NOAA ARL Monthly Activity Report

January 2003

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Contents

Highlights

1. AMS Climate Variations Committee. Dian Seidel will chair the American Meteorological Society's Climate Variations Committee for the 2003-2006 period. The committee is responsible for planning conferences and symposia, preparing AMS Statements, providing advice to the AMS Council, and advancing the interests of the discipline in climate-related matters. dian.seidel@noaa.gov

2. ARL Studies of Atmospheric Mercury Show Considerable Advance. Several ARL groups are working on aspects of pollution by mercury. The geographical range of the studies is from Alaska to Florida.

Methylmercury Interagency Workgroup (MeHg IWG). ARL is participating in the Methylmercury Interagency Workgroup (MeHg IWG), convened by the Office of Science and Technology Policy (OSTP). The group met on January 30th to review its collection of information from the various agencies about their recent or ongoing research related to mercury contamination in the Gulf of Mexico. Once all pertinent activities have been accounted for, a plan for coordination will be developed and reported to OSTP. (Russ Bullock, 919 541 1349)

Mercury in the Arctic. Even in winter, the coastal tundra at Barrow, AK appears to emit gaseous elemental mercury (GEM) to the atmosphere. Mercury is annually deposited to the snowpack in spring before snowmelt. Snow melt produces the strongest return to the atmosphere, but much deposited mercury remains in the meltwater to be emitted slowly through the summer. Three months of flux measurement by the gradient method this winter show the process continuing despite arctic night and new snow. The nearly continuous flux averaged 0.65 $ng(Hg)m^{-2}hr^{-1}$, two orders of magnitude below the peak emission at snow melt, but significant over the long term. We were quite pleased that this average flux agreed very well with the value of 0.82 $ng(Hg)m^{-2}hr^{-1}$ found in chamber measurements on the snowpack in January 2002. brooks@atdd.noaa.gov

Mercury and the Community Multiscale Air Quality Models System. Analysis of the non-linear sensitivity tests of the Community Multiscale Air Quality (CMAQ) mercury model continued, but thus far, the results have been more confusing than enlightening. For reasons that are not yet clear, average air concentrations and accumulated wet depositions during the 2-week test period are rather chaotic in the vicinity of the test cells. When individual sources are simulated separately, and their effects are added to those from all other source in the model to arrive at the total solution, the results show somewhat greater deposition around the source cell, as expected, but not in the actual source cell itself. It appears that the sequence used to calculate the various modeled processes (*i.e.*, advection, chemistry, deposition) may have something to do with this unexpected result in the source cells. What is clear, is that there are definitely observable effects related to the non-linear chemistry and deposition of mercury. (Russ Bullock, 919 541 1349)

International Mercury Model Intercomparison. A draft report on the second phase of the International Mercury Model Intercomparison Study was completed and sent to the participating model developers for final mark-up. The results show rather poor correspondence between observed and modeled air concentrations of all species of mercury. It is apparent that estimates of the rate of emission of the various species of mercury from land and water surfaces, including re-emission of past deposition, are not realistic. The more complex models, like the Community Multiscale Air Quality (CMAQ) model, which more finely resolve the vertical and horizontal structures of the atmosphere, performed best. But, even those models showed considerable difference from observed concentrations of reactive gaseous mercury and aerosol mercury. (Russ Bullock, 919 541 1349)

Silver Spring

3. Meteorological Data Conversions for HYSPLIT. The generic decoder used to convert latitude-longitude meteorological data files to ARL format (HYSPLIT compatible) was further generalized to permit the specification of sub-grids. This change was prompted by the need to create higher resolution global archive

data, now that the NCEP global model is being run at a resolution that supports 0.5 degree output fields. The sub-grid option permits regional archives at manageable data volumes. The routine NCEP extraction program obtains the sigma-level data from the spectral coefficients and interpolates the results to pressure surfaces for public distribution. Routine access to the sigma-level data on a regular latitude-longitude grid was not previously available. We are now able to extract the primary fields from the global model on the sigma surfaces and convert those binary data files, to the standard ARL format on the same horizontal grid as the pressure level data. roland.draxler@noaa.gov, barbara.stunder@noaa.gov

As a backup to the NCEP forecasts, AFWA MM5 simulations are now available for the CONUS at 15 and 45 km resolution. These data are interpolated to the AWIPS-212 grid so that they are identical to the NCEP ETA forecast fields. A request by another AF agency to be able to use the AFWA 5 km MM5 output for HYSPLIT simulations prompted a review of the AFWA 15/45 km decoders; the 5 km relocatable model results can now be used.

To dispel the common impression that higher resolution is always better for dispersion calculations, it should be noted that the HYSPLIT ozone forecasts for the summer of 2002 using hourly 36 km MM5 fields had several features that were initially attributed to flaws or disadvantages of the particle advection scheme – in particular, high ozone concentrations at night due to the accumulation of particles in convergence zones. The HYSPLIT advection scheme was extensively tested and the higher order schemes (for instance the 4th order Runge-Kutta) produced almost identical results as the standard 2nd order predictor-corrector (which in turn was very similar to the simple predictor with the gradient terms included). However, applying a simple low-pass filter to the meteorological data, produced the most significant change in the predictions – all in the right direction. roland.draxler@noaa.gov

4. READY Updates. Corrections have been made to NOAA NWS text products and several new products have been added to the State Weather Page of READY (http://www.arl.noaa.gov/ready/states.html) This page was designed to provide quick access to NOAA NWS state and local weather forecasts and observations for emergency response applications. glenn.rolph@noaa.gov

NOAA NCEP/NCAR Reanalysis Data: NOAA NCEP/NCAR gridded reanalysis data (available from the Climate Diagnostic Center (CDC)) have been updated through the end of 2002. These data can be used by the HYSPLIT model in READY for the period 1948-2002. glenn.rolph@noaa.gov, Roland Draxler

5. AVN Short-Range Model renamed GFS in READY. The AVN Short Range Model was renamed the GFS (Global Forecast System) model in READY to be consistent with changes NOAA NCEP plans for early this year. This GFS dataset has a temporal resolution of 3 hours, a horizontal resolution of 1 degree, and a forecast out to 84 hours. In addition, a new GFS dataset was added to READY in January that has a temporal resolution of 6 hours, a horizontal resolution of 1 degree, and a forecast out to 180 hours. Shortly we will be adding a third GFS dataset that has a temporal resolution of 12 hours, a horizontal resolution of 2.5 degrees, and a forecast from hours 192-384. Unfortunately 12 hourly, 2.5 degree grid files are not available at this time from NOAA NCEP for hours 0 to 180, and creating a lookalike set from the 1 degree grid is very difficult. Therefore, we are not able to have one complete file from hours 0 to 384 for use in READY at this time. Eventually these three datasets will replace all the AVN and MRF datasets on READY. glenn.rolph@noaa.gov

6. READY/HYSPLIT registration. Since 24 September 2001, NOAA ARL has been requiring all users except those with **.noaa.gov** computer domains to register before being permitted to run the HYSPLIT transport and dispersion model on the NOAA ARL READY (http://www.arl.noaa.gov/ready.html) website. At the end of January 2003 over 1320 users have been registered. glenn.rolph@noaa.gov

7. Extreme warming of the Antarctic stratosphere in 2002. The most surprising feature of the last year of data from the ARL 63-station radiosonde array was the exceptional warmth of the Antarctic low stratosphere during the austral spring, with values about 10K above the 1961-90 average. This is the warmest spring of the 45-year record, and as in the case of the second warmest spring of 1988, is associated with a near disappearance of the Antarctic ozone hole. Meetings are planned dealing with the reasons for, and ramifications of, this unexpected warming of the Antarctic low stratosphere. (Jim Angell, 301 713 0295, x127)

Boulder

8. SURFRAD/ISIS. The monthly averaging code for SURFRAD was improved to automatically set a monthly average to missing if it is found that less than 80% of the possible values of a particular parameter are available. The 2003 monthly averages for SURFRAD were recomputed, and now shown on the SRRB web site.

Calibrations of the SURFRAD standard instruments used at Table Mountain that are usually carried out over the winter months (PARs and PIRs) have been completed. The standard PARs, as well as those that were retrieved from the field in 2002, were sent to the factory for calibration. The three SURFRAD standard pyrgeometers were sent to the World Radiation Centre in Davos, Switzerland to be calibrated by their black body calibration device. If time permits, the standard PIRS will be sent to NREL to be calibrated using the new Eppley-built black body at NREL. Given that little difference is found between the two calibrations, NREL will be used in the future as the primary source of SURFRAD standard pyrgeometer calibrations. (John Augustine, 303 497 6415)

SURFRAD data through Oct 2002 and ARM data through June 2002 have been submitted to the Baseline Surface Radiation Network archives (BSRN).

ARM data submissions will always lag SURFRAD submissions by several months due to the delay in getting data files from the ARM Tropical Western Pacific sites. Currently there are thirty-six sites represented in the BSRN archive. Six of those sites are SURFRAD and four are ARM, and together they account for more than 25% of the total stations. When considering the data submitted, SURFRAD and ARM together account for 35% of the available data files. Information about BSRN and the data available through the archive can be found at <http://bsrn.ethz.ch/>. (Gary Hodges, 303 497 6460)

9. Ultraviolet radiation – CUCF. Patrick Disterhoft of the Central UV Calibration Facility (CUCF) has been nominated to the Council of Optical Radiation Measurement's (CORM) board of directors. The board position is for three years. CORM's membership has more than 240 active members, with 14% of the membership being international. The membership consists of people from industry and government concerned with pressing problems and national needs in optical radiation measurements and to advise NIST of these needs through periodic reports.

The CUCF has developed and operates an Angular Response Measurement System that measures the 2-pi cosine response of broadband and narrow-band radiometers. Recently, a component failure in the data acquisition system used to measure the cosine response of multi channel instruments prompted a change from Simultaneous Sample & Hold (SSH) to a channel by channel scan. The SSH approach was originally adopted due to concerns about data skew, arising mainly from source variability and degradation, that sequential scanning of the channels might produce. Experience showed that the source stability was much better than the manufacturer advertised, so when the SSH system failed it was decided to try sequential scanning. (Of course the primary decision driver was the equipment and software available on hand.)

Initial results obtained by scanning the channels provided results in agreement with previous cosine response measurements, but had unacceptable levels of uncertainty. Sampling rate, sample size and number of data runs were adjusted until the uncertainty was reduced to acceptable levels. (Note: Uncertainty is mainly driven by

sample size and sampling rate. Multiple data runs are needed to eliminate data corrupted by momentary fluctuations in source intensity.) While the results are acceptable, the uncertainty in measurement obtained by scanning are –on average- 25% to 50% larger than those obtained using the sample & hold approach. Scanning does have the advantage of using readily available equipment. The CUCF will return to the SSH method of data acquisition once equipment is available. (Patrick Disterhoft, 303 497 6355; Charley Wilson, 303 497 7314)

Letters of agreement between the EPA and ARL regarding the EPA's funding of the Central UV Calibration Facility were signed in early January. (John Augustine, 303 497 6415)

Oak Ridge

10. Terrestrial Carbon Program. Data collection at the Walker Branch Site has been very consistent this period. There were no equipment outages or power losses at the site. Progress continues on the logistics for the new CHESS site, necessitated by developments at Oak Ridge National Laboratory. The Division is awaiting shipment of the UpRight tower. The requests for purchase have been sent out for the installation of the guy wire anchors, the support building, and the installation of the deep-earth ground. Assistance from EASC has been requested to help expedite the awarding of the contract for the building. Accumulation of hardware and equipment for installation of the tower and base continues. meyers@atdd.noaa.gov

11. Gravity waves and turbulence. Work continues on an investigation of the correlations between turbulence in the surface layer and atmospheric gravity waves, with a focus on data from the Salt Lake City urban dispersion study (VTMX). Figure 1 shows a graph of TKE and pressure for the period 09:00 to 10:30 UTC on 18 October 2000. Perturbations of various amplitudes and durations are seen in both variables throughout the period; however, between 09:40 and 10:00 the perturbations in TKE appear periodic with almost equal amplitudes. These data were then band-passed filtered admitting perturbations with periods between 3 to 5 minutes. These filtered signals are plotted in Fig. 2. It is clear that a positive correlation between pressure and TKE perturbations exists. The phase differences between the signals are most likely due to timing differences between the data loggers rather than physical processes.

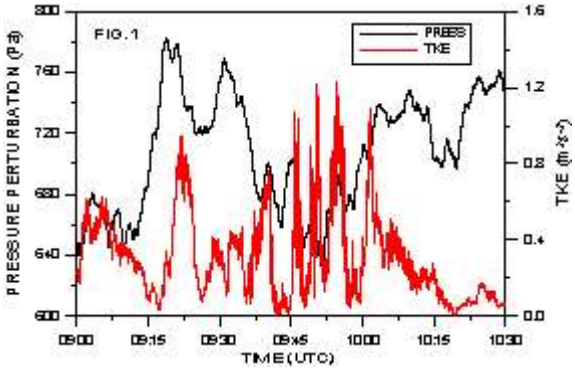

Figure 1

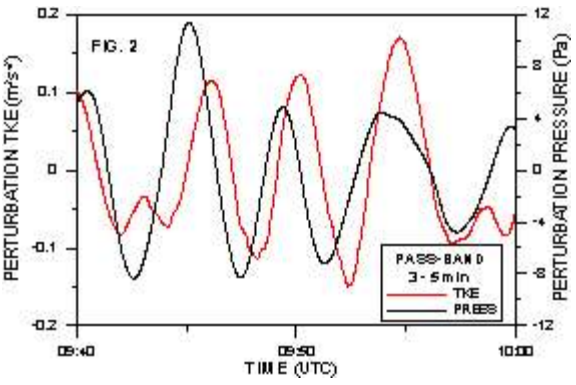

Figure 2

This is a work in progress, and many questions remain to be addressed. Chief among these is the independence of the perturbation. If the pressure perturbations are due to propagating gravity waves, then the analysis is of value. However, if the pressure perturbations are forced by the turbulence, then we are just looking at two views of the same thing. But this raises the question on the source of the TKE perturbations, etc. Any and all comments and suggestions are welcome. nappo@atdd.noaa.gov

12. Atmospheric Dispersion System (NADS). A GIS-based demonstration system running the HYSPLIT dispersion model was delivered to ARL/Silver Spring in January. Two computers comprise the system. One collects surface data and model forecasts. The model is NCEP's ETA model at 40-km grid spacing. The second uses this information to run HYSPLIT, to render the GIS output, and to provide the user interface. pndergrass@atdd.noaa.gov, Dumas

13. Canaan Valley. Plans for upcoming studies in the Canaan Valley area and for analysis of data from Summer 2002 were advanced in coordination meetings. Two water-quality stations are to be installed on the Canaan Valley Institute's land. They will monitor the relation between water-quality measurements and atmospheric-deposition assessments. The data from Summer 2002 were obtained during an intensive field study of dry deposition of pollutants to the Canaan Valley. Deposition rates are being quantified for particulate and gaseous species suspected of being harmful to the area's ecological health. vogel@atdd.noaa.gov, Meyers

14. Coupled Dynamical/Photochemical Modeling. A final report, coauthored with collaborators from the University of Alabama in Huntsville (UAH), was prepared and submitted to the Texas Commission on Environmental Quality (TCEQ; formerly TNRCC). The report describes research conducted over the last year on using the coupled LESchem model to simulate the potential for formation of pockets of high ozone concentrations downwind of a petrochemical point source. herwehe@atdd.noaa.gov

15. U.S. Climate Reference Network. A Science Review meeting was held on January 22 - 23 at NCDC in Asheville, NC. A presentation on science research questions presently being investigated by ATDD was provided by Tilden Meyers. hosker@atdd.noaa.gov, Meyers

Two USCRN sites were installed in Lafayette, LA and Monroe, LA in early January. Discussion was begun with personnel at the NASA National Scientific Balloon Facility (NSBF) in Palestine, TX concerning the installation of a USCRN site. NCDC contacted ATDD concerning a high rate of missing data from USCRN sites transmitting to GOES West. A preliminary analysis shows a common problem occurred on all sites during a period in late January. Analysis of communication issues is continuing. hall@atdd.noaa.gov, Black, French, Hosker, Meyers, Brewer, Randolph, Bryant, Lew, Ridenour

Research Triangle Park

16. Community Multiscale Air Quality Model. Sea salt dynamics are being incorporated into the Community Multiscale Air Quality (CMAQ) model aerosol module. The procedure entails including wind profile and roughness length information from the Meteorology-Chemistry Interface Processor, constructing a mask for land-use information to denote the presence or absence of salt water in a particular grid cell, calculating sea salt emissions using the generation function of Smith and Harrison (1998), and distributing sea salt particles into the bins of the sectional model. A similar procedure will be used for the modal aerosol module within CMAQ, although the lognormal sea salt emissions distribution will dovetail with existing aerosol modes, omitting the need to partition the sea salt emissions into sections. (Michelle Mebust, 919 541 0833)

Several CMAQ model simulations were made to test different model configurations and input data sets for a winter time period. These tests are being conducted to perform a preliminary analysis to help address the issue of nitrate over-prediction. The continental United States was modeled for the period of January 4-15, 2002, the first part of a planned 6-week simulation period. The simulations included tests of (1) updates to the dry deposition modeling, (2) updates to the heterogeneous N_2O_5 reaction, and (3) the possible impacts of using simple ice in MM5 for explicit clouds instead of a mixed-phase scheme. Revisions to the dry deposition algorithm led to a 15-25 percent reduction in aerosol nitrate concentrations. As a bounds check on the heterogeneous N_2O_5 reaction, the reaction probability was set to a lower limit (0.01), which led to a 10-30 percent reduction in aerosol nitrate. The resolved cloud water treatment also had a significant impact on aerosol nitrate in areas associated with precipitation. These results reveal CMAQ's sensitivity to dynamical factors and are consistent with our understanding of atmospheric processes. (Shawn J. Roselle, 919 541 7699)

Two major CMAQ evaluation exercises were completed, using special 1999 data for SOS/Nashville and SOS/Atlanta. Both were in-depth examination of CMAQ, the first for fine particulate matter and the second for ozone. The Atlanta 1999 study was the first in the eastern United States to provide simultaneous, real-time

PM_{fine} composition data forming the basis of the in-depth PM_{fine} analysis. Extensive gas-phase measurements in the Nashville 1999 study provide necessary variables for ozone diagnostic metrics.

Results of the CMAQ PM_{fine} evaluation showed that CMAQ performed well for particulate sulfate at the diurnal and synoptic time scales, as it has in earlier evaluations. CMAQ tracks the day-to-day synoptic variation in the primary species reasonably well. CMAQ performs best (little bias) during the daytime hours for key species of nitric acid (HNO_3), total ammonia ($=NH_3 + NH_4$), and total carbon (principally organic carbon) when turbulent and cloud mixing throughout the mixed layer is quite extensive. There is a significant daytime under-prediction for particulate nitrate. CMAQ is biased very high at night for most gas and particulate species, except for sulfate. Most, and in some cases all, of the bias in the 24-hour CMAQ predictions stem from its nighttime bias. There is a significant nighttime over-prediction for particulate nitrate. A major source of the nighttime bias is attributable to the premature collapse of the evening mixed- layer. A key insight from this evaluation is that errors in the meteorological inputs to CMAQ exert a major influence on CMAQ's prediction of PM_{fine} concentrations.

Implications regarding PM_{fine} measurements reveal the major insights into the functioning of CMAQ came solely from the hourly data, with little interpretive value coming from the 24-hour data. It will be difficult to accurately assess the performance of any model and judge its reliability for regulatory use solely based on comparisons against 24-hour and longer-term averages. Measuring ammonia is critical, yet difficult. Measurement of hourly NH_3 needs more attention and support.

Results of the CMAQ ozone evaluation showed that CMAQ's performance on the diagnostic tests of photochemical dynamics in the Nashville, Tennessee, 1999 SOS evaluation domain is very good overall. This evaluation included three process-level tests previously developed and used in the 1995 diagnostic evaluation of the model, and new tests made possible here for the first time by additional measurements of key species such as HCHO, HO_2H, and HNO_3. The three process-level tests examined air mass aging, photochemical O_3 production efficiency, and relative time spent in radical-limited and NO_X-limited regimes. The model's performance in the aggregate is shown to be quite good for this moderate-sized city. Predicted O_3 with the newer chemistry tends to cluster with the higher observed O_3 values at any given age range, yet the photochemical production efficiency agreement is excellent. CMAQ simulations were examined at 8-km and 2-km grid cell resolutions. The diagnostic comparisons suggest that the 2-km resolution produces slightly better photochemical processing fidelity and somewhat better O_3 predictions at the Nashville sites. (Robin Dennis, 919 541 2870)

Work has continued on speeding up the CMAQ model for both air quality forecasting and public release versions. Some progress has been made with the parallel processing architecture, which splits off an input/output processor to work independently of the rest of the chemistry-transport kernal processors. Additionally, reordering some of the main data structures to achieve data locality has improved CMAQ's performance by about 20 percent. (Jeff Young, 919 541 3929)

17. Community Multiscale Air Quality Model Plume-in-Grid (PinG) Modeling. Test simulations of the recently-installed PinG gas/aerosol module contained in the Community Multiscale Air Quality (CMAQ) Chemical Transport Model (CTM) has progressed. Successful model simulations were performed on a single processor Sun Unix workstation. Additionally, model simulations with the same CTM/PinG code and test case data set have been performed on a multi-processor Cray mainframe computer to ensure that the PinG algorithm can be exercised in a parallel processing mode. Model results from these systems were in agreement. Model runs on an IBM multi-processor system and on a Linux-based computer are planned. The updated PinG concentration output file contains both gaseous and aerosol species, and an additional plume visibility output file is also generated. Results of analyses of plume aerosol species concentrations from the CTM/PinG simulations are being prepared for an upcoming conference. (James Godowitch, 919 541 4802)

18. Air Toxics Modeling. The Community Multiscale Air Quality (CMAQ) model is being modified to differentiate between the amounts of formaldehyde and acetaldehyde from primary emissions and secondary production. Both the SAPRC99 and CB-IV mechanisms for atmospheric chemistry are being used in this work. Each mechanism will contain two new species based on the air emissions of formaldehyde and acetaldehyde. Each undergoes the same loss and transport processes as formaldehyde and acetaldehyde, but does not have any sources from chemical reactions. If the work is successful, the resultant model will support the National Air Toxics Assessment. (William T. Hutzell, 919 541 3425)

19. Dioxin Modeling. Further simulations are attempting to determine how important gas to particulate partitioning is in simulating the deposition and ambient air concentrations of dioxins and furans. Current simulations set ratios of emitted particulate to gas dioxin and furans to constant values. Previous simulations either neglected to include partitioning or used a partitioning algorithm outlined in Cooter and Hutzell (2002). Each set of simulations is being compared with observed air concentrations from a national monitoring network. (William T. Hutzell, 919 541 3425)

20. Community Modeling and Analysis System Center. The next CMAS-sponsored Models-3 Users Workshop is scheduled for October 27-29, 2003, at the Environmental Protection Agency, Research Triangle Park, North Carolina. CMAS has scheduled training for users of CMAQ and the SMOKE emission model during April 2003 and during the week of the Workshop. On January 28, 2003, Bob Imhoff and Zac Adelman of CMAS presented the concepts for a specialized on-line air quality modeling data clearinghouse at CMAS. Bill met with CMAS and the University of North Carolina at Chapel Hill, Carolina Environmental Programs (CEP) staff on the transition of CMAS from its current location at MCNC to CEP. (Bill Benjey, 919 541 0821)

21. Fugitive Dust Modeling. A blowing dust emission model is being developed, to yield hourly dust emission estimates in conjunction with SMOKE. Dust emissions are difficult to simulate and can play a significant regional role in air quality simulations. The prototype is now being tested with examples from July 1999 and April 2001. The most recent additions to the model are satellite-derived vegetation cover fraction data from NASA (National Aeronautics and Space Administration) used to adjust BELD3 (Biogenic Emissions Land Cover Data version 3) land-cover information for a more accurate estimate of land susceptible to wind erosion at a given time. Beginning in February, work will begin on applications of the fugitive dust model to unpaved road dust, dust from off-road activities, and agriculturally induced (tillage) dust. Funding from the Emission Inventory Improvement Program will allow creation of GIS (Geographic Information System)-based input databases and modification of the dust emission codes for use as a module in the SMOKE emission model. Bill and his colleagues have prepared a project plan to guide the completion and implementation of this work during calendar year 2003. (Bill Benjey, 919 541 0821)

22. Improved Dry Deposition Model. The dry deposition model used for Models3/CMAQ, known as M3dry, is being updated. M3dry is designed to be used with the Pleim-Xiu Land Surface Model (PX LSM) that is an option in the MM5. The stomatal pathway is modeled according to the canopy conductance input from the PX LSM. Non-stomatal pathways, to the cuticle and ground, are parameterized according to relative reactivity and effective Henry's law. Updates include resistance to snow based on literature review for NH_3, SO_2, O_3, HNO_3 and NO_2. When the air temperature is below freezing, snow resistance follows the same form as dry ground and dry cuticle resistance. Resistance is inversely proportional to a relative reactivity factor for each chemical species. Above freezing, resistance to snow is a parallel combination of resistance to frozen snow and liquid water with an additional diffusive resistance. Other updates include relative humidity dependence for cuticle resistance to NH_3 and temperature dependence of dissociation factors used to compute effective Henry's Law coefficients. Treatment of ground surface wetness similar to the existing treatment of wet cuticles scaled on effective Henry's Law were added. Several parameters for relative reactivity have been updated to be consistent with recent literature reports of cuticle resistances for NH_3, SO_2, and HNO_3. (Jonathan Pleim, 919 541 1336)

23. Ammonia Deposition Improvements to CMAQ. Work continued on the M3dry subroutine in the Meteorology Chemistry Interface Processor. The original version used a value of 4.3 for the pH of rainwater, which is used to calculate the effective Henry's Law constant. While this would be appropriate for some areas of the east coast of the United States, it is not representative of the western half of the United States. As a first cut, the code was modified so that east of 100° longitude, the pH = 4.5 and west of 100°, pH = 5.5. It is anticipated that gridded values of pH will eventually be examined. Also the calculation was modified of the effective Henry's Law constant by replacing the original code with a call to the subroutine used to calculate this constant for CMAQ. This maintains consistency with CMAQ and allows for the calculation of temperature dependent dissociation constants, which was not included in the original code. Using this revised version of the code, some sensitivity studies were run to assist us in finding an appropriate value for the reactivity of ammonia (a scaling factor used in M3dry). The revised MCIP for the period January 4-19, 2002, in preparation for CMAQ runs. (Donna Schwede, 919 541 3255)

24. Urban Atmospheric Observatory. Alan Huber participated in the planning workshop for developing a New York City Urban Atmospheric Observatory, which was sponsored by the Department of Energy's Brookhaven National Laboratory (BNL) and Environmental Measurements Laboratory (EML) in Lower Manhattan, New York City, January 27-28, 2003. The goal of the Urban Atmospheric Observatory is to support Homeland Security by providing local scale observations with quality screening, available in real time in support of the National Atmospheric Release Advisory Center and the New York City Office of Emergency Management. In the early years, intensive arrays of observations would be collected in 1-km areas for purposes of providing observed details of urban airflow and dispersion to support the evaluation and developments of improved urban models. In the out years, the refined and evaluated models, along with the atmospheric observations, would be used to support Homeland Security needs. Plans are to develop this program as a multi-agency, including NOAA and EPA. Measurements and modeling pollutant transport in urban street canyons and subway systems are of particular interest. Alan presented a summary of local scale modeling and research now ongoing in support of EPA's World Trade Center related studies and how the Urban Atmospheric Observatory could be useful to provide real-time support of routine air pollution modeling for New York City. What may be developed for this program could be transferable to similar future programs in other urban areas. (Alan Huber, 919 541 1338)

Idaho Falls

25. CBLAST-Low. Wind speed and wind direction intercomparisons between CBLAST-Low data acquired in July-August, 2001, by the LongEZ (N3R) research aircraft, buoys and SAR images are ongoing. The work is in collaboration with Don Thompson of JHU/APL and Jim Edson of WHOI. Comparisons between SAR-derived winds, N3R winds and buoy winds have been done. Results are promising. However, some interesting observations are still being analyzed. For example, on the first flight, the N3R derived stability (z/L) was negative while the ASIMET buoy indicated positive z/L values. This may be due to the fact that Monin-Obukhov similarity theory may not be applicable under these light wind conditions. MO theory was used to determine the buoy stability values. tami@noaa.inel.gov

26. CBLAST-High. Instruments were returned from AOC during January, including the BAT probe, data system, and IRGA. The last test flights (in December) indicated that the re-designed BAT utilizing an aluminum hemisphere did indeed work and will hopefully alleviate the problem associated with damage to the hemisphere from precipitation. We are identifying pieces of the system that will require upgrade, particularly the data system, which will need to be re-packaged for this summer's field deployment. In addition, the IRGA will require work on the mirror and fiberglass supports as both sustained water/rain damage during the hurricane flights this summer. jeff.french@noaa.gov

27. Joint URBAN-2003. Work continues on the optimization of the Automated Tracer Gas Analysis Systems (ATGAS) for the Oklahoma City project. Enhancements have been made to significantly speed up analysis time by programming the instrument to prepare for the next sample while the analysis of the previous sample is taking place. This increase in speed has, however, introduced other issues such as personnel keeping track of the increased analyses being performed by all four ATGAS at the same time. Small blue lights were added to each ATGAS to inform the operator at a glance of which instrument is in need of attention (i.e. clips need to be opened, analysis is complete, purging is complete). New temperature sensors are being added to increase the precision of the oven temperature readings. Filters are being added on some of the power supplies on each ATGAS to reduce the noise which was causing problems in the ATGAS analysis. Detection limit studies are being performed to characterize each ATGAS analysis ability (i.e., linearity, limit of detection, drift, valve performance, etc.). The new ATGAS have the advantage of the addition of twelve separate valves to increase analysis flexibility, however, this increased complexity has facilitated the need for increased scrutiny of their performance. The primary focus this month was the analysis of low-level concentration standards and the effect of changing analysis parameters. Small changes were made, and a detection limit study was performed to provide indications of an increase or decrease in analysis performance. Studies will need to be conducted on high level concentration standards to indicate the analysis range and also their effects on the lower concentration standards. debbie@noaa.inel.gov, Roger Carter, Shane Beard

In preparation for the Joint Urban 2003 experiment scheduled for July of 2003, all 10 continuous SF_6 analyzers have been operated for approximately a week as a preliminary system check out. No problems were discovered with any of the systems. A number of minor modifications have been done to the continuous analyzers since their last deployment. These include the installation of a safer automated cleaning system, audible noise suppression, electrical noise filtering, and ventilation improvements. The new systems worked without a problem during the test. roger.carter@noaa.gov, Shane Beard

28. BRACE. FRD has begun analysis of processed CO, SO_2, and O_3 data received from ARL HQ this month. We have developed MatLab programs to pick out the straight and level tracks from each flight and plot the concentration of these parameters vs. time and position. The programs will be modified to include the nitrogen oxide, formaldehyde, peroxide, and meteorological data and to make 3-D representations of the concentration and concentration ratio data. tom.watson@noaa.gov

29. Idaho Falls Emergency Operations Center (EOC). Kirk Clawson and Jeff French participated in an EOC activation exercise on January 22. The scenario involved the Advanced Test Reactor at TRA. The drill used the new hazard assessment of the reactor containment building, which assumes a release of material over a 48-hour time period. This exercise of this scenario gave the FRD team a challenge with the changed release time. kirk.clawson@noaa.gov and Jeff French

Las Vegas

30. Nuclear Emergencies – NEST, FRMAC and ARG. A briefing was prepared on DOC/NOAA's support of the Federal Radiological Emergency Response Plan (FRERP) for use in the DOE FRMAC's Operations Outreach presentation. This is a part of SORD's support of the Nuclear Emergency Search Team (NEST), the Federal Radiological Monitoring and Assessment Center (FRMAC), and the Accident Response Group (ARG). (Walt Schalk, 702 295 1262)

31. Cooperative Institute for Atmospheric and Terrestrial Applications (CIASTA). NV-RAMS ran to completion on the University of Nevada-Las Vegas (UNLV) computer system 28 of 31 days (a 90% completion factor). Two non-run days were due to HQ server hard-drive problems. The final problem occurred with the number of CPUs requested for the run. (Walt Schalk, 702 295 1262)

The UNLV super-computer has been upgraded. It now has 32 CPUs and increased memory. Discussions with the Computer Center's Director resulted in being allowed to run the model using 12z data, increasing the length of the model run, and the ability to run the model more often. Data are continuing to be renamed and saved daily, and backed up to CD monthly (3 CDs). (Walt Schalk, 702 295 1262)

32. Web Site Activity – Las Vegas. An active weather alert graphic and link was added to the ARL/SORD web site. Whenever a weather watch, warning, alert, or advisory is issued by ARL/SORD an alert graphic is displayed on the SORD home page (http://www.sord.nv.doe.gov/arlsord-1.htm). The red graphic flashes five times to alert the user that a weather alert has been issued. By clicking on the "alert" the user is taken to the latest weather alert page. (Jim Sanders, 702 295 2348)

33. Computer Systems/DRA Backup. The backup computer system for the Desert Rock field station at the Nevada Test Site (DRA) was upgraded to act as a complete system in case of failure of the main computer system. To accomplish this task, mostly new internal computer parts were installed in the computer to give it the necessary capabilities. Additionally, it was decided that the newly upgraded system would be used to make it possible for the DRA observer to enter updated forecasts and warnings into the local network. (Jim Sanders, 702 295 2348, and Ray Dennis, 702 295 1263)

34. NTS Temperature. Temperatures on the NTS were much above normal for January. Every day of the month experienced above normal temperatures as measured at DRA. At DRA the month averaged an amazing 8.7^0F above normal. The maximum temperature measured at DRA was 79^0F, on the 31st. This reading represented a new record maximum temperature at DRA for the month of January. The old record, 73^0F, was set in 1994. A total of 14 days had temperatures that averaged 10^0F or more above normal. One of these was the 31st which averaged 18^0F above normal. In addition, ten new record high daily temperatures were set at DRA.

35. ARL Administrative Items – Research Initiatives. The current status of some of the ARL FY-05 initiatives is:

Weather Research Flux Aircraft Initiative. This initiative has been grouped with other initiatives dealing with the hydrologic cycle. They will be incorporated into a single, unified initiative for submission in the FY '06 budget cycle.

Carbon Cycle Aircraft Initiative This initiative has not been included specifically in the proposal to be sent forward to the next level of review. The team lead, David Hoffmann, did however indicate that there would be some funding available for participation in a Carbon Cycle field campaign to be held in summer 2005.

Airborne Estuary Flux and Salinity Measurements Initiative. The deposition initiatives have been grouped together and will move forward.

Full text of the initiatives as well as "White Papers" on the Weather Research and Carbon Cycle research initiatives are available at http://arlaircraft.noaa.inel.gov under the Programs button. tom.watson@noaa.gov

Air Quality Forecasting Initiative. A group has been assembled from OAR HQ, ARL, AL, ETL, FSSL, and others to write a budget initiative for a NOAA Air Quality Forecasting program. The initiative is for $6 M/year for the next 5 years. ARL will focus on a section dealing with development of observation systems and networks to provide initialization of forecast models and for process studies. Two conference calls have been held to work on an outline and a writing meeting will be held in Silver Spring on February 19. tom.watson@noaa.gov