NOAA ARL Monthly Activity Report

December 2002

Bruce B. Hicks, Director
Air Resources Laboratory

Contents

Highlights

*1. **ARL Authors Receive OAR Paper of the Year Award**.* The 2001 paper "Climatological characteristics of the tropical tropopause as revealed by radiosondes" by D. J. Seidel, R. J. Ross, J. K. Angell, and G. C. Reid has been given the OAR Paper of the Year award. The paper was published in J. Geophys. Res. 106D8:7857-7878.

Silver Spring

*2. **Modeling the Atmospheric Fate and Transport of Air Toxics**.* A modeling analysis was completed for the current phase of a mercury modeling intercomparison project being organized by the Meteorological Synthesizing Center East of EMEP. The results obtained with the HYSPLIT– Mercury model were very consistent with ambient measurements for gaseous elemental and particulate mercury, and reasonably consistent with ambient measurements of reactive mercury compounds. Comparable difficulties in modeling reactive mercury were also found by other participants in the study. A final report and publication on this phase of the study is being prepared with the other study participants. mark.cohen@noaa.gov

*3. **HYSPLIT and MM5**.* Ozone simulations with HYSPLIT using MM5 data showed some biases that could not be explained by the chemistry and did not show up in previous tracer verification studies. Further investigation showed that the higher vertical resolution of the MM5 data in conjunction with the virtual temperature correction to compute the mixing, resulted in day-time mixed layer depths that were on average at least 50% too high. Unlike many of the coarser resolution NCEP models, MM5 showed a strong specific humidity gradient across the mixed layer top. The use of a virtual temperature correction to the mixing computation tended to smooth that gradient. The correction was eliminated and the mixed layer top was set to equal the last index below the mixed layer depth rather than the first index above it. The results provided mixed layer depths identical to those produced by MM5. The revised code was tested against the tracer experiment archive (using the coarser resolution reanalysis data) and found a slight change in the model verification results. However calculations using MM5 data showed substantially higher air concentrations. roland.draxler@noaa.gov

*4. **CMDL - HYSPLIT Trajectory Comparison**.* As the result of a question from a researcher that showed a dramatically different trajectory climatology using the CMDL isentropic trajectory model (Joyce Harris) and the 3-D kinematic trajectories produced by HYSPLIT through the web site, we have started an model inter-comparison to attempt to quantify the difference. In addition to the differences due to the isentropic/kinematic assumptions, there are differences in the integration methods and meteorological data. A special version of HYSPLIT was created to compute isentropic trajectories identical to the CMDL model. The CMDL model is being modified to produce 3-D kinematic trajectories. Initial tests with comparable (but not identical) meteorological data are encouraging. Tests are now starting with the re-analysis archive. roland.draxler@noaa.gov

*5. **Comprehensive Test Ban Treaty Support.**.* In the CTBT application, the HYSPLIT model is run in "backward dispersion" mode from selected sampling locations to produce a file similar to air concentration, but representing the potential source regions that may have contributed to the measurement. The simulation is started by releasing pollutant particles over the duration of the measurement. One multi-day simulation is run per measurement location. Output fields would normally be computed at a similar or finer temporal resolution than the measurements. In normal operational model the model would be run backwards several days when the first measurement is detected. Each subsequent day may show measurements at more locations. A new simulation would be initiated at each location. A program was created to convert these files to an ASCII format requested by CTBTO for their upcoming test. In addition another program was developed to processes the concentration files by summing the values at each grid point for all the files. The spatial location of the maximum value

represents the most likely source location. A multiple regression module is being developed (Al Taylor) to incorporate the upwind pattern from zero measurement locations to eliminate regions that could not have been the source. roland.draxler@noaa.gov

6. High-Resolution Global Meteorology Archive. In collaboration with Mark Iredell, NCEP, a script based on one of the NCEP operational scripts has been developed to generate a high-resolution global meteorology archive. The script is to be run by ARL on an as-needed basis. The archive is composed of 3-hourly pressure-level data (wind components, temperature, relative humidity, geopotential height) on a one-half degree grid and additional single-level data such as mean sea level pressure, precipitation, surface momentum flux, etc. The 24 pressure levels are at intervals of approximately 12 mb up to 925 mb, then every 25 mb up to 700 mb, and then every 50 mb up to 300 mb. These data can then be readily converted to ARL-format, for input to HYSPLIT, using one of Roland Draxler's data decoder programs. barbara.stunder@noaa.gov

7. Demise of the Berlin Polar-Stereographic Map Analyses. With the retirement of Karin Labitzke, the Meteorological Institute of the Free University Of Berlin has discontinued issuance of mean-monthly fields of pressure-height and temperature on polar stereographic map projections (projections centered on the North Pole). This projection has been used for 39 years by ARL to estimate the variation in size and displacement of the 300 mb north circumpolar vortex, vortex size estimated by planimetering the area north of pressure-height contours in the main belt of westerlies, vortex displacement by the difference in size of vortex quadrants. The vortex has contracted since 1963, to be expected due to the mid-latitude, tropospheric warming during this period, and displaced further away from the Pole in the direction of Japan, a consequence of the asymmetric nature of the warming. There are aspects of this analysis worthy of being investigated further, and this is being done with the aim of another publication. Also to be pursued is the possibility of the transformation of the pressure-height information on other map projections to the polar-stereographic projection, thus perhaps allowing for continuation of the Berlin analyses with only minor inconsistencies. (Jim Angell, 301 713 0294, x125).

Boulder

8. SURFRAD/ISIS. The lease for the Sioux Falls, South Dakota SURFRAD station at the EROS Data Center was signed on Dec. 4, 2002. Likewise, the lease for the Canaan Valley SURFRAD station in West Virginia is moving again. It was held up for the past half year because the Fish and Wildlife Service had purchased a very large plot of land adjacent to the Canaan Valley location, and they had been expending most of their efforts to securing the new tract. (John Augustine, 303 497 6083)

9. SURFRAD/ARM. 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)

10. Central UV Calibration Facility (CUCF). The Central UV Calibration Facility (CUCF) performs calibration audits for the EPA UV Monitoring Program managed by the University of Georgia, National UV Monitoring Center (NUVMC). The EPA UV Monitoring program has 21 sites located across the United States. The CUCF performs calibration audits on Mark IV Brewer UV spectroradiometers at approximately one third of the sites per year during the Fall. This year the CUCF visited Acadia ME, Gaithersburg MD, Great Smokey Mountains NC, Canyonlands National Park UT, Sequoia National Park CA, and the Virgin Islands.

Calibrations are performed with 2-3 CUCF calibrated horizontal 1000W lamps to check for consistency between lamps. Responsivity from different lamps agreed within 2%. The variation is explained primarily by the changing external temperature during the different scans. The responsivities are then compared to previous audits by the CUCF. Changes in the responsivity occur in two separate spectral regions, 290-325 nm and 325-363 nm. Approximate changes in the responsivity between the two audits (calibration dates are given in parentheses, Julian date and year) are given for the two spectral regions.

Acadia:	45% and -40% (243 1999 and 257 2002)*
Gaithersburg:	NA and 0% (262 2000 and 268 2002)*
Smokey Mountains:	+3% and +3% (249 2002 and 266 2002)**
Canyonlands:	-5% and -10% (301 2000 and 282 2002)
Sequoia:	+50% and +50% (287 2000 and 329 2002)
Virgin Islands:	+1% and -5% (309 2000 and 2002)

*component switch changed responsivity shape in 290-325 nm region
**compared to most recent EPA calibration

Changes in the responsivity are due to many factors, including but not limited to mechanical changes and upgrades to the instrument during the period, temperature effects on the responsivity, and degradation of instrument components. (Patrick Disterhoft, 303 497 6350 and Kathleen Lantz, 303 497 7280)

11. Ozone Algorithm Meeting. Irina Petropavlovskikh traveled to Washington DC on December 17 & 18th to attend an Ozone algorithm meeting. The algorithm had been developed for a future ozone monitoring instrument on the NPOESS/NOAA satellite. Irina serves on the science advisory board for the National Polar orbiting Operational Environmental Satellite System (NPOESS), Ozone Mapping and Profiler Suit (OMPS). (Irina Petropavlovskikh, 303 497 6279)

Oak Ridge

12. Terrestrial Carbon Program. Data collection at the Walker Branch Site has been consistent this period. The NASA photometer arrived after repair, but attempts to bring it on-line have not been successful, thus far. ISIS instrumentation was replaced with newly calibrated equipment. There were no other equipment outages or power losses at the site. Progress continues on the logistics for the new CHESS site. The contract for the 192 ft walk-up tower has been awarded by EASC to UpRight, and ATDD has been notified that it will be shipped in February. A brief status meeting was held with involved ATDD personnel. Hardware and equipment for installation of the tower and base is being accumulated. Preliminary contacts have been made with contractors for installation of guy wire anchors, and the deep-earth ground. meyers@atdd.noaa.gov

13. Atmospheric Dispersion System. The NOAA Atmospheric Dispersion System is intended to provide NOAA with a unified dispersion forecasting capability, converging activities at several laboratories and line offices. It is to include four dimensional (3D plus time) assimilation of NOAA's routine observations and forecasts into a detailed atmospheric model, forecasting on scales of 4 km or less. Such forecasts are already under consideration at weather forecast offices (WFO) for severe weather, forest fires, and other applications. The meteorological forecasts feed ARL's HYSPLIT dispersion model, enhanced to encompass small-scale dispersion. A graphical user interface (GUI), readily used and interpreted, is to control the system's operation. Its output is to be directly useful to emergency responders and decision makers. Deployment of a HYSPLIT/GIS demonstration system for Silver Spring, is scheduled for January 2003. pendergrass@atdd.noaa.gov, Dumas, Dobosy

14. Canaan Valley. Canaan Valley Institute has purchased more than 3200 acres of forest land at the boundaries of Canaan Valley enabling expansion of current instrument suites. Implementation of measurement

systems on the new land was discussed with CVI's science staff. In particular two water quality stations are proposed. These would test the link between atmospheric deposition, already measured in the Canaan Valley, and the high acidity levels in local streams. vogel@atdd.noaa.gov, Meyers

15. CASES-99. A series of wave-like disturbances were observed during the CASES-99 field program. Observations were made by aircraft, tethered lifting systems, radiosondes, Raman and high-resolution Doppler lidar, an instrumented 60-m tower, and a surface array of microbarographs. Of particular interest were coherent disturbances observed between 04:00 and 06:00 UTC. Analyses of these data indicated that these were ducted gravity waves within the first 1000 m of the PBL. Closer examination of the data identified two ducting regions, one at about 100 m AGL and one at about 600 m AGL. Theoretical analysis supported these observations. Waves within these separated ducts interacted through a process known as Eckart's resonance (see Fritts and Yuan, 1989, *JGR*, 94, 18,455-18,466). The resulting intrinsic frequencies of the resonant modes of these interacting waves are predicted to approach one another when plotted as functions of wave number, and are referred to as "kissing" modes (Jones, 1970, *J. Atmos. Terres. Phy.*, 32, 1555-1566). The closeness of these approaches is proportional to the spatial separation of the ducts. nappo@atdd.noaa.gov

16. Mercury in the Arctic. A 20m gradient flux system for Hg^o was installed, and is currently running at the CMDL lab in Barrow. The system will run through the spring to detect any fluxes of Hg^o from the snowpack before the late-springtime melt. The measured flux throughout December was zero, as expected.

On December 7th, Steve Brooks gave a "Mercury in the Arctic" presentation to Hopson Middle School students and teachers in Barrow. This was part of the National Science Foundation Schoolyard Program and was organized by the Barrow Arctic Science Consortium. brooks@atdd.noaa.gov

17. U.S. Climate Reference Network. A USCRN station was installed at Bondville, Illinois, December 15 - 21, 2002. CRN/NWS test sites in Sterling, VA and Johnstown, PA were also established this month. Data are being sent automatically by FTP to sites at NWS and ATDD. hall@atdd.noaa.gov, Dumas, Black, French, Brewer, Randolph, Heuer, Lew, Bryant

Research Triangle Park

18. CMAQ Mercury Model. Test applications of the Community Multiscale Air Quality (CMAQ) mercury model were conducted to investigate the importance of simulating the effects of individual sources of mercury in the context of all other sources, as is done with CMAQ, rather than as a single non-interacting source, as is the case with most Lagrangian model treatments. Initial results show that the incremental effects of a single source, or group of sources, are overestimated by Lagrangian model treatments given the physicochemical information currently available for mercury in air and cloud water. It appears that the atmosphere may have a certain limited capacity to hold oxidized mercury, especially in cloud water, such that the introduction of additional oxidized mercury leads to its rapid chemical reduction and less additional deposition of mercury than would be expected from a simple linear relationship between emission and deposition as is often assumed in Lagrangian modeling frameworks. This non-linear relationship between the emission and deposition of mercury could be a very important issue to source attribution studies currently underway. (Russ Bullock, 919 541 1349)

19. Improved Mass Continuity for CMAQ. An important aspect of dynamic meteorology models is the maintenance of mass continuity, which is essentially the dynamic balance between mass fields and momentum fields. However, when the meteorological fields are provided to an off-line chemical transport model (CTM), mass continuity may not be preserved because of spatial and temporal interpolation as well as different numerical integration techniques in the CTM. Thus, some sort of correction is usually required to avoid spurious sources and sinks of chemical mixing ratios and concentrations. A new approach to this problem has been implemented and tested in CMAQ, following the work of Yamartino. This approach involves diagnosing the vertical advective mass fluxes to explicitly maintain continuity with the provided mass field. Thus, the 3-d

advection in the CTM is guaranteed to produce the exact same density field as provided by the meteorology model. Mass will be conserved to the same degree that it is in the meteorology model. Tests of the new scheme show significant differences from the current model for concentrations of widespread chemical species such as CO and ozone mainly in areas of complex terrain. (Jonathan Pleim, 919 541 1336)

20. *CMAQ Air Toxics Modeling.* The version of Community Multiscale Air Quality (CMAQ) model developed to treat 18 air toxics compounds is being modified to incorporate a greater degree of functionality. The revised code uses a generalized approach so the simulated compounds and their chemistry are specified in one FORTRAN 90 module. The modification easily allows adding or changing compounds to be simulated while using the same process of linear decay. This new module also permits a product to be generated from each reaction without changing the chemical mechanism. Other revisions include two loss processes besides the current bimolecular reaction. A compound can undergo unimolecular decomposition or photolysis. The former uses a temperature dependent rate to represent thermal decay, while the latter uses a multiple of a photolysis rate within the chemical mechanism of CMAQ. These changes are being tested against the earlier version of CMAQ for air toxics. Future research includes an additional loss process to enable modeling the fate of polycyclic aromatic hydrocarbons such as naphthalene. (William T Hutzell, 919 541 3425)

21. *Ammonia Deposition Improvements to CMAQ.* Modifications to the M3DRY subroutine of the Community Multiscale Air Quality (CMAQ) model were implemented to better account for wet and dry deposition of ammonia to snow. This is key to improving the performance of CMAQ with respect to ammonia chemistry and the interaction of ammonia with fine particulate matter. The dry cuticle resistance for ammonia was modified to account for relative humidity effects. Preliminary runs showed negative deposition velocities for 1200Z (1200 hours Greenwich Mean Time), a problem that had been reported before. The problem was traced to errant values of the vegetation fraction in the MM5 meteorology files for that specific hour (1200Z). Other parameters that are derived from the same data set for use by MM5 appear to be correct for this hour. Although the MM5 code needs to be corrected, time and resource limitations dictate using the available files. Consequently, a patch was developed for the Meteorology-Chemistry Interface Processor (MCIP) code that uses the vegetative fraction value from 11Z. Another problem with the MM5 files is that MM5 was run with the "simple ice" option. Another software patch for MCIP was developed to resolve this problem. The revised and patched MCIP code has been run for the period January 4-14, 2001. The "vegetative fraction" and "simple ice" software patches were also implemented in the original MCIP code and tested for the January 4-14, 2001, period as a consistency test. (Donna Schwede, 919 541 3255)

22. *Community Modeling and Analysis System (CMAS) Center.* Following the highly successful 2002 Models-3/CMAQ Users Workshop, arrangements for the next CMAS-sponsored annual Models-3 Users Workshop are being made for the Research Triangle Park area in October 2003. Announcements are planned for January 2003. In addition, operating protocols for CMAS are being reviewed by the External Advisory Committee. The protocols will be released to the public within the next two months. CMAS has also begun the process of transition from being based at MCNC to the Carolina Environmental Programs (CEP) at the University of North Carolina at Chapel Hill. (Bill Benjey, 919 541 0821)

23. *Air Quality Forecasting Initiative.* A program (PREMAQ) is being developed to translate meteorological model output from National Center for Environmental Prediction (NCEP) to a Community Multiscale Air Quality (CMAQ) simulation grid. A forecast domain for the northeast United States was successfully defined using NCEP's software, and a sample data set has been processed on that grid in GRIdded Binary (GRIB) format. The forecast domain includes all of New England and key cities for air quality influence such as Atlanta, Chicago, Birmingham, and St. Louis. Work has also begun on creating software to process the GRIB formatted data for PREMAQ. The goal is to program and use PREMAQ to process NCEP meteorological fields for CMAQ for initial testing in late January. (Tanya Otte, 919 541 7533)

24. Improvements for Emission Modeling for Air Quality Forecasting. The simulation of emission data for an air quality forecasting model requires efficient and accurate estimation of temporal and spatial variations of emission sources. The existing emission inventory modeling and processing system (Sparse Matrix Operator Kernel Emission model with the Mobile 5b mobile source emission model, or SMOKE/Mobile5b) has been streamlined for mobile source emissions. A nonlinear least squares method has been developed to separate the spatial and temporal variations that are not dependent on meteorological fields from the spatial and temporal variations that are dependent on temperature. This technique has been tested on a national 32-km spatial resolution domain for the month of June 1999. The emission estimates using this streamlined technique were within 3% of the emission estimates directly from Mobile5b for Volatile Organic Compounds and were within 1% of the emission estimates from Mobile5b for Nitrous Oxides (NO_x). In the development of an air quality forecasting system using the National Center for Environmental Prediction (NCEP) meteorological fields, it is necessary to translate and convert the meteorological data sets created in GRIB format (GRIdded Binary) to a format usable by the Community Multiscale Air Quality (CMAQ) model. The GRIB format is designed for efficient archival and transmission of two-dimensional gridded arrays. It is a sequential access flat file format that is "quasi-self-describing" (a table look-up procedure is used). It is used for archival by the world's largest operational meteorological centers (National Meteorological Center and the European Center for Medium Range Forecasting). CMAQ uses the Models-3 Input/Output Applications Programming Interface programming library for data storage and access. This format is self-describing and machine independent. An interface between these two data formats is currently being developed for use within an air quality forecasting system. (George Pouliot, 919 541 5475)

25. Modeling New York City. Alan Huber gave a seminar on the developments of the Computational Fluid Dynamics (CFD) model of lower Manhattan supporting EPA's analyses of the New York City World Trade Center (WTC) events at the Department of Energy's Brookhaven National Laboratory (BNL) on December 2, 2002. BNL is interested in how this work might be expanded into other areas of Manhattan. Under discussion is how DOE and NOAA might work together on future Homeland Security related initiatives for New York City, which would establish a real-time intensive observational network for New York City to support real-time atmospheric transport and dispersion modeling to be interfaced with New York City's Office of Emergency Management. This long-term project would begin as a pilot study with the DOE Environmental Measurements Laboratory (EML), which is being transferred into the new Department of Homeland Security. The EML site is just a few blocks North of Canal Street on the West side of Manhattan adjacent to the EPA's WTC area. On December 3, 2003, Alan Huber visited the EML to examine potential sites for locating meteorological observation stations. (Alan Huber, 919 541 1338)

26. Strategic Plan for the Climate Change Science Program. Ellen Cooter, Ken Schere, and S.T. Rao attended the U.S. Climate Change Science Program Planning Workshop for Scientists and Stakeholders held December 3-5, 2002, at the Marriott Wardman Park Hotel, Washington, DC. More than 1100 United States and International Global Change scientists gathered to comment on the Strategic Plan for the United States Climate Change Science Program released for public comment November 11, 2002. Plenary sessions were convened to present Agency (*e.g.*, NOAA) and Organization (*e.g.*, World Meteorological Organization) level comments. Twenty-four break-out sessions were conducted to address specific topic areas of the Plan. Each break-out session included a brief overview of the Strategic Plan position, presentations by a panel of invited reviewers and open discussion from the floor. All those with oral comments were encouraged to submit written comments via the Science Program World Wide Web site. Summaries of each breakout session were presented in plenary at the close of each morning and afternoon. The consensus across all groups was that the Plan represented a good start, but that there needs to be better and more explicit coordination across plan topic areas. There was active discussion regarding the "Two Modeling Center" philosophy. Plan writers conceded that this aspect needed additional clarification. (Ellen Cooter, 919 541 1334)

Idaho Falls

27. CBLAST-Low. In spite of the tragic death of Dr. Timothy L. Crawford and the total loss of the LongEZ research aircraft and all its instrumentation, efforts continue to support CBLAST-Low. Although essentially only one year of data was collected during the multi-year project (a three-week period from late July to early August 2001), it is our intention to go forward with the scientific analysis. We have an exceptionally high-quality data set and have numerous flights over the several CBLAST-Low surface assets including the ASIMET buoy, three-dimensional sea surface temperature array, and the R/V *Asterias*. These data are also being used for satellite (e.g., SAR) and model (e.g., COAMPS) verification and validation.

Aircraft-based low-level turbulent flux measurements are absolutely critical to the success of CBLAST-Low. Various options have been explored in an attempt to replace N3R for the 2003 CBLAST-Low field study. We have recommended a joint effort with the San Diego State University (SDSU) to use their Sky Arrow airplane. Like N3R, the SkyArrow is a pusher airplane with the engine in the rear. The Sky Arrow also comes with a Standard Airworthiness Certificate allowing it to fly in the United States. Many of the instruments flown by N3R are routinely flown by the SDSU Sky Arrow. This includes the BAT probe, infrared gas analyzer (IRGA), and infrared radiometers. We should be able to add a laser altimeter for one-dimensional wave height characterization. In addition, we may be able to add a Ku-band scatterometer for short-wave characterization. The SDSU Sky Arrow will also be able to acquire some limited sea state characteristics such as sea surface temperature (SST), one-dimensional wave height/slope, and short wave mean square slope. jerry.crescenti@noaa.gov

28. URBAN-2000. A final SF_6 concentration data set was released to the public this month. The data set includes concentrations corrected for CATS adsorption of SF_6. The data set also includes sampler locations determined by Jerry Allwine using aerial photographs as well as the sampler locations we determined with GPS receivers. Progress also continues to be made on the final report. Only the results section remains to be fleshed out. We are investigating various methods of automatically plotting concentration isopleths from the sampling grids and sampling arcs for inclusion in the results section. kirk.clawson@noaa.gov and staff

29. Joint URBAN-2003. FRD is heavily involved in the large intensive field study planned for Oklahoma City in July. In early preparations, several modifications have been made to the Automated Tracer Gas Analysis System (ATGAS) to speed up the analysis of samples and automate some of the QC checks. We are also working on improvements to make operation easier. Several of the improvements have been incorporated, but more testing needs to be conducted to ensure that they do not adversely affect the data quality. roger.carter@noaa.gov, Debbie Lacroix

Prototype printed circuit board layouts were completed for the sampler control and interface board, the micro-power switching power supply, and the cartridge memory module. The layouts were sent to a printed circuit board manufacturer and the prototype boards were received for testing in here in our lab. We have inserted components and started testing the new boards with some modifications to the previous breadboard version this design is based on. The new board allows for a 13th valve to purge the samplers used with calibration standards. Also added to the current version is the ability to independently address the valves in the zero/spike cartridge and the valves inside the sampler. This will allow more flexibility in the operation of zero/spike samplers and allow purging. The final addition to the layout allows the use of a serial electrically erasable memory (SEEPROM) module to store sampling data into each filled cartridge by the sampler during a test. Presently we have a few minor modifications required on the power supply board and main sampler board. The SEEPROM module has not been tested yet. randy.johnson@noaa.gov, Shane Beard

30. INEEL Support. Discussions continued with DOE management and contractors regarding proposed upgrades of the INEEL dispersion modeling. Finding a source of funding for the upgrades continues to be the main hurdle. With budgets being tight, there is no readily available source of funding within INEEL to support

the effort. However, there is still hope that DOE will find the resources to at least begin the upgrade process. In the longer term, there is hope that the INEEL modeling effort can eventually be linked into an ARL dispersion modeling initiative, which is under consideration for the FY 2005 NOAA budget. richard.eckman@noaa.gov and Kirk Clawson

31. ***INEEL Mesoscale Modeling***. Further tests were conducted with a new 2-grid MM5 configuration based on the 12 km Eta model output. This configuration takes advantage of the steadily increasing resolution of the NCEP modeling products, and it runs faster than the current configuration, which is based on 40 km Eta model output. Snow cover continues to be a weak spot in the modeling. The Eta model still appears to provide unrealistic representations of snow cover, at least over Southeast Idaho. This often causes significant errors in the MM5 forecast temperatures. The NWS seems to have some fairly realistic maps of snow cover at http://www.nohrsc.nws.gov, but these data do not appear to be used for initializing the Eta model. richard.eckman@noaa.gov

Las Vegas

*32. **Cloud-to-Ground (CG) Lightning Study***. On December 5, a presentation on the SORD Lightning Detection and Alert system was given to Nevada Test Site (NTS) facility operators. Focus was on lightning warning procedures, review of a SORD proposal to change the lightning alert procedure to a three-tiered system, and to review lightning safety on the NTS. (Darryl Randerson, 702 295 1231)

*33. **Regional Planning Organizations (RPOs) Technical Meeting***. ARL/SORD staff participated in the annual RPO Technical Meeting in Dallas, TX, (December 3-4) at which federal, state, tribal and non-governmental organization representatives of all five RPOs shared information and plans for the implementation of the Regional Haze Regulation. Dr. Marc Pitchford, SORD, as the Co-Chair of the Data Analysis and Monitoring Working Group presided at the breakout meetings of that group. Two topics of particular interest included a progress report on the Visibility Information Exchange Web System (VIEWS) project, and a briefing on the Navy's global aerosol forecast modeling system.

VIEWS is a web-based clearinghouse, data browser, and system of data analysis tool for ambient air quality data used for implementation of the Regional Haze Regulations. VIEWS was approved for funding by all five of the RPOs a year ago and is already functional with substantial operational capabilities to find, organize, analyze, and display data from across the nation (http://vista.cira.colostate.edu/views/). VIEWS will continue to expand the data it provides access to and the data analysis tools over the next several years.

Dr. D. L. Westphal, Naval Research Laboratory in Monterrey, CA, presented an overview of the Navy''s global aerosol forecast system, which has been operational since the late 1990s and provides four daily estimates of the smoke, dust and sulfate concentrations globally with 1 degree longitude by 1 degree latitude resolution as well as twice-daily 5-day forecasts. The system uses a sophisticated combination of aerosol atmospheric modeling, satellite detection of vegetative burning to determine smoke emission rates, and a wind suspended dust emissions model to generate estimates available at http://www.nrlmry.navy.mil/nrl-bin/display_directory?DIR=/users_hadley/westphal/public_html/globaer/ops_01/noramer. (Marc Pitchford, 702 895 0432)

*34. **NTS Precipitation Climatology.*** Analysis of precipitation data from the SORD/NTS Raingage Network indicates that 2002 was the driest year on record for many locations on the NTS. The data show that the station in Yucca Flat received only 17% of the annual average precipitation for that site, Jackass Flat (4JA) received only 19%, up to Mercury, which received only 57% of its'' annual mean. The "driest" annual NTS total remains the 0.98 inch at 4JA in 1959. However, 2002 did set eight new minimum annual precipitation records for NTS locations. The average for all 15 NTS stations was 29% of the long-term averages. As 2002 ended, Southern

Nevada was declared to be in extreme drought conditions for the last six months of the year. (Doug Soule', 702 295 1266)

35. *Climatology/Long Term Stations*. Data were obtained for approximately 1000 locations in the lower 48 states, selected for long-term climate studies. These stations were selected in coordination with DOE, and are being used for climatic trend analysis (temperature and precipitation). SORD extracted and summarized the maximum and minimum temperatures for locations in the West for their periods of record. The states selected are Nevada, California, Arizona, Utah, New Mexico, Colorado, Wyoming, Montana, Idaho, Oregon, and Washington. The temperature summaries for these states and stations are on SORD''s Web Server (Climate Page). Summaries for other states/stations can be developed if requested. (Doug Soule', 702 295 1266)