



NOAA ARL Monthly Activity Report



June 2002

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At the time of editing this report, the news of Tim Crawford's death arrived. Tim was conducting a low-altitude air-sea exchange flux run in the Long-EZ, exactly as he has done dozens of time in the past, when he suffered a massive stroke. The plane appears to have crashed at full speed. The accident occurred several miles off the coast of Martha's Vineyard, at about 3:00 PM on 3 August. Tim's wife, Sharon, was present at Cape Cod at the time of the accident. Our sympathies are with her and the others of Tim's family.

In the light of these sad more recent events, it is especially interesting to note the descriptions of work in preparation for the Cape Cod and subsequent studies, items 28 and 29 below.

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Highlights

1. Successful Around the World Balloon Flight Used HYSPLIT/READY. Luc Trellemans and David Dehenauw, Belgian meteorologists advising Steve Fossett's successful around the world balloon flight, made extensive use of the HYSPLIT trajectory model on ARL's READY website (<http://www.arl.noaa.gov/ready.html>). The team used the HYSPLIT model to plan for the best time for liftoff from Northham, Australia, and during the flight to find the best altitude to fly at to succeed in his around the world quest. Several statements have been made by the team in the US and international media, expressing the team's "appreciation and gratitude towards NOAA ARL and its kind people, without whose efforts in HYSPLIT modelling, we would not even have to think about undertaking such an adventure." David Dehenauw hopes to visit Silver Spring in the near future and give a presentation about the use of HYSPLIT during the flight. For more information, see <http://www.noaanews.noaa.gov/stories/s932.htm> and <http://www.spiritoffreedom.com/glenn.rolph@noaa.gov>

2. Outstanding Scientific Paper Award. A paper by Dian Seidel (formerly Gaffen) and co-authors recently received a NOAA Research Outstanding Scientific Paper award.

Gaffen, D.J., B.D. Santer, J.S. Boyle, J.R. Christy, N.E. Graham, and R.J. Ross, 2000: Multi-decadal changes in the vertical temperature structure of the tropical troposphere. *Science*, 287, 1239-1241.

The paper addresses the apparent discrepancy in temperature trends seen in surface observations and in satellite observations of the lower troposphere. It shows that an independent observing system, the radiosonde network, confirms the greater surface warming during the period of satellite observations (since 1979), and places that result in the context of a longer data record (since 1960), during which the surface and lower tropospheric temperature trends were more consistent. dian.seidel@noaa.gov

Silver Spring

3. Seasonal Radiosonde Temperatures for 1958-2002. A binomial weighting (smoothing) has been applied to the seasonal temperatures for climatic zones, hemispheres and globe obtained after exclusion of nine anomalous tropical stations from the 63-station radiosonde network. Some smoothing of the time variation in seasonal temperature is required in order to clarify the shorter-term variations in atmospheric temperature, such as the quasi-biennial variation, the variation associated with El Nino, and the variation resulting from volcanic eruptions. The smoothing of

course reduces the amplitude of any oscillation, the reduction in amplitude about 30% in the case of the QBO. The smoothed time series have been plotted as a function of height for climate zones, hemispheres and globe, and as a function of climate zone for each of four height intervals (surface, troposphere, tropopause, and low-stratosphere). After the smoothing there is an obvious tropospheric cooling in both polar zones and both temperate zones following the Pinatubo eruption, even though it is in the tropics that the low-stratospheric warming associated with this eruption, as well as the eruptions of Agung and El Chichon, is most apparent. It is also clearly seen that not only did the El Chichon induced cooling beginning in the spring of 1982 nearly destroy the usually close relation between Nino3 SST and tropical tropospheric temperature 1-2 seasons later (Nino3 SST peaked in the winter of 1983-84), but that the Pinatubo induced cooling in the summer of 1991 caused the tropical tropospheric temperature to peak in the season before this eruption rather than 1-2 seasons after the Nino3 SST maximum in the winter of 1991-92. These plots will be used for seasonal updates of tropospheric and stratospheric temperatures to complement the annual updates which include confidence intervals based on individual radiosonde-station values. (Jim Angell, 713-0295, x127)

4. *Volcanic Climate Forcing Index.* Planning began for a project to create an improved index of volcanic climate forcing for the past 500-1000 years in collaboration with NCAR and Rutgers University. The index will be based primarily on ice core sulfate data and will be used by Amman to force the NCAR coupled climate model in an effort to assess the contribution of volcanoes to periods of relatively cold climate in the past 1000 years (the “Little Ice Age”). melissa.free@noaa.gov

5. *Review Meeting for 2002 WMO/UNEP Scientific Assessment of Ozone Depletion.* Chairmen, authors, and reviewers met in Les Diablerets, Switzerland, June 24-28 to complete the final review of *WMO/UNEP Scientific Assessment of Ozone Depletion: 2002*, which is required under the Montreal Protocol on Substances that Deplete the Ozone Layer. The main findings for the five-chapter review were agreed upon, as was the wording of a three-part executive summary for policymakers. Release of the executive summary is planned for late July or early August and the full report will be published later. Dian Seidel and Betsy Weatherhead served as reviewers for the report. dian.seidel@noaa.gov

6. *Hysplit Modifications.* Several small changes were introduced this month: An error was found and corrected in the GRIB decoder for data records; an option was added to compute the vertical velocity from the integral of the horizontal velocity divergence; the internal vertical mixing time step was reduced to match the stability criterion for the entire profile rather than just at a specific position; the averaging of the vertical mixing coefficient in the boundary layer was eliminated; the dateline test for plumes over the international dateline was modified; the initial AGL trajectory height output value was corrected; and changes were made to the graphical outputs. The revised code results were compared with the DATTEM archive; changes to the model’s performance were negligible. roland.draxler@noaa.gov

Boulder

7. *SURFRAD/ISIS.* The SURFRAD processing, averaging, and modification code was improved to use the component sum (direct plus diffuse) as the basic measurement of total solar irradiance,

and to use the global measurement as a secondary measurement. This improves the net solar and total net radiation calculations that are disseminated with SURFRAD data. The entire SURFRAD data set is being reprocessed with the improved code. (John Augustine 303 497 6415)

An initial visit to the Bismarck, ND ISIS site revealed that the site was in relatively poor shape. A good bit of time was spent discussing these issues with the site contact. In the future the National Weather Service, i.e., SRRB's site contact, will notify SRRB about equipment being installed near the ISIS instruments.

A new SURFRAD site location being proposed by the United States Geological Survey in Sioux Falls, SD was surveyed on June 5th. Gary Hodges met with Tom DeFelice to discuss the proposed site location. The proposed site is located on the grounds of the USGS building north of Sioux Falls. The location is excellent, consisting of a natural prairie environment with undisturbed views of the horizon. Three other groups are planning to locate equipment there –

- The National Climate Data Center will be installing a Climate Reference Network (CRN) tower <http://lwf.ncdc.noaa.gov/oa/climate/research/crn/crnmain.html>.
- The National Geodetic Survey has installed a Continuously Operating Reference Station (CORS) <http://www.ngs.noaa.gov/CORS/cors-data.html>.
- The Natural Resources Conservation Service plans to install a station in support of their Soil Climate Analysis Network (SCAN) <http://www.wcc.nrcs.usda.gov/scan/>. (Gary Hodges 303 497 6460)

8. Umkehr Analysis . The first results of the Umkehr ozone profile retrievals using newly updated algorithm were discussed with a group of scientists at NASA/Goddard. A related paper “Validation of the updated Umkehr ozone retrieval algorithm against SAGE II data” by Petropavlovskikh I., E. Weatherhead, P.K. Bhartia, and A Stevermer was presented at the Spring AGU meeting in Washington DC (May 27-31, 2002). There are several recommended improvements to the operational (ca. 1992) Umkehr ozone profile retrieval algorithm [Mateer and DeLuisi 1992]. A key change is in the construction of the *a priori* profile. In the Mateer & DeLuisi algorithm the *a priori* profiles are constructed using the total ozone column. Although this selection makes the algorithm computationally fast, it has the undesirable property that the *a priori* profiles vary from year to year. It has been shown that one can obtain equally good retrievals by using fixed *a priori* profiles that vary with season and latitude, but have no day-to-day or long-term variability. (Irina Petropavlovskikh, 303 497 6279)

9. Central UV Calibration Facility. The Central UV Calibration Facility hosted the third annual Front Range UV Workshop on June 5, 2002. The workshop was a huge success with twice as many attendees than were expected. More than 30 people attended the 17 presentations that were given. The talks ranged from Long Term Trends in Solar Irradiance, Total Ozone, and UV at the GAW Station, to Verification of the CUCF's Horizontal Irradiance Scale. Due to the huge success of this meeting and the large turnout, there was talk of extending the next workshop to two days to allow more time for informal discussions and exchange of ideas.

The CUCF will be constructing a Portable Field Calibrator for the ENEA (Italy's Environmental Service) Brewer double monochromator, stationed at Lampedusa, Italy. The CUCF has developed a new method for independent verification of its horizontal irradiance scale. The new method allows for the precise rotation of its portable field calibrator, thus allowing lamps calibrated in both the vertical and horizontal orientation to be operated. The rotation system is mounted to a bench that is portable enough to be moved to various locations. (Patrick Disterhoft, 303 497 6355)

Oak Ridge

10. Canaan Valley. The NOAA Canaan Valley Air Quality Research and Monitoring Station received a major upgrade. The full energy-balance suite of instruments was installed, including a four-band net radiometer and upgrades to sensors of moisture, temperature and heat flux in the soil. A new 3-D sonic anemometer and a new fast-response infrared gas analyzer completed the installation. In part, this upgrade prepares for intensive dry deposition studies planned for August 2002. vogel@atdd.noaa.gov, Hall, Meyers

11. CASES-99. Analyses of the wave ducting event observed during the early morning hours of 14 October were completed. These analyses including lag analysis, beamsteering, and pressure-wind speed correlations, were used to determine the characteristics of ducted waves. These waves had an a phase speed of about 10 ms^{-1} , a horizontal wavelength of about 3000 m, and propagated toward the northwest. A linear gravity wave model using observed vertical profiles of wind and stability was used to calculate the neutral modes for these observation times. The comparisons between the observed waves and the calculations were good. A journal article "Analysis of Ducted Motions in the Stable Nocturnal Boundary Layer During CASES-99" by Fritts, Nappo, Riggin, Balsely, Eichinger, and Newsom has been submitted to the Journal of Atmospheric Science. nappo@atdd.noaa.gov

12. EPA Air Toxics Program. Due to the recent corrections made to the photolysis rates (J-values) used in the CB4 photochemical mechanism, a new 3-h (11:00-14:00 LST) idealized highway emissions coupled simulation was performed toward the end of June using the LESchem model. As in the previous recent air toxics simulations, four north-south highway continuous line sources of formaldehyde (FORM), acetaldehyde (ALD2), nitric oxide (NO), nitrogen dioxide (NO_2), and carbon monoxide (CO) were specified at $x = 2, 3, 4,$ and 5 km on a $20 \text{ km} \times 10 \text{ km} \times 4 \text{ km}$ domain with a mean westerly wind of 1 m/s . For this simulation, the NO_x emissions were assumed to be realistically partitioned as 90% NO and 10% NO_2 . Initial postprocessing and analysis of the results revealed that the scenario was hydrocarbon-limited as evident in the nitric oxide scavenging of ozone (O_3) downwind of the highways. herwehe@atdd.noaa.gov

13. GEWEX/GCIP. A new GEWEX site was installed at the Audubon Grasslands Research Ranch, located about 45 miles southeast of Tucson, Arizona. The site, which was recently burned over by a wild grass fire, will provide a unique opportunity to evaluate the evolution of the surface energy balance during the monsoon season in southeastern Arizona. The data from this site, along with other NOAA sponsored GEWEX sites, can be visualized at <http://dbserver.atdd.noaa.gov/GEWEX>. meyers@atdd.noaa.gov, Heuer

Research Triangle Park

14. CMAQ Model - June 2002 Release. The latest version of the CMAQ air quality model was released by the National Exposure Research Laboratory at the end of June 2002. This version includes a number of significant upgrades to the model over the previous 2001 version. Among the changes are the addition of a new aerosols module, *aero3*, which includes an improved treatment for secondary organic aerosol formation by including semivolatile compounds that partition between gas and aerosol phases and the incorporation of aerosol thermodynamics. In addition, the SAPRC-99 chemical mechanism was added to the CMAQ model, now providing users with a third choice for the chemical mechanism. A new highly efficient chemical solver was added for all of CMAQ's chemical mechanisms. Also included is a new optional vertical diffusion module. The CMAQ model code is available on the ASDM website, ftp://ftp.epa.gov/amd/stand_alone_models3/cmaq/. Technical documentation for this version of the CMAQ model will be added to the website next month, as will the base case test and sensitivity results for a July 1999 episode covering the eastern United States. The testing of the June 2002 release of CMAQ included four model configurations (new CMAQ code, previous release code, and two variations) over three model domains (32, 8 and 2-km horizontal grid dimensions) that were compared against observational data from three networks (AIRS, CASTNet and IMPROVE) involving nine species (O_3 , SO_2 , NO_3 , HNO_3 , $PM_{2.5}$, EC, OC, SO_4 , NH_4). The suite of metrics used in the evaluation included Mean Bias, Mean Normalized Bias, Mean Absolute Gross Error, Mean Normalized Gross Error, Normalized Mean Error, Normalized Mean Bias, Mean Fractional Bias, Root Mean Square Error, and Correlation. Comparison of these metrics across each CMAQ configuration and domain in concert with visualization and graphical analyses using PAVE (Package for Analysis and Visualization) provided a comprehensive checkout of the model for the June 2002 release. Extensive evaluation exercises will be conducted with this version of the model for $PM_{2.5}$ and ozone through Fall of this year using summer 1999 field intensive data sets for Nashville (Southern Oxidants Study) and Atlanta (supersite). (Ken Schere, 919 541 3795; Brian Eder, 919 541 3994)

Analysis of the results obtained from the CMAQ mercury model on the European test domain for Phase II of the International Mercury Model Intercomparison was conducted. Two test periods were simulated: June 26 to July 7, 1995, and November 1 to 14, 1999. For the 1995 test period, measurements of total gaseous mercury air concentration at four locations in north-central Europe were compared to the simulation results. The comparison showed moderate agreement between model predictions and observations, but there is strong evidence that some sources of elemental mercury in air are not resolved in the emission inventory used for the simulation. For the 1999 test period, measurements of reactive gaseous mercury and particulate mercury at the same four locations were compared to the simulation results. This comparison shows somewhat better statistical correlation than for the 1995 tests, indicating that industrial emissions of oxidized mercury are better resolved than elemental mercury emissions from natural sources and from contaminated land and water bodies. (Russ Bullock, 919 541 1349)

Changes to the CMAQ aerosol dry deposition routine were tested for a 15-day simulation period. Results were analyzed and compared against previous simulations. These changes were the result of debugging a problem where the geometric mean diameter of the aerosol size distribution became too large, resulting in an unrealistic aerosol dry deposition velocity. The processing of aerosols in clouds is being re-examined. In the current algorithm, the standard deviation of the aerosol size

distribution is preserved through the cloud life cycle. The removal of the aerosol number concentration is scaled against the sulfate mass removal. The mean diameter of the distribution can become large when most of the mass is removed by rainfall. (Shawn J. Roselle, 919 541 7699)

15. *The Community Modeling and Analysis System (CMAS) Center.* Because the CMAS is crucial to formation of a CMAQ user community for collaboration in model improvements, training and support, ASMD worked with CMAS and EPA's Office of Air Quality Planning and Standards in planning the Models-3/CMAQ User's Workshop, scheduled for October 21-23, 2002, in Research Triangle Park, North Carolina. The Workshop schedule, draft agenda and call for presentations have been issued. Extended abstracts rather than full papers are requested. (William Benjey, 919 541 0821)

16. *Development of Advanced Emissions Modeling Systems.* ASMD and EPA's National Risk Management Laboratory, Air Pollution, Prevention and Control Division (APPCD) continued work on an implementation plan for the Mobile-Modal Model (MMM), a precursor of the Multiscale Motor Vehicle and Equipment Emission System (MOVES) model expected in four to five years. The general plan is to implement and test the Mobile-Modal model during FY 2003. However, MOVES will supercede MMM and is expected to be implemented for operation with SMOKE by FY 2006. The implementation plan was revised during June. A meeting to coordinate the implementation of Mobile-Modal between ASMD and APPCD is tentatively planned, with the implementation plan due by the end of FY 2002. (William Benjey, 919 541 0821)

17. *Meteorological Preprocessors.* Boundary layer algorithms from the AMS/EPA Regulatory Model Improvement Committee Meteorological Processor (AERMET) have been incorporated in an upgrade to the Meteorological Processor for Regulatory Models (MPRM) preprocessor; testing of the revised code is in progress. MPRM supports the Industrial Source Complex dispersion model and continues to be used for regulatory applications. When testing is completed the upgraded MPRM will be made available on the EPA web site. (Desmond Bailey, 919 541 5248)

18. *Development of the Multimedia Integrated Modeling System (MIMS).* The Multimedia Integration Modeling System (MIMS) framework is software infrastructure or an environment for constructing, composing, executing, and evaluating multi-media models. ASMD is working with developers in addressing issues that arose in applications, designing MIMS distributed execution capabilities to take advantage of remote computers, and identifying an off-the-shelf plotting application that can be linked with MIMS. These new additional features will allow more types of modeling applications and provide better support for the latest CMAQ and SMOKE models. (Steven Fine, 919 541 0757; Steve Howard, 919 541 3660)

19. *Global Climate and Air Quality Assessment.* ASMD scientists worked with the EPA Global Change Research Program (GCRP) to develop a work plan for regional climate modeling. The meteorology output will be used to drive CMAQ for air quality assessment. A work assignment between GCRP and the Department of Energy's Pacific Northwest Laboratory is being processed, with a meeting planned for early Fall. During June, two presentations were given that were pertinent to the ASMD global climate/air quality assessment project. One presentation outlined the current status and plans for the EPA National Risk Management Research Laboratory (NRMRL) project for developing future emission factors for future technology pathways in energy-intensive sectors of transportation and electricity generation. The resulting emission factors will be on a national

scale without regional differentiation initially. Another planned NRMRL project with the Northeast States for Coordinated Air Use Management (NESCAUM) may also provide estimates specific to the northeastern United States, but might not be available for ASMD's air quality simulations. The other presentation looked at the influence of climate change on control strategies for ozone and fine particulate matter in urban areas. Using a Southern California domain, tests were performed by the University of California-Davis during a summer episode using an air quality model (based on the CIT model) with artificially increased temperature fields. Although the results were very preliminary since only one episode was considered, the results suggested that increased temperatures could increase ozone concentrations with the change predominantly caused by the temperature effects on the chemical reaction rates rather than on temperature-dependent emissions. (Alice Gilliland, 919 541 0347)

20. Analysis of NADP/NTN and AIRMoN Data. An analysis was performed of data from the National Atmospheric Deposition Program (NADP) precipitation chemistry networks National Trends Network (NTN) and Atmospheric Integrated Monitoring Network (AIRMoN). NTN and AIRMoN maintain five collocated monitors that provide wet deposition and concentration data for ammonium, nitrate, sulfate, and four base cations. NTN data are collected weekly, while AIRMoN data are collected daily. The AIRMoN and NTN data were compared over an seven- year period to consider the comparability of the data on annual and monthly basis. (Alice Gilliland, 919 541 0347)

21. Estimating the Plume from the World Trade Center Recovery Site. ASMD completed a general characterization of the dispersion of the particulate matter from the World Trade Center (WTC) recovery site in the ambient air during the three months following the events of September 11, 2001. Hourly estimates of plume transport and particulate dilution were made using a blended observational and dispersion modeling approach. A derivative of the CALMET-CALPUFF dispersion model was employed to simulate the plume dilution for a 50 x 50 km square area surrounding lower Manhattan. This modeling was completed in collaboration with North Carolina State University. The results of this three-month simulation were developed to support the Environmental Protection Agency's June 2002 assessment of the environmental impact of the events on September 11. A movie of the hourly mapping of the plume has been developed. In addition, a model replication of all buildings south of Canal Street in lower Manhattan was completed using licensed digital information from Vexcel Corporation. Meteorological information from both EPA (two SODAR's and a 10-m tower) and BLM sites (six 2-m stations) in lower Manhattan are being displayed with monitored particulate matter to examine the influences of meteorology on air pollution concentrations. The graphic below depicts a one-hour example of these data displayed within the building model. The lower left hand corner of this graphic includes the winds reported at the five ASOS sites in the Metropolitan Area. Several supporting technical papers are under preparation to provide critical technical reference. A digital model of each building has been developed to support construction for wind tunnel model studies and the numerical simulations (application of Fluent CFD code) studies of the fine scale pollution dispersion near ground zero, which should be completed next year. (Alan Huber, 919 541 1338)



22. Evaluation of Clear Skies Initiative Ozone Modeling. The Comprehensive Air quality Model with extensions (CAMx) is being used to estimate the extent of future year ozone nonattainment with and without the emissions reductions associated with the Clear Skies Initiative (CSI). As part of this analysis, three 1995 base case episodes were simulated with grid cell sizes of 36/12 km. An operational evaluation consisting entirely of comparisons against surface ozone data was completed for the entire domain, as well as several dozen subregions. At the synoptic scale, the model exhibited little overall bias (-2.1 percent) or error (21.1 percent). However, for some of the individual subregions, particularly those that included coastal areas, model biases and errors approached +/- 40 percent. Based on successful comparisons back to previous regional modeling evaluations, the model was judged suitable for usage in estimating future year ozone levels upon incorporation of the CSI emission reductions. (Pat Dolwick, 919-541-5346)

23. Fire Emissions Modeling. The objective of this task is the development of a prototype stand-alone emissions processor that will introduce smoke from fires (prescribed and wildfires) into the Models-3/CMAQ modeling system based on state-of science algorithms developed by the U.S. Forest Service (USFS). A demonstration of this version is scheduled for September in Research Triangle Park, North Carolina. Bi-monthly conference calls continued between the ASMD and EPA's Office of Air Quality Planning and Standards (OAQPS) to ensure the full implementation and testing of the processor that will be incorporated into the generalized SMOKE (Sparse Matrix Operator Kernel Emissions) processor. This effort is being performed by CIRA (Cooperative Institute for Research in the Atmosphere) and administered by the U.S. Park Service. Plans are underway to establish the requirements and sources for the activity databases and the emissions model will be optimized for both regional as well as national assessments. To this end, a workshop is being planned for mid-winter by OAQPS. (Jason Ching, 919 541 4801)

24. Fugitive Dust Modeling. Work continues on the development of algorithms for modeling of windblown dust from industrial operations and from agricultural tillage practices, and of fugitive dust from on- and off-road sources. The issue was addressed for introducing agriculture tillage practice to establish the time windows for which crop type and land use is exposed and subject to wind erosion. When completed, this effort will be implemented as an emissions processor for the Models-3/CMAQ system, producing hourly dust emission estimates in conjunction with SMOKE. The development of the stand-alone prototype version continues, and the initial testing of the windblown dust component will be tested by directly inserting data into CMAQ. Development of fugitive dust from on- and off-road mobile sources will begin in late summer. However, operational use will depend on converting the dust module to a form that runs in conjunction with SMOKE. This will require compilation of GIS-based surrogate data on agricultural operations, roads (especially rural unpaved roads), and construction activity. The initial coding of the prototype dust module is nearly complete, and coding for use of the dust module with SMOKE will begin between August 2002 and August 2003. Full implementation of these algorithms into Models-3/CMAQ is expected in late FY 2003. (Jason Ching, 919 541 4801; William Benjey, 919 541 0821)

25. Neighborhood-scale Modeling. The objective of this study is to develop a capability for modeling air toxics and particle concentrations at neighborhood-scale grid dimensions. An important component of this effort is to address the concentration variability and chemical variability due to turbulent motions as well as from sub-grid concentration variability arising from individual sources. The overall effort will be an integral component of the air pathway linkage to models of human exposure. In June, the effort begun to establish the runs for testing the prototype air quality simulation model for the greater Philadelphia metropolitan area. Specifications for the science modules and model inputs for the set of nested model runs of CMAQ was established. The grid model simulations will be available in July; they will be the basis for the a preliminary report on the study. The MM5 meteorological model was modified for this domain to incorporate a set of detailed urban canopy parameterizations (UCP) for more realistic simulations of the flow and dispersion fields in the Philadelphia urban areas. The advances include modification of the governing equations for momentum, turbulent kinetic energy, heat, and moisture in a variety of urban land-use categories for fine-scale grid resolutions. (Jason Ching, 919 541 4801; Tanya Otte, 919 541 7533)

26. Determination of Coastal Waters Constituents Using Remotely Sensed Data. Work is underway to develop robust algorithms to extract aerosol optical depth over type II waters from remotely sensed hyperspectral imagery. Additional development work is proceeding in the determination of spacial patterns of chlorophyll and suspended sediment. The May 15, 2002, field study over the Pamlico Sound in North Carolina, included NASA's Airborne Visible and Infrared Imaging Spectrometer (AVIRIS) aboard an ER-2. A SeaWiFS simulator was flown at low altitude concurrent to the AVIRIS imaging. Subsurface radiometry and water samples were taken to provide ground truth turbidity and chlorophyll concentration at fixed locations in the Sound. Applications of this work will include the study of Pamlico Sound flow patterns, nutrient loading, and the study of algae blooms. Additionally, as hyperspectral imagery collected from satellites becomes more readily available, image analysis will provide critical timely data on aerosols, precipitable water, sediment, and chlorophyll for rapid update models. (John Streicher, 919 541 3521)

Idaho Falls

27. *CLAST-High*. Installation of turbulence instruments on one of the NOAA P3's (43) began in earnest, after overcoming some initial hurdles regarding AOC concerns of the structural integrity of the instrument package. A trip to MacDill AFB in mid-June allowed Jeff French to work with AOC engineers to install the wiring and roughly half of the instruments on the P3. The installation work was hampered by the requirement that AOC have the aircraft 'Reconnaissance Ready', pushing the CBLAST install to a lower priority at that time. The CBLAST install is now on track, with the physical mounting of the BAT probe and the sea-surface temperature radiometer the last two items yet to be installed. Back at the FRD facility, work continues on the data system. The rack-mount cases were re-built with aircraft-standard locking hardware. Software testing also continues this month. jeff.french@noaa.gov

28. *CBLAST-Low*. Preparations continue for the upcoming CBLAST-Low field study that will be conducted during August 2002 off the coastal waters south of Martha's Vineyard. Detailed calibrations have been conducted over this last month on the BAT probe pressure sensors, accelerometers, temperature probes, humidity sensors, pyranometers, infrared radiometers, laser altimeters, analog-to-digital (A/D) boards, and amplification circuits. jerry.crescenti@noaa.gov, Jeff French, Tim Crawford, Tami Grimmett

29. *Refractive Turbulence*. Because of LongEZ contract delays, the spring refractive turbulence study was not flown. Resources from this experiment are being redirected to the August study, using Airborne Research Australia's high-altitude Egrett research aircraft. The Australian study has been expanded to run from August 20 through September 18. The Egrett's older BAT electronics are being updated and calibrated for the study. TLC@ida.net

30. *Hurricane Turbulence – the ET Probe*. Field tests of the ET probe continued during June in an effort to track down the cause of the data dropouts that have dogged the system. Most of the dropouts were traced to calibration problems in the acquisition software, and these have been fixed. The system is now working more or less as designed, and the output winds look qualitatively reasonable. However, the probe has not yet been compared with reference instruments (e.g., a sonic anemometer) to determine whether the turbulence and flux estimates are reasonable. Several probes have now been sent to ATDD in Oak Ridge, TN to prepare for possible deployment during this hurricane season. ATDD is much closer to the hurricane action than FRD, so it was decided to run the ET probe deployment out of ATDD. If a hurricane makes landfall in the U.S. this year, the intention is to deploy 3 ET probes near the coast in its path. richard.eckman@noaa.gov, Tom Strong, Tim Crawford; Ron Dobosy and Dave Auble [ATDD]

31. *Ion Mobility Spectrometry*. The IMS prototype is now running with a polonium-210 ionization source. Initially, the Ion Mobility Spectrometer (IMS) with this ionization source produced a number of peaks, but did not give any observable response to SF₆. Dr. Atkinson from the INEEL was able to help us identify the peaks as contamination in the IMS drift cell and identify the electronic circuit board and an electronic insulating compound used on the ion gate as the source of some of the contamination. After the gate was redesigned to prevent these materials from being exposed to the drift region and the entire IMS was cleaned and baked out, peaks may be observed on the introduction of relatively high levels of SF₆. However, one contaminate peak remains in the

system and must be removed before it will perform correctly. roger.carter@noaa.gov, Shane Beard, Debbie Lacroix

32. *Rain In Cumulus over the Ocean (RICO)*. Investigators from several universities, NCAR, and NOAA gathered in Ogden during the AMS Cloud Physics Conference in June to discuss plans for an upcoming cloud study to take place in Puerto Rico in 2004. The focus of the project is to investigate the initial formation of drizzle and raindrops in trade-wind maritime cumuli. Aircraft slated for the project include the Wyoming KingAir and the NCAR C130. During the planning meeting, several investigators expressed interest in getting a third aircraft instrumented to investigate the turbulence in small cumulus. Turbulence has been proposed as a possible mechanism responsible for the often observed, but as of yet unexplained, broadening of the cloud droplet size distribution in small, warm clouds. ARL scientist Jeff French is teaming up with Gabor Vali from the University of Wyoming to use the Wyoming cloud radar and the Wyoming KingAir to investigate small scale structure of cumulus clouds. jeff.french@noaa.gov

33. *Emergency Operations Center (EOC)*. Jerry Crescenti and Brad Reese represented FRD during an all-day EOC exercise on June 12, 2002. The drill scenario involved a meltdown of the Test Reactor Area (TRA) reactor. A special 48-hour “canned” meteorological data set was prepared by Roger Carter for the drill. The simulated data was based on typical summer days which experience moderate southwesterly winds up the Snake River Plain in the afternoon and light northeasterly drainage winds in the morning. The drill was conducted in two parts. In the morning, the simulation was a “real-time” emergency as EOC personnel had to respond to the crisis at hand. In the afternoon, the scenario was pushed 48 hours into the future with a slow but continuous leak of radioactive materials from TRA. Numerous MDIFF simulations were made during the exercise in order to assess the potential for contamination and for use in evacuation. Plume projections from the simulated meltdown presented a challenge to EOC personnel. Several modifications and enhancements will be made in the next few months to MDIFF from the lessons learned during this exercise. jerry.crescenti@noaa.gov, Brad Reese, Neil Hukari, and Rick Eckman).

Rick Eckman and Debbie Lacroix were called to the EOC on June 20, 2002 due to a wildfire that began at the side of U.S. Highway 20 near the border of the INEEL. As luck would have it, the EOC activation occurred with just one hour left in Rick and Debbie’s duty period. After about two hours, they were relieved by Jerry Crescenti who stayed until the fire was contained. rick.eckman@noaa.gov, Debbie Lacroix, and Jerry Crescenti

Las Vegas

34. *Test-Readiness/Sub-Critical Experiments*. SORD provided full meteorological support to the another major experiment (OBOE IX). The Deputy Director of SORD served as the Meteorological Advisor on the Test Controller’s Scientific Advisory Panel. SORD personnel presented a comprehensive assessment of current and projected meteorological conditions in the vicinity of the OBOE experiment in Yucca Flat, making use of a wide variety of remote meteorological sensors, NOAA weather forecast models, and the RAMS model centered on the Nevada Test Site (NTS). SORD also provided test management with the predicted transport and dispersion pattern for the unlikely occurrence of release of toxic material into the atmosphere. (Doug Soule’, 702 295 1266)

35. NOAA Cooperative Institute for Atmospheric and Terrestrial Applications (CIASTA). The NV-RAMS model ran to completion on the University of Nevada-Las Vegas (UNLV) computer system 28 of 30 days (93%). The two failures this month were due to the UNLV computer being down. Data are continuing to be saved daily, and backed up to CD monthly (2 CDs per month). (Walt Schalk, 702 295 1262)

36. Climatology Research – Nevada. The statistical prediction technique for maximum temperatures at the NTS was checked out for the months February through May 2002. There were some problems with receipt of the required radiosonde data at times, which interfered with the statistics. Some bias seems to be present in the predictions for this period, with the predictions being lower (1-4°F) than the actual maximum temperatures for April and May, although March had a bias of 1-2°F on the high side. The absolute errors generally are in the range of 3-5°F. This technique for prediction of the maximum temperatures generally works well when the temperatures are near average, but seems to consistently under-predict departures from normal. This tendency for under-prediction of departures from normal is not unexpected for a statistical technique, which generally tends towards the averages. (Doug Soule, 702 295 1266)