPS data products and their interpretation were presented, including several by ARL scientists and collaborators. Details of the session can be found at

<http://agu.org/cgi-bin/sessions?meeting=sm02&part=A42D&maxhits=100>

dian.seidel@noaa.gov

Boulder

6. *SURFRAD/ISIS.* A dialog has been started with the Tom DeFelice at the EROS Data Center near Sioux Falls, South Dakota. In early June, Gary Hodges visited the site to discuss technical matters and site placement. Although there are no funds for this endeavor, there are hopes of establishing a SURFRAD station there. If this project comes to fruition, the new station will fill a hole in the existing national network.

ISIS stations are being visited on a ad hoc basis, i.e., combining visits with other necessary travel. Initial inspection of three of the stations revealed the need for proper ventilators, modems, higher capacity data loggers, and new enclosures. Modems from Campbell Scientific have been purchased and are installed when these visits are made. Another major problem that has been discovered is obstructions around the stations that block views of the sun at various times of year. Particularly, serious obstructions have been found at Hanford and Bismarck. We have also found that the home made ventilators that were used are not adequate for long-term use and must be replaced with Eppley models. Extra Eppley ventilators reserved for SURFRAD are being installed during our visits. Meanwhile, new ventilators to cover all ISIS stations have been ordered from Eppley.

All ISIS data have been processed through May using the new processing software, developed this past winter, that mimics SURFRAD data processing. A web plotting page for ISIS data has also been developed, although it has not yet been linked on the SRRB web page. (John Augustine, 303 497 6415)

7. *UV Precision Spectrometry.* The USDA's U111 UV Precision Spectroradiometer developed by ASRC/SUNY is located at the Table Mountain Test Facility (TMTF), 8 km north of Boulder. This instrument is used for UV research, ground based validation and by the Central UV Calibration Facility for UV calibration of other instruments. This is the CUCF's primary reference instrument. Development of algorithms to process the raw data from the U111 has been in progress. Recent improvements include incorporating yearly wavelength calibration into the data processing. Monthly wavelength calibration is logged, plotted, and compared to the yearly calibration. Wavelength registration scans that occur before each half hour scan have been incorporated into the algorithms to improve the wavelength accuracy from 0.01 nm to 0.005 nm.

Wavelength registration scans across the day indicate a drift that corresponds to temperature. The responsivities for the spectroradiometer are being regenerated to include the improved wavelength corrections. kathy.o.lantz@noaa.gov and patrick.disterhoft@noaa.gov

Oak Ridge

8. *Washington Dispersion Testbed.* The first of several stations being deployed to demonstrate the utility of the planned dispersion testbed in Washington DC are being set up. Arrangements are being made to use a radio telecommunications systems, with the base receiver station on the roof of SSMC-III in Silver Spring. (pendergrass@atdd.noaa.gov)

Research Triangle Park

9. *Models-3/Community Multiscale Air Quality Modeling System.* A Community Modeling and Analysis System (CMAS) center has been set up, providing Models-3 user support by phone and e-mail (particularly on emission preparation issues, including new emissions data and major point-source selection features of the latest version of the SMOKE emission model). A revised script version of CMAQ remains on schedule to be released to the public by the end of June 2002. A beta version was previously provided to Office of Air Quality Planning and Standards (OAQPS), along with emission data for a two-day 1999 tutorial (32-km and 8-km resolutions nests).

The CMAS is crucial to formation of a CMAQ user community for collaboration in model improvements, training, and support. Bill continued to collaborate with CMAS and OAQPS in the planning of a Models-3/CMAQ User's Workshop, scheduled for October 21-23, 2002, in Research Triangle Park, North Carolina. An announcement for the Workshop is available at <http://www.emc.mcnc.org/projects/CMAS/workshop/workshop.htm>. (William Benjey, 919 541 0821)

10. CMAQ Scientific Liaison. An oversight group has been formed to coordinate future changes to Community Multiscale Air Quality model (CMAQ). This group will have equal representation from both NOAA/ASMD and MCNC, consisting of leaders for both science (Jonathon Pleim and Rohit Mathur) and software implementation (Jeff Young and Carlie Coats), as well as executive facilitators (Ken Schere and Bob Imhoff). Shawn Roselle is the liaison between both organizations. Some of the issues to be handled by this group include code optimization (including parallelization) and unification of the modeling systems (CMAQ and MAQSIP). (Shawn J. Roselle, 919 541 7699)

11. CMAQ Mercury Model. Application of the CMAQ mercury model on the European test domain for Phase II of the International Mercury Model Intercomparison was completed. Two test periods were simulated: June 26 to July 7 of 1995 and November 1 to 14 of 1999. In this phase of the intercomparison, simulated air concentrations of elemental mercury gas, reactive gaseous mercury, and particulate mercury are being compared to observations made at four sites in northern and central Europe. Qualitative and statistical comparisons between modeled and observed conditions were begun during this month and will continue into the first week of June, at which time the Meteorological Synthesizing Centre - East in Moscow will require all results from the participating modelers.

NOAA personnel compiled the EPA response to the UN Environment Program draft Global Mercury Assessment document. Russ Bullock served as the coordinator for EPA comments dealing with the transport, transformation, and environmental fate of mercury in air, water and terrestrial media. These comments will be combined with input from other U.S. government agencies at the Department of State, Office of Environmental Policy. A final round of comments on this comprehensive U.S. government review document will occur in June. (Russ Bullock, 919 541 1349)

12. CMAQ Dioxin Research. Dioxins modeling research work updated the prototype CMAQ for dioxins to enable using the base version of CMAQ that will be released in June 2002. Updates were tested on the Cray T3E and IBM/SP computers with identical data sets. The results agreed within three significant figures. Future work will run the updated prototype with other data sets that represent larger domains and longer periods. The goal scopes model behavior under a range of climatic conditions. Particular interests focus on how gas to particle partitioning and deposition velocities behave. Simulations will also investigate such questions as the following: How do model predictions change when dioxins are simulated as homologues versus congeners, and how does the global background affect concentrations and deposition of dioxins? (Bill Hutzell, 919 541 3425)

13. Multimedia Integrated Modeling System. Development continues on the Multimedia Integrated Modeling System (MIMS). The MIMS framework is software infrastructure or environment for constructing, composing, executing, and evaluating cross-media models. Work is conducted in collaboration with the EPA Office of Air Quality Planning and Standards, Argonne National Laboratory, MCNC Environmental Modeling Center, and North Carolina State University.

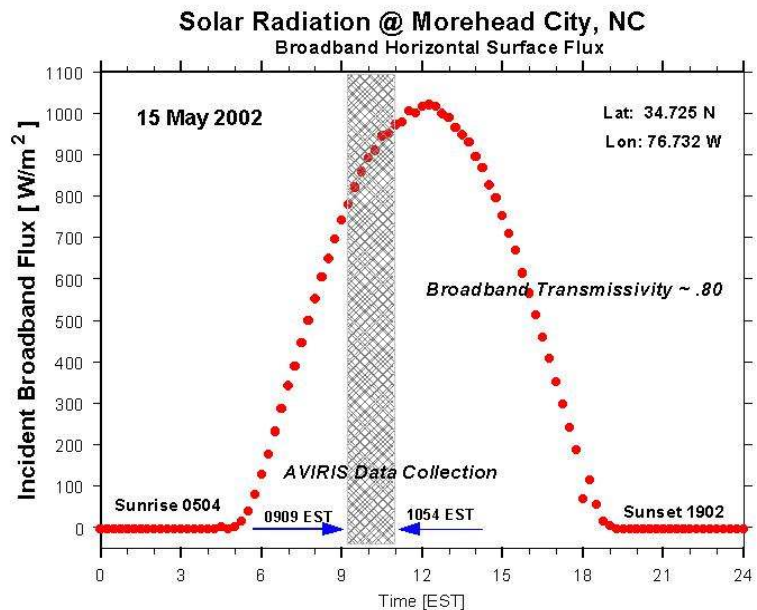
Recently added features will allow more types of modeling applications and provide better support for the latest CMAQ and SMOKE models. Along with the MIMS development, he made modifications to the three compartmental model that allows it to better take advantage of the MIMS capabilities. (Steve Howard, 919 541 3660; Steve Fine. 919 541 0757)

14. MIMS Three Compartment Model Application. Argonne National Laboratory has delivered the first draft of a MIMS three compartment model (3cm) pilot application. This is the first MIMS application that builds, solves, and displays the results of a numerical environmental model rather than simply accessing pre-compiled, self-contained (black box) code. This draft implementation is currently limited to tracing the movement of non-reactive volatile organic chemicals in air, water, and biota (predator and prey) media within a single rectangular area. Download and scenario definition documentation was developed and the entire system tested by in-house scientists. MIMS framework and draft 3cm application files are being shared with an external compartmental modeling expert for additional technical system review prior to further pilot development. Issues that remain to be fully tested or resolved include execution speed (presently too slow), the ability to easily add or redefine fate and transport processes, expansion of the existing system of equations to include new or redefined environmental media, and use of the MIMS framework sensitivity analysis capabilities. (Ellen Cooter, 919 541 1334, or Steven Fine 919 541 0757)

15. Wind Tunnel Modeling. The World Trade Center wind-tunnel project continues to progress on schedule. About 25% of scale model buildings have been constructed with model installation in the meteorological wind tunnel expected in mid-August. Flow and concentration measurements should begin in early Fall. The new Laser Doppler Velocimeter (providing remote measurements of flow and turbulence through optical windows in the tunnel floor) was successfully inaugurated. A preliminary study was conducted within narrow, two-dimensional model street canyons to determine the critical Reynolds Number needed to insure turbulent flow. Using the street canyon width as the appropriate length scale, the critical Reynolds number (above which similarity of turbulence in the model and atmosphere can be assumed) was found to be between 4000 and 5000. In our proposed study of Lower Manhattan, the lowest Re will exceed 10,000 (well above the critical value). (Steve Perry, 919 541 1896, and Roger Thompson, 919 541 1895)

16. Airborne Visible and InfraRed Imaging Spectrometer. The AVIRIS (Airborn Visible and InfraRed Imaging Spectrometer) was flown over the Pamlico Sound in North Carolina on May 15, 2002. In a coordinated effort involving EPA, NASA, NOAA, the University of North Carolina, the University of Maryland, and Duke University, data were collected to characterize the spacial variation of chlorophyll, suspended sediment, and various nutrients across the Pamlico Sound using both hyperspectral remote sensing from 20km ASL, low altitude SeaWiFS simulator imagery, submerged radiometry, and chemical/biological analysis of water samples. These data will also

serve to validate and/or develop algorithms for quantification of aerosol optical depth over type II (turbid coastal) waters from remote imagery, with ground truth measurement determined from Langley analysis of the total and diffuse irradiance throughout the day using a UV MultiFilter Rotating Shadowband Radiometer. At the request of EPA, NASA offered the services of the ER-2 flight mission team to fly the Pamlico Sound and Lower Neuse River Basin during a window from May 10 to June 5, 2002. The weather dictated the selection of the day. The entire experiment team was kept apprised of the likelihood of good weather conditions by daily email of the forecast for the coming four days. Prior consultation with all team members indicated that ideal conditions would consist of clear skies, winds < 10 - 15 knots (depending on direction) so as to preclude induction of white caps, and no recent history of high wind conditions that may have resuspended significant sediment. A variety of forecast models were consulted (RUC, ETA, MRF). On the afternoon of May 14, with all conditions at or within specifications, a preliminary GO was issued, followed by a confirmation at 0630 the next morning. The sky was exceptionally clear (see the diagram). By all preliminary accounts the effort was a success. (John Streicher, 919 541 3521)



17. Mobile-Modal Model. ASMD is working with the Air Pollution, Prevention and Control Division of the EPA National Risk Management Laboratory on an implementation plan for the Mobile-Modal Model (MMM), a precursor of the Multiscale Motor Vehicle and Equipment Emission System (MOVES) model, which is expected from the EPA Office of Transportation and Air Quality in four to five years. The general plan is to implement and test the Mobile-Modal model during FY 2003. However, MOVES will supercede MMM and is expected to be implemented for operation with SMOKE by FY 2006. Consequently, the degree to which it is advisable to expend resources to install MMM in SMOKE will depend on whether the prototype installation can be beneficial to installation of MOVES. The details of how this will be done will be in the implementation plan, now being drafted, which is due at the end of FY 2002. (William Benjey, 919 541 0821)

18. Fire Smoke Plume Modeling. The development of a prototype stand-alone emissions processor that will introduce smoke from fires (prescribed and wildfires) into the Models-3/CMAQ modeling system based on state-of science algorithms developed by the U.S. Forest Service has begun. A demonstration of the prototype is scheduled for later this summer. Bi-monthly conference calls ensure the full implementation and testing of the processor that will be incorporated into the generalized SMOKE (Sparse Matrix Operator Kernel Emissions) processor. This effort is being performed by CIRA (Cooperative Institute for Research in the Atmosphere) and administered by the U.S. Park Service with funding from the U.S. EPA and U.S. Forest Service. Plans are underway

to establish the requirements and sources for the activity databases and the emissions model will be optimized for both regional as well as national assessments. (Jason Ching, 919 541 4801)

19. Fugitive Dust Modeling. Work has begun on developing algorithms for modeling windblown and fugitive dust (from on, off roads) from industrial and agricultural tillage practices. The issue of sub-grid land-use categories that can yield dust is being addressed. Also, a methodology to calculate wind speed representative of these sub-grid land-use areas is being investigated to provide the wind values used to determine if the criteria for dust production threshold has been reached. When completed, this effort will be implemented as an emissions processor for the Models-3/CMAQ system. The development of the stand-alone prototype version is now underway, with initial testing to be conducted this summer. Full implementation of these algorithms into Models-3/CMAQ follows, and is not expected until late FY-2003. (Jason Ching, 919 541 4801)

20. Neighborhood Scale Modeling. A prototype air quality simulation model at neighborhood scales is being implemented for Philadelphia Metropolitan Area. Specifications for the science modules and model inputs for the set of nested model runs of the CMAQ were established. Model simulations to be performed this summer will form the basis for a preliminary report on the study. The MM5, CMAQ's meteorological processor, was modified and run to incorporate a set of detailed UCPs for more accurate simulations of the flow and dispersion fields in urban areas. The advances include modification of the governing equations for momentum, turbulent kinetic energy, heat, and moisture in a variety of urban land use categories for fine-scale grid resolutions. Additionally, two Request for Proposals were issued to obtain gridded data on building and tree canopies, and to process and produce the UCP for the Houston, Texas, area, the venue of the next major modeling study using Models-3/CMAQ modeling system. The overall effort will develop the air pathway linkage to human exposure models. (Jason Ching 919 541 4801)

21. Task Force on Online Library. The Air & Waste Management Association has formed a task force to research an online library for the association. Evelyn Poole-Kober participated on the task force and contributed information on copyright and intellectual property issues; costs of electronic journals available from other publishers and associations; costs to small research libraries versus large academic one; site licenses agreements; and archival plans. The task force completed the draft report in May to be presented at the June 2002 annual AWMA meeting in Baltimore, Maryland. (Evelyn Poole-Kober 919 541 4536)

Idaho Falls

22. Extreme Turbulence Probe. A series of tests of the ET probe were performed in May by mounting the probe on the back of a pickup truck and driving at highway speeds. A large number of data dropouts were observed with the system, and they showed a peculiar pattern. The probe consists of separate hemispheres with their own sensors, A/D boards, etc. When the center of a hemisphere is facing into the wind, few data dropouts occur while the pickup is moving below about 17 m/s, but they become common above that speed. When the seam between the hemispheres is facing into the wind, the opposite result is observed, with the dropouts mainly occurring below about 17 m/s. There are several possible explanations for the dropouts, including calibration errors and software problems, and these are being investigated. richard.eckman@noaa.gov, Tom Strong, Roger Carter

23. Hurricane Balloon. May 5 to May 9, 2002 a visit was made to Mexico to seek permission and make arrangements for launching balloons from the west coast of Mexico. On Monday morning a meeting was held with Dr. Michael Rosengaus, the director of the Servicio Meteorologico National (SMN). He is very interested in hurricane research and the hurricane balloon project. In addition to his interest in this project, he committed an English speaking employee (Mr. Armando Rodriguez) to provide a tour of the selected balloon launch facility in Acapulco later in the week. During our meeting with Dr. Rosengaus, a presentation was made showing the operation and goals of the hurricane balloon. Following this presentation, Dr. Rosengaus provided a very informative presentation about hurricanes off the west coast of Mexico (in the eastern Pacific). A visit was made to a launch site at the Acapulco Airport (about a five minute walk from the airport terminal). The inflation shelter has plenty of room inside and has 12-foot wide doors. The launch site looks like it will work well for balloon preparation and launch. It appears that there may be some interference from some nearby towers but only under certain wind conditions. Should these wind conditions arise at launch time, there is a path over a fence and toward the runway that should provide a good open area for balloon launches. randy.johnson@noaa.gov

24. URBAN 2000/VTMX. The NOAA Tech. Memo on meteorological data collected during URBAN 2000 received final approval for publication and went to press this month. A presentation on the mobile real-time SF₆ analyzers was presented at the 4th Symposium on the Urban Environment, sponsored by the American Meteorological Society. Side meetings with URBAN 2000 players and future OKC 2003 players were also held during the meetings. A program plan will be forthcoming in the next month. kirk.clawson@noaa.gov

25. Emergency Operations Center (EOC). Jerry Crescenti and Brad Reese represented FRD during an EOC exercise on May 16, 2002. The drill scenario involved a partial meltdown of a nuclear reactor at the Test Reactor Area (TRA) facility due to a power outage. A special “canned” meteorological data set was prepared by Roger Carter and Neil Hukari for the drill. The simulated data was based on a typical summer day which experiences light northeasterly drainage winds down the Snake River Plain in the morning with a reversal to moderate southwesterly winds in the afternoon. As a result, plume projections from the simulated meltdown presented a challenge to EOC personnel. jerry.crescenti@noaa.gov, Brad Reese, Roger Carter, and Neil Hukari

Support appears to be increasing for a major upgrade of the dispersion modeling system that supports INEEL. The current system, based on the MDIFF model, has been in place for many years and in many respects is obsolescent. The State of Idaho and some INEEL personnel have been asking for specific upgrades related to the computation of radiological doses, but no funding has been available to make the upgrades. Likewise, FRD staff is interested in making upgrades to many of the meteorological algorithms. There now appears to be some interest from DOE in making such upgrades. It is not clear at this time whether the upgrades would entail a wholesale replacement of the existing system or just modifications to the existing system. richard.eckman@noaa.gov, Kirk Clawson

26. Purdue's New Research Aircraft. Dr. Crawford met with Purdue University staff to advise them on the instrumentation of their new Small Environmental Research Aircraft. Dr. Paul Shepson leads this exciting new effort which will focus on the flux measurement of difficult chemical species. This airborne research effort will be the first to use of disjunct eddy accumulation combined with modern miniature chemical sensors such as ion cylindrical trap mass spectrometers on a small aircraft. We are very excited about the application of this miniature technology on small

aircraft and its potential to reduce cost while revolutionizing airborne atmospheric chemistry research.

Another first will be the use of real-time winds to drive the disjunct eddy-accumulation system on a small aircraft. One of our Best Aircraft Turbulence (BAT) probes with software, sensors and A/D system was delivered at the meeting. Detailed discussion followed relating to correct installation and operation. We are very pleased the effort is enthusiastically supported by Purdue's Aviation Technology Department. Instead of the usual compromise of a pressure radome, a BAT probe will be mounted out from of the aircraft on a boom to mitigate flow distortion. tim.crawford@noaa.gov

Las Vegas

27. Mesoscale Modeling. May was one of our best months. NV-RAMS ran to completion on the University of Nevada-Las Vegas computer system 29 of 31 days (97%) in May. The two failures this month were due to the lack in the acquiring of the ETA initialization file. One of the 29 completed days stopped at 24 hours, but graphics were generated. Data are continuing to be renamed and saved daily, and backed up to CD monthly for May (3 CDs). (Walt Schalk, 702 295 1262)

28. Computer Systems. SORD's computer systems are undergoing updates and replacements. Two new Sun workstations were purchased. These will be used as a new Web Server and a replacement system for SORD's aging Sun Server. Both systems have been checked out and software installed on them. Testing and installation will be completed in June. Several new PC's are being purchased for NTS support, emergency response, and replacing existing PC's. These PC's include three notebook computers and several desktop computers. (Doug Soule, 702 295 1266, Jim Sanders, 702 295 2348, and Rick Holmes, 702 295 1252)