NOAA ARL Monthly Activity Report

April 2003

Bruce B. Hicks, Director
Air Resources Laboratory

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Highlights

1. Director appointed in Boulder. On April 21, Joe Michalsky assumed duties as the director of the Surface Radiation Research Branch of ARL in Boulder. He comes to SRRB from an academic position at the State University of New York at Albany which he held for the past 11 years. Before that Joe worked as a research scientist at DOE/PNNL in Richland, WA.

2. Progress in Air Quality Forecasting. Files and data have been transferred to the National Center for Environmental Prediction (NCEP)/NOAA high-performance forecasting computers. Development of the air quality forecasting model on these platforms is underway. Several software programs to link Eta model output with Community Multiscale Air Quality (CMAQ) were successfully installed on NCEP's operational hardware to support the air quality forecasting initiative. Modifications were made by ASMD to two of NCEP's existing codes to accommodate the northeast United States simulation domain and the meteorological fields that are required for running CMAQ. Those two codes are working properly on NCEP's hardware. In addition, the PREMAQ (pre-processor to CMAQ) code, which was developed by ASMD to perform grid and variable transformations, was run successfully on NCEP's operational hardware. NCEP is testing PREMAQ on a new test data set in preparation for the semi-operational cycling that will start in early June. (Tanya Otte, 919 541 7533; Jeff Young, 919 541 3929)

The dry deposition model used for Models3/CMAQ, known as *M3dry*, has been modified to be used in the air quality forecast system. Since the forecast system is based on NCEP's *Eta* model the new dry deposition model is named *Etadry*. *Etadry* uses atmospheric and canopy resistances from the land surface model in *Eta*. These parameters define the stomatal pathway for dry deposition in a way consistent with evapotranspiration in the LSM. The other deposition pathways, to leaf cuticles and the ground, are parameterized as in *M3dry* using additional parameters from *Eta* such as the fraction of vegetation coverage, leaf area index, and canopy wetness. (Jonathan Pleim, 919 541 1336)

Silver Spring

3. Comprehensive Test Ban Treaty (CTBT). Position papers on topics related to Environmental Emergency Response were prepared for the NWS delegation to the upcoming WMO XIV Congress. Perhaps more controversial to the US than other delegations, the WMO and the CTBT Office (CTBTO) have reached a data exchange agreement. The CTBTO provides meteorological observations at their (very) remote radiological sampling locations and the WMO's RSMCs (and any other National Meteorological Service that wants to participate) would provide "source-attribution" dispersion model simulations to the CTBTO in the event of a significant above-background measurement. The agreement would be similar to the one WMO has with IAEA with regard to nuclear accidents. Recently (March 24-26), the CTBTO conducted a full-scale test with 10 international participants, including most of the RSMCs. The US participated through NOAA/ARL and a DoD agency that represents the US in data exchange issues with CTBTO. The US does provide for a substantial fraction of the CTBTO's budget and has funded the initial development of many of their technical programs. As a footnote to the test, Australia was examining some of the results and noted that one of the models (not theirs) showed a possible source location in the southern Atlantic ocean, where all the other models indicated

Iceland (the correct location). They asked us to run the "ensemble" version of HYSPLIT and one of the ensemble members also showed a contribution from the South Atlantic. roland.draxler@noaa.gov

4. HYSPLIT Updates. In anticipation of a closer working relationship with NCEP, HYSPLIT has been restructured to make the model installation more compatible with the way code is installed on the NCEP computers. A minor code correction was required to handle simulations with meteorological data only every 12 hours when the data occurred at hours other than 0000 or 1200 UTC. A new display option was installed. roland.draxler@noaa.gov

5. Program Migration to NCEP for Testing. In support of our long-term plan to migrate applications from ARL computers to NCEP computers, two test applications, which have been running on ARL workstations are now running on our development account on the new NCEP system: the wildfire smoke forecasts and the Hawaii dispersion ensemble. These programs are both planned for eventual operational implementation once the appropriate administrative mechanisms are identified. Detailed descriptions of these applications have appeared in previous monthly reports. roland.draxler@noaa.gov

6. Iraq Data Archive. A subset centered over Iraq of high-resolution NCEP global model analyses for the wartime period has been archived. Though there are currently no plans to use the data, we chose to make and archive the model output at a finer resolution than the current ARL FNL global archive in case any analyses would be needed later. The data are on a one-half degree grid, have more levels than the standard NCEP output and are at 3-hour intervals. barbara.stunder@noaa.gov

7. Southwest Asia Modeling Support. The HYSPLIT simulations were restructured to permit Email updates of the CONTROL file in both the "afwa" and "chppm" accounts. The MM5 analysis data (both 5 and 15 km) were archived to both CD and 4 mm tapes for the first three weeks. Subsequent archives, if still required, will only be to tape. roland.draxler@noaa.gov

8. Impact of ENSO and QBO on the North Circumpolar Vortex. The impact of ENSO, QBO and sunspot number on the size and position of the 300 mb north circumpolar vortex is being reexamined and summarized. Based on the full 43-year record, there has been a significant expansion of the vortex at the time of the El Nino and a significant contraction of the vortex about one year later, the latter a consequence of the tropospheric warmth in low and mid latitudes (due to latent heat of condensation) which follows an El Nino. The vortex expansion is mostly due to the increase in size of the "El Nino quadrant" 90W-180 at this time, and relates to greater storminess in Southern California. To help distinguish the impact of the QBO (9 season period) on the polar vortex from that of El Nino (about 20 season period), the QBO influence is examined using monthly, rather than seasonal, values of vortex size. Vortex size is little affected by the phase of the QBO, a consequence of quadrants 0-90E and 0-90W tending to be relatively large a few months before QBO east wind maximum whereas quadrants 90E-180 and 90W-180 are relatively small at this time. Thus, there is a subtle tendency (1 or 2 degrees of latitude only) for the vortex to be displaced toward Europe and the Atlantic a few months before QBO east wind maximum, a displacement difficult to determine by other means. The relation of vortex size and position to sunspot number will be examined next. (Jim Angell, 301 713 0295, x127).

9. Upper-air Temperature Dataset Intercomparison Paper. A manuscript on "Uncertainty in Signals of Large-Scale Climate Variations in Radiosonde and Satellite Upper-Air Temperature Datasets" by D.J. Seidel, J.K. Angell, J. Christy, M. Free, S.A. Klein, J.R. Lanzante, C. Mears, D. Parker, M. Schabel, R. Spencer, A. Sterin, P. Thorne, and F. Wentz, has been submitted to the *Journal of Climate*. The paper examines eight upper-air temperature datasets and quantifies the magnitude and uncertainty of various climate signals, including: stratospheric QBO and tropospheric ENSO signals; stratospheric warming following three major volcanic eruptions; the abrupt tropospheric warming of 1976-77; and multi-decadal temperature trends. Uncertainty

estimates are based on the individual time series and on the spread among estimates from different time series. The large spread among trend estimates suggests that using multiple datasets to characterize large-scale upper-air temperature trends gives a more complete characterization of their uncertainty than reliance on a single dataset. For other climate signals, there is value in using more than one dataset, since signal strengths vary, but the uncertainty in individual datasets is large enough to effectively encompass the spread among datasets. dian.seidel@noaa.gov

Boulder

10. SURFRAD/ISIS. Plans have been made to install a new SURFRAD station from June 3 to June 13 on the grounds of the EROS Data Center, which is approximately 15 miles north of Sioux Falls, SD. The lease has been secured and SRRB personnel have been in contact with the USGS regarding specifics of the station installation. This new SURFRAD station will be collocated with several other monitoring experiments, including a CRN station, a GPS water vapor retrieving CORS station, and a SCAN soil moisture station. NASA also has a MODIS antenna at that site. The USDA is considering the future placement of a UV monitoring station there. (John Augustine 303 497 6415)

11. UVB Standard Broadband Calibrations. Calibration factors for the CUCF set of three reference UV radiometers at the Table Mountain Test Facility were calculated for June 2002. The average calibration factor at a solar zenith angle of 40 and total ozone of 300DU has increased by 4% since 1994. The change since the last calibration (June 2001) is statistically insignificant. In summary, the absolute response changed by -0.48%, -0.49%, and 0.81% between the May 2000 and November 2002 for the three reference UVB radiometers. No significant change in the shape of the spectral response has occurred, within the uncertainties of the measurements. The centroid has shifted slightly to longer wavelengths by approximately 0.1 nm. No statistically significant change in the cosine response has been detected. (Kathy Lantz 303 497 7280 Patrick Disterhoft, 303 497 6355)

Oak Ridge

12. Terrestrial Carbon Program. Data collection at the Walker Branch Site was generally trouble-free in April with only a couple of power outages due to weather. Progress continues on the successor system at the new tower site. The RFP for the support building is complete, and bids will be requested shortly. Contractors have been selected for the lightning protection: grouting the electrode trenches and drilling the deep-earth ground. Since the deep-earth ground is considered construction, its specification has been forwarded to NOAA EASC. Extensions to connect with the electrodes have been exothermically welded onto the tower base's rebar cage in preparation for placement in concrete. Forms to receive the concrete have been fabricated. meyers@atdd.noaa.gov

13. Knoxville Air Quality Summit. A Regional Clean Air Action Summit was held at the University of Tennessee Conference Center in Knoxville on April 25. ATDD was invited to attend by Congressman Wamp's local office. Senator Alexander of TN was the Keynote Speaker, and Congressman Wamp was the luncheon speaker. Presentations were provided by the Tennessee Department of Environment and Conservation, University of Tennessee, Tennessee Valley Authority, and the National Park Service. Great emphasis was placed on the high ozone levels observed in eastern TN, and their economic implications. Many local political leaders attended. shifflett@atdd.noaa.gov

14. Mercury in the Arctic. The gradient flux measurements of gaseous elemental mercury (GEM) continue at Barrow. The surface has been a GEM source from the beginning in January, with peak emissions during periods of warming. These peak emissions are well correlated with near-surface GEM enhancements. The cumulative flux over the period is 3.66 μg Hg m^{-2}, well above expected. Mercury storage in the snowpack, per unit surface area, was 0.41 μg Hg m^{-2} in mid-January. By April, deposition had increased that to 10.6 μg Hg m^{-2}. According

to these flux data, roughly 1/3 of the deposited mercury has already been released from the snowpack, well before annual melt in late May/early June. This unexpected result also requires that our previous deposition rate estimates be raised by roughly 1/3. brooks@atdd.noaa.gov; Steve Lindberg, ORNL

15. Mercury in the Antarctic. In October 2003, the Antarctic Tropospheric Chemistry Intensive (ANTCI) will begin. It will involve mercury atmospheric speciation measurements in the Spring at McMurdo to investigate mercury and halogen chemistry near the coast, and later (November - January) at South Pole Station to investigate potential mercury and hydroxyl (OH) chemistry in the absence of halogens and local pollution sources. brooks@atdd.noaa.gov

16. Ice Station Polarstern. ATDD has been asked to participate in measurements of atmospheric surface fluxes over the ice in the western Weddell Sea in Antarctica in November 2004. ATDD has been asked to provide microbarographs to monitor gravity waves during the campaign. nappo@atdd.noaa.gov

17. Canaan Valley. Plans for the Long-Term Ecological Research Site on the Canaan Valley Institute's (CVI) grounds continue to develop in meetings between staff of CVI and NOAA/ARL. Also, analyses continue, estimating deposition rates for nitrogen species to Canaan Valley's watersheds. The data were obtained in Summer 2002 during an intensive field study using the Relaxed Eddy Accumulation method. vogel@atdd.noaa.gov, Meyers

18. Italian National Research Council Sky Arrow. Work is progressing on the three Mobile Flux Platform systems that are being built for the Italian National Research Council, Institute for Agricultural and Forest Meteorology. Despite problems with procurement of some needed parts, the MFP systems and appropriate spare parts are still scheduled to be delivered to Italy for installation in the Sky Arrow aircraft in June 2003. auble@atdd.noaa.gov, Brooks, Dumas, Ludwig, and Mayhew

19. Extreme Turbulence Probe. Important progress has been achieved toward reliable wind measurement from the ET probe through reanalysis of a road test from 2002 September 16. The ET probe is a sphere with thirty ports, 1 mm in diameter, arrayed over its surface to sense the pressure distribution from which wind is inferred. Only the five ports most nearly facing the wind are used in any calculation. Changing wind direction leaves ports behind, and brings new ports into use. dobosy@atdd.noaa.gov, Auble

20. Urban Dispersion Study. A planning meeting of the Joint Urban 2003 Science Team was held in Oklahoma City on April 1 - 2, to refine the experimental plan and select measurement locations for the late June - July field study. A follow-up meeting was held at the University of Hamburg (Germany) on April 14 - 15 to review progress on the wind tunnel modeling of downtown OKC, which is underway as a design aid for the Joint Urban 2003 study. Extensive demonstrations of flow visualization over the 1/300 scale model of OKC were provided. Following still and video photography of these visualizations, quantitative measurements of the winds, turbulence, and tracer concentrations will be performed for four different source locations. hosker@atdd.noaa.gov

21. U.S. Climate Reference Network. A Design Review of the current configuration of the US Climate Reference Network stations was hosted by ATDD on April 9 - 10. NESDIS, NCDC, ATDD, and NESDIS contractor staff attended. There was general agreement that the present configuration is satisfactory for most sites (cold weather locations present special needs), and that most of the necessary documentation is in good shape. hosker@atdd.noaa.gov, Meyers, Hall, French, Black, Shifflet, Conger, and Ridenour

A monthly status review and teleconference on the US CRN were held in Asheville, NC, at NCDC on April 29. ATDD provided a presentation on site installation statues during March and early April. A Canadian/U.S. Bilateral Meeting on climate reference stations was hosted by NCDC in Asheville, NC on April 30 - May 1.

ATDD was invited to attend. Plans for collaboration between the USCRN and the Canadian Reference Climate Stations (RCS) were drafted. meyers@atdd.noaa.gov, Hosker

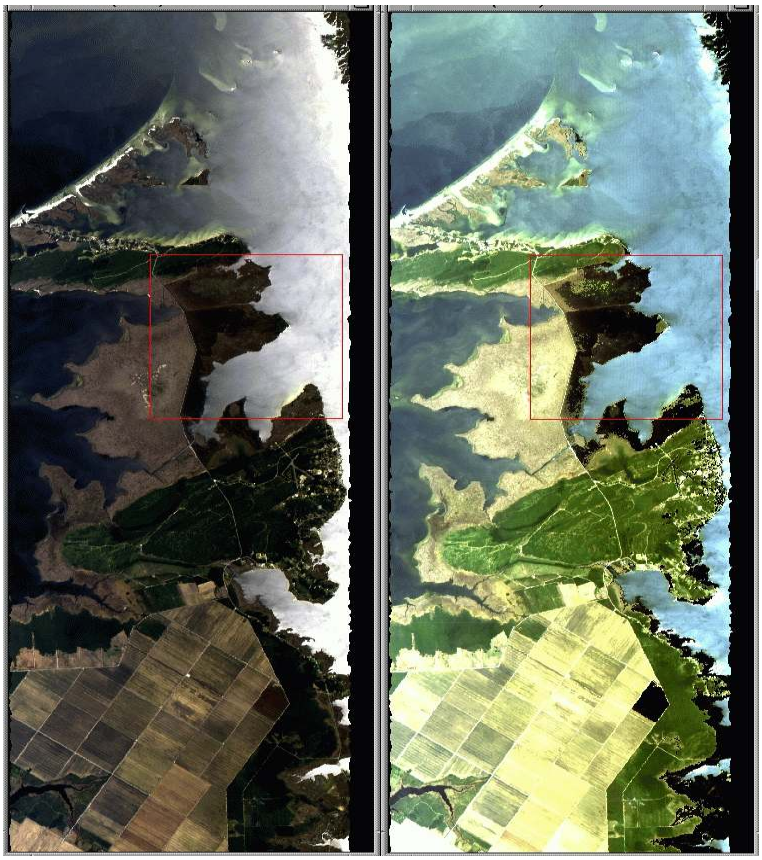
Research Triangle Park

22. CMAQ Winter Simulations for Aerosols. More tests were performed on the Community Multiscale Air Quality (CMAQ) model to address the issue of nitrate over-prediction in winter. An error was found in the heterogeneous N_2O_5 reaction; correcting this bug reduced modeled nitrate concentrations by 10% to 30% over the continental United States. An evaluation of results using CASTNet, NADP, SEARCH sites, and the Pittsburgh Supersite showed significant improvement in model performance. Sulfate is unbiased and within a factor of 1.5 of the observations. Both nitrate and ammonium are now within a factor of 2 of the observations. (Shawn J. Roselle, 919 541 7699; Robin Dennis, 919 541 2870)

23. CMAQ Mercury Model. A meeting of participants for the International Mercury Model Intercomparison meeting was held at the Meteorological Synthesizing Center - East (MSC-East) in Moscow, Russia, on April 15 and 16, 2003. ARL participation was limited, due to security concerns and the restrictions on international travel. An electronic presentation was sent to MSC-East and a phone hook-up was used to present the latest results from the Community Multiscale Air Quality mercury model (CMAQ-Hg). Overall, the CMAQ-Hg results compared with observations of air concentration of total gaseous mercury (TGM), reactive gaseous mercury (RGM), and particulate mercury at the same degree of accuracy as for the other Eulerian-type models. The agreement for TGM was statistically stronger than those for RGM and particulate mercury. There was some indication that low concentrations of TGM observed at two sites in Sweden might be attributable to the recently discovered polar sunrise elemental mercury depletion phenomena, as back trajectories for those observations were found to be associated with transport of air from the northern boundary of the project study area. None of the participating models could resolve these incidents of low observed TGM since all of the models used boundary values for air concentration that were appropriate for annual averaged conditions. (Russ Bullock, 919 541 1349)

24. Pamlico Sound Study - Remote Sensing Imaging Processing. Interest in remote sensing for ecological assessments has expanded to include such coastal estuaries as the Pamlico Sound region of North Carolina. Atmospheric correction of satellite images over low reflectance surfaces will be essential for even qualitatively discriminating the spatial patterns of chlorophyll, colored dissolved organic matter (CDOM), and suspended sediment. An Airborne Visible and InfraRed Imaging Spectrometer (AVRIS) collected data over Pamlico Sound on May 15, 2002. In a coordinated study involving the EPA, NASA, NOAA, the University of North Carolina, University of Maryland, and Duke University, data were collected to characterize the spatial variation of chlorophyll A, suspended sediment, and colored, dissolved organic matter (CDOM)) across the Pamlico Sound using both hyperspectral remote sensing from 20 km ASL, low altitude SeaWiFS simulator imagery, submerged radiometery, and chemical/biological analysis of water samples. 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. Weather conditions on May 15 provided near-perfect atmospheric and surface conditions for the imaging.

A dark surface water vapor algorithm was developed and tested in the latest iteration of the Reflectance Processor model as shown in the picture to the right. The image displays a raw radiance from the AVIRIS spectrometer. On the right, the same image is shown as surface reflectance, following glint and atmospheric correction. The light blue coloring clearly shows qualitative variations in water quality. In future work, dark surface aerosol algorithms from recently published literature will be incorporated. These enhancements will enable accurate determination of the atmospheric water vapor fields and aerosol optical depth over class II waters such as the Pamlico, and yield improved accuracy in surface reflectance. (John Streicher, 919 541 3521)



25. Global Climate and Air Quality Project. Progress has been made on several computer programs designed to manage a large Regional Climate Model (MM5) data set that is expected to arrive over the next several months. The data management aspect of the program is necessary to streamline processing by the Meteorology-Chemistry Interface Processor (MCIP) for the Community Multiscale Air Quality (CMAQ) model. Additionally, a post-MCIP quality control and statistical module is partially complete. Seasonal and regional statistics applied to air-quality related variables (user-controlled) will be another option encapsulated in the module, as well as visualization options of these analysis. (Robert Gilliam, 919 541 4593).

26. Air Toxics Modeling. Community Multiscale Air Quality (CMAQ) model tests continue with the modified versions of the SAPRC99 and Carbon Bond-IV (CB-IV) mechanisms that treat several toxic compounds for the National Air Toxics Assessment. The effort determines whether the versions match earlier results. The process is encountering obstacles that concern the reliability of the Fortran 90 compilers used. The compiler predominately used, INTEL, produced runtime errors not produced by a separate compiler from the Portland Group. Similar errors have appeared when executing the Dioxins model compiled with INTEL. The problems may be linked to floating point representation. To remove the runtime errors, compilations are varying options when using the INTEL compilers. (William T. Hutzell, 919 541 3425)

27. Dry Deposition Modeling . Additional species were added to the *M3dry* deposition algorithm including N_2O_5 and NO_3. One of the parameters required for the deposition calculation is the diffusivity. Upon examination of these values for the diffusivity of these chemicals and others, it became apparent that the diffusivities in *M3dry* were incorrect. The diffusivities for all gases will now be taken at 273.15 K and 1 atm. The diffusivity of water and the kinematic viscosity were also adjusted so that the values now correspond to these conditions. The temperature scaling that had been added to *M3dry* in V2 was removed since it was unnecessary. The diffusivities and the kinematic viscosity are always used as ratios in the subroutine, so the temperature adjustment cancels out. (Donna Schwede, 919 541 3255)

28. Euler Backward Iterative (EBI) Solver for CMAQ. Development work on a new EBI gas-phase chemistry solver for the Carbon Bond-IV mechanism in the Community Multiscale Air Quality (CMAQ) model has been completed. The EBI solver differs from the existing CMAQ modified Euler backward iterative (MEBI) solver in that numerical solutions to two key species groupings are replaced with analytical solutions. In tests conducted using a continental 32-kilometer grid resolution modeling domain, the EBI solver was found to be about 2.3 times faster than the MEBI solver, with no appreciable difference in model predictions. Depending on the model configuration, use of EBI in place of MEBI in CMAQ can reduce model run times by 15% to 35%. Additional testing of the EBI solver with a higher resolution modeling domain is planned to further test its robustness. Barring any unforseen complications, the new EBI solver will be included in the next CMAQ public release and will be use in the air quality forecasting version of CMAQ. In parallel with the solver work, additional tests are being conducted with CMAQ in which the transport of fast-reacting gas-phase radicals is eliminated to improve computational efficiency. Tests conducted thus far indicate that model run times can be reduced an additional 5% to 7% without affecting model predictions. This modeling approach also will be tested using a higher grid resolution. (Gerald Gipson, 919 541 4181)

29. Emissions Modeling. Development of an emissions processing system for air quality forecasting is continuing. Version 3.11 of the Biogenic Emissions Inventory System (BEIS3.11) has been combined with the meteorological pre-processor as a first step towards integrating all pre-processing into a single program called PREMAQ. During May, other meteorologically-dependent emissions-related operations will be integrated into CMAQ. BEIS3.11 is now available for downloading and testing at www.epa.gov/asmdnerl/biogen.html. In BEIS3.11, the soil NO algorithm has been revised to better distinguish between agricultural and non-agricultural land, and to limit adjustments from temperature, precipitation, fertilizer application, and crop canopy to the growing season and to areas of agriculture. A leaf shading algorithm has been added for estimating methanol emissions from non-forested areas.

MOBILE6 is being tested for criteria and toxic pollutant mobile-source emissions within the Sparse Matrix Operation Kernel Emission (SMOKE) system. MOBILE6 is being compared to MOBILE5B for the January 2002 winter evaluation period. Testing of Plume-in-Grid (PinG) sources with this newest version of SMOKE is also underway. (George Pouliot, 919 541 5475)

30. Dust Emissions. Dale Gillette spent the month of April at a field experiment in Las Cruces, New Mexico. The experiment was concerned with dust emissions from desert ecosystems. Measurements of particulate fluxes were taken during dust storms at locations in the Northern Chihuahuan Desert. He collected data for five dust storms. During one storm, dust concentrations peaked at more that 60,000 micrograms per cubic meter. Sampler arrays during the experiment were situated at four locations. The number of samples for a single storm from these arrays was 265. The data will be used to verify models of sediment flow in desert ecosystems and to locate dust "hot-spot" sources within larger source areas. (Dale Gillette, 919 541 1883)

31. Dust and Ammonia Emission Modeling. Work continues on implementing a dust emission model being developed by Shan He and a new model for short-term estimates of ammonia emissions from fertilized fields. Geographic Information System-based input data required by both models is now being compiled and tested. The dust model will estimate particulate emissions from roads, construction, and agricultural fields using the new input data. Following acceptance testing, the dust model will be installed as a module of the Sparse Matrix Operation Kernel Emission (SMOKE) model by the end of 2003. A model for estimating short-term variations in ammonia emissions from fertilized fields will be developed and tested during the summer of 2003 following an intensive updated literature survey that is being sponsored by the Emissions Factor and Inventory Group of the EPA Office of Air Quality Planning and Standards. (Bill Benjey, 919 541 0821)

32. NOAA Planning Workshop for 2004 Field Study. Ken Schere and Robin Dennis attended the first planning workshop for a major field study off the northeast coast of the United States during the summer of 2004. Over 100 participants attended the Workshop, indicative of the wide interest and planned participation in the study.

The Workshop was hosted at the University of New Hampshire, Durham, New Hampshire, an academic participant in the upcoming study. This field study will use land observations, aircraft, and the NOAA ship Ron Brown to quantify the flux of air pollution off of the northeast coast of the United States. Several European groups also attended the Workshop, as they will be participating with concurrent aircraft observations over the Atlantic Ocean and western Europe to quantify the flux of air pollution crossing the Atlantic to Europe. Ken Schere presented NOAA's plans for testing of the Eta-CMAQ air quality forecast system during the summer of 2004. (Ken Schere, 919 541 3795)

33. Waterloo Center for Atmospheric Science (WCAS)-Board of Directors Meeting. Ken Schere and S.T. Rao were invited members to the first meeting of the Waterloo Center for Atmospheric Science (WCAS) Board of Directors at the University of Waterloo, Ontario, Canada. This emerging center will focus on laboratory, experimental, and modeling research in air pollution. Dr. James Sloan, the WCAS Director, presented the research plans for the Center. These include the establishment of a Canadian center of expertise in CMAQ regional air quality modeling. ASMD is collaborating with WCAS in helping with the CMAQ model as their Center is established. WCAS has participation by Canadian academic institutions, the Ontario and Canadian Federal governments, and Canadian industry. (Ken Schere, 919 541 3795)

34. Air Quality Forecasting Workshop, April 29 - May 1, 2003, Houston, Texas. Jason Ching participated in a Workshop on Air Quality Forecasting, sponsored by the US Weather Research Program (USWRP) Office, in Houston, Texas, from April 29 to May 1, 2003. The USWRP has adopted air quality as one of its principal scientific focuses and charged this Workshop to produce an Air Quality Forecasting Science Implementation Plan, which would provide a basis for the Interagency Working Group of the USWRP to support research for improving air quality monitoring, forecasting, and evaluation of the forecast products. Organized around discussion groups, the plan involved such science issues as clouds and aerosols, planetary boundary layer dynamics, advanced observational data assimilation systems, modeling, operational forecasting, and improving the value of prediction systems for stakeholders.

35. Particulate Matter Science for Policy Makers: A NARSTO Assessment. Forty-two air quality scientists from Canada, the United States and Mexico have completed a three-year review and assessment of the current state of knowledge on airborne particles, a major component of air pollution in North America. The assessment provides a comprehensive overview of the situation across the continent, identifies problem areas, and provides guidance for effective action to reduce this health concern. The review was released at the opening of the April conference of the American Association of Aerosol Researchers in Pittsburgh, Pennsylvania.

The report (http:/www.cgenv.com/Narsto) provides science-based guidance for governments and other agencies working to reduce air pollution throughout North America. The study concludes with a summary of current knowledge for nine key regions in North America, including such pollution-prone areas as Los Angeles and the San Joaquin Valley of California, Mexico City, the eastern United States, and the Windsor to Quebec City, Canada, corridor. These descriptions provide a template for communicating science to air quality managers. The report was coordinated by a three-country agency of government, university, and industry representatives, NARSTO, whose focus is on the North American Research Strategy for Tropospheric Ozone and Aerosols. NARSTO's mission is to provide scientific advice to guide action to reduce air pollution, including ground-level ozone and airborne particles. The first NARSTO assessment completed in 2000 focused on ground-level ozone across North America.

Reducing airborne particles or particulate matter (PM) is a complex task, since they have a wide variety of sources, and can be formed under many different conditions. Some particles, such as from forest fires, are natural in origin. However, most of the finer airborne particles, which are the greatest health concern, originate from the burning of fossil fuels in motor vehicles, homes, industry, and electric utilities. There is a considerable and growing body of evidence that shows an association between adverse health impacts, especially on the cardiorespiratory system, and short- and long-term exposures to airborne particles. The finer particles are of

greatest concern, because they can penetrate deeply into the lungs aggravating existing heart and lung disorders. (Jeff West 919 541 4635).

Idaho Falls

36. Extreme Turbulence Probe. Major revisions to the ET Probe data acquisition software were completed in late April. (The ET probe is being developed to be deployed in land-falling hurricanes to measure turbulence.) Bench tests of the software were performed to ensure all the pressure and temperature sensors were working properly and were reasonably calibrated. A road test was then conducted on 25 April, in which the ET probe was mounted on a pickup truck side-by-side with a cup anemometer and wind vane. The truck was then driven at highway speeds on a road heading into the desert west of Idaho Falls. This test proved to be highly encouraging. The probe provides reasonable wind-speed values down to about 5 m/s, which is a lower speed threshold than had been anticipated. At speeds greater than about 25 m/s, the ET probe speeds tend to trend above the cup anemometer speed. Of course, cup anemometers have there own quirks, so this deviation from the one-to-one line does not automatically indicate a problem with the ET probe. Further tests will be conducted in May. The relatively low threshold speed for the ET probe opens up some additional opportunities for static tests on breezy days. richard.eckman@noaa.gov, Tom Strong, Jeff French

37. JOINT URBAN 2003 (JUT). Preparations for field deployment to Oklahoma City in late June are in high gear. Seventy new samplers are under construction as well as approximately 300 new cartridges. Construction will be complete in late May or early June. randy.johnson@noaa.gov

An updated experiment plan for field deployment was received in preparation for a field experimenter's meeting in Oklahoma City 31 March-04 April. The numerous proposed release sites and the many participants combined with the various test wind regimes, has also resulted in a very complex experimental plan. The month was spent mostly in implementing the plan for FRD by breaking the plan into discrete tasks for FRD personnel. A revised sampler location plan was submitted to the science team for comment. kirk.clawson@noaa.gov

Gas chromatograph (GC) optimization for determining SF_6 concentrations in bag samplers continues. GC#1 has proven highly effective and reliable in measurements from 1.97 ppt to 50,500 ppt using the 500 µl sample loop. Measurements using the 250 µl sample loop seem to be reliable from 10 ppt to 200,000 ppt. GC#3 is able to see similar concentrations using the same sample loop sizes although there is less reliability. The ranges for this instrument may need to be adjusted slightly. Optimization will continue on GC#2 and GC#4 next month and detection limit studies will be conducted on all GC's during the month of May and into June to determine an appropriate average instrument limit of detection (ILOD) and instrument limit of quantitation (ILOQ). Method detection limit studies will be conducted in May to determine acceptance criteria for field data. debbie@noaa.inel.gov

38. CBLAST-High. Preparations continue for the summer 2003 hurricane season. In April, two new aluminum spheres were fabricated to replace the prototype fabricated during last year's hurricane season. The new spheres are more robust and weigh less than the prototype. The spheres also require less labor in the manufacturing process. Work continues on software upgrades to the data system. These upgrades focus on some limited capabilities for real-time calculations of the wind, temperature, and moisture and significantly improved graphics/display capabilities. The system is slated for installation on the P3 in early June with test flights in late July. jeff.french@noaa.gov

39. CBLAST-Low. ONR approved our recently submitted budget request for continued funding (at a reduced level) for FRD's involvement in CBLAST-Low. With the loss of the LongEZ and the departure of Jerry Crescenti (the original PI), it was unclear what role FRD would be allowed to play in CBLAST-Low. ONR approved our request to focus on analysis of data collected during the 2001 field campaign during which the LongEZ flew approximately 100 research flight hours. The four primary objectives laid out in the proposal are:

(1) to complete the comparison of LongEZ measured winds with SAR-calculated winds, (2) to extend the analysis of the determination of transfer coefficients and how they relate to sea-state, (3) to complete the analysis of temperatures from the FUST probe, and (4) to support other scientific users of the LongEZ data. jeff.french@noaa.gov, Tammi Grimmett

40. Refractive Turbulence. Work continues on analysis of data collected during last summer's field campaign in Adelaide, Australia. Currently, comparisons are being conducted between two methods used to calculate winds from the Egrett data: winds from software provided by ARA and a method devised by ARL. At this time the comparison is reasonable, but more work needs to be done. jeff.french@noaa.gov

Las Vegas

41. Vulnerability Index. ArcView 3.1 was used to create a 17 panel display chart for immediately visualizing dispersion patterns for the continental U.S. (CONUS). In the center is a large display of the CONUS surrounded by 16 panels showing Alaska, Hawaii, and 14 CONUS major cities.

42. Mesoscale Modeling. NV-RAMS ran to completion on the University of Nevada-Las Vegas (UNLV) computer system 29 of 30 days (a 97% completion factor). Data are continuing to be renamed and saved daily, and backed up to CD monthly (4 CDs). Work is continuing with UNLV Computer staff to test the "miser queue" function by initiating the normal run at 2105 and the miser run at 2345. The regular run has been very stable using 16 CPUs. The miser run has also been reasonably stable since April 16th. The miser run has been changed to separate the data download portion from the model execution portion. Testing is on-going. A test 12z run was started on April 18th. It has been very stable since the 18th and is using 18 CPUs. Script files to generate graphics for this run are being developed. Also, some restructuring of the directory structure is in progress. Some graphics are produced but automated generation is not stable yet. (Walt Schalk, 702 295 1262)

43. U.S. Geological Survey (USGS) Satellite Data. USGS satellite derived elevation data for the whole Earth were downloaded. These data contain the average elevations for 30 arc-second quadrangles over the Earth. The resolution is from about .9 kilometer to .5 kilometer, depending on the latitude. These data can be used with graphical display programs, such as Kashmire 3-D, to produce plots. The plots can be utilized as backgrounds for the display of meteorological data, etc. (Doug Soule', 702 295 1266)