NOAA ARL Monthly Activity Report

October 2002

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Contents

1. Highlight – Mercury in the Arctic. Depletions of mercury (Hg) and ozone (O_3) in the Arctic during springtime have been conclusively linked to short-lived bromic oxide (BrO) within the marine and near-coast boundary layers. Using HYSPLIT, we modeled parcel trajectories from active regions where cracks in the sea ice (leads) are opening and refreezing. Twelve-hour trajectories coincide with BrO maps derived from GOME satellite data. The precursor, molecular bromine, is mostly likely released from sea-ice surfaces supersaturated with salt. Though sea salt contains 650 chloride ions to each bromide, the source is sufficient. During rapid freezing of open leads, brine is rejected from the developing ice matrix to become trapped within the crystalline interstices. As interstitial volume decreases, brine is further concentrated, migrating to the exterior

surfaces. Brine reaching the ice-water interface reenters the ocean. Brine reaching the ice-air interface becomes supersaturated within the microscopic water layer. Here bromide ions, reaching threshold concentrations, combine as molecular bromine and are released as a gas. The mechanism functions best in rapidly freezing lead ice below -20 C, which forms frost structures at the ice-air interface. Fast-freezing ice traps more sea salt; low temperatures thin the microscopic brine layer; and frost structures increase the ice-air surface area.

We theorize that Br_2 produced at the ice-air interface is advected downwind until photodissociated to begin the sequence:

$Br_2 + h\nu \Rightarrow 2Br$
$Br + O_3 \Rightarrow BrO + O_2$
$BrO + BrO \Rightarrow 2Br + O_2$
$Br + Hg^o \Rightarrow HgBr$ (radical precursor to HgII) (Brooks, ATDD)

2. ARL Heat Stress Data Product Now Operational. The NOAA National Climatic Data Center has created a "U.S. Heat Stress Index Data" website offering climatological and updated heat stress data based on work by Dian Seidel and Becky Ross. Transferring this research dataset to operations at NCDC was complicated by changes in National Weather Service surface meteorological observations that took place between the end of the period analyzed in the original study (1995) and present. The data and related information can be found at http://lwf.ncdc.noaa.gov/oa/climate/research/heatstress/index.htm. dian.seidel@noaa.gov

Silver Spring

3. NMM - Non hydrostatic Mesoscale Model. An ensemble dispersion forecast system was originally designed by ARL to provide a volcanic plume dispersion prediction capability for the Kilauea Volcano in Hawaii as part of a NASA project. Earlier this year NCEP initiated their new mesoscale model (NMM), in parallel mode, over several different domains, including the Hawaiian archipelago. A program was written so that HYSPLIT can use the NMM model output fields. The NMM fields have an exceptionally well resolved boundary layer consisting of about 18 levels below 850 hPa. The NMM is run twice-per-day by NCEP over the Hawaiian islands. In the current configuration, only the 0000 UTC forecast is used to create an ensemble of dispersion forecasts. Currently the dispersion ensemble is run locally on ARL's workstation. The output products are transferred to ARL's web server for analysis and visualization (see http://www.arl.noaa.gov/data/ensemble. The NMM forecast usually completes by 0500 UTC and then the ensemble prediction is initiated. The dispersion ensemble normally finishes around 0900 UTC. The current operational configuration consists of 27 ensemble members. roland.draxler@noaa.gov

4. Comprehensive Test Ban Treaty Organization (CTBO). CTBTO and WMO have negotiated an agreement which enables CTBTO to request meteorological products from WMO member countries and particularly the WMO regional Specialized Meteorology Centers for transport model products. The primary CTBTO requirement, with respect to WMO, is to identify the source location of clandestine nuclear tests based upon radiological measurements and meteorological modeling results. A meeting was held at CTBTO headquarters this month (October 16 -18) to finalize some of the technical details. The participants agreed to provide CTBTO with "source sensitivity matrices". These can be computed several ways, but the most typical method is to run the transport-dispersion model from a measurement location with a negative time step. The upwind dispersion pattern represents regions that could have been the source of the measurement. A preliminary format was agreed upon for the data exchange. The final format is subject to the development of WMO standards for dispersion model products. It was also suggested that CTBTO use automated procedures to request and receive products. A simple test will be conducted in January to evaluate the procedures and data formats. CTBTO wants to do a complete exercise of the system during March 2003. Some WMO centers were uncertain they could meet that time-frame. At a minimum, participation is expected from CMC-

Montreal, BoM-Melbourne, UKMET-Bracknell, JMA-Toyko, and NOAA-ARL. There may also be several non-RSMC participants. roland.draxler@noaa.gov

5. NWS Radiosonde Continuity Meeting. On October 29, the National Weather Service hosted an all-day meeting to discuss how best to ensure radiosonde data continuity for climate monitoring and research as NWS implements a radiosonde replacement system across the US upper-air network. Jim Angell, Bill Elliott, Melissa Free, and Dian Seidel participated, along with several dozen NOAA and non-NOAA experts on radiosonde operations and climate research. The goal was to guide the work of a "tiger team" that will provide the NOAA Council on Long Term Climate Monitoring and NWS Director Kelly options for implementing overlapping observations during the transition period. Lively discussions served to identify areas of philosophical differences within the group, practical constraints to enhancing the long-term continuity of radiosonde data, and the challenges of understanding climate changes using operational observations. dian.seidel@noaa.gov

Boulder

6. SURFRAD/ISIS. The recently published method for extracting aerosol optical depth data from routine radiometric data has been completely automated. The new software was tested on the two-month period run for Table Mountain SURFRAD that was featured in the JAM article. It successfully duplicated the Table Mountain results—with no intervention. The new automated method produces more accurate aerosol optical depths than were reported in the JAM paper. It does this by statistically removing outlier I-zero values from the pool of candidates recovered from the clear-sky Langley plots. This reduces the standard error of the mean I-zero, and thus increases the accuracy of the retrieved aerosol optical depths. The automated software was then successfully applied to other SURFRAD stations and verified using AERONET data. The automated method and new results have been described in a paper by John Augustine and Carlos Medina that was submitted to the 12th Symposium on Meteorological Observations and Instrumentation, which will be held in February in Long Beach, Calif., in conjunction with the 2003 AMS Annual Meeting.

An instrument exchange and hardware improvements were performed at the Madison, WI SURFRAD site 28-30 Oct by Gary Hodges. New equipment installed included Eppley ventilators and an updated Campbell Scientific modem. General site improvements were made including the rerouting of signal and AC cables, and the removal of non-functioning and unused equipment. (Gary Hodges, 303 497 6460)

Oak Ridge

7. Terrestrial Carbon Program. Release of the property for the new tower site (Chestnut Ridge Environmental Studies Site, CHESS) has been granted, and a renewable five year lease has been signed with DOE. Progress continues on the logistics for the new site. A survey of the tower site will soon be conducted and the exact orientation and location of the tower (including location of guy anchors), support building, and ancillary site will be finalized. meyers@atdd.noaa.gov

The second US-Italy workshop on collaborative research in terrestrial carbon was held on October 24 - 25 in Boulder, Colorado. Joint projects under way were summarized, and a proposal for a new major research effort on carbon regional balances in Italy and the US (CARBIUS) was developed. The latter would require extensive field measurements and analyses of CO_2 air-surface exchanges in Italy and along the west coast of the US. A report was prepared for NSF and DOE. hosker@atdd.noaa.gov

8. VTMX Program. Data obtained during the October 2000 Salt Lake City basin experiment by a microbarograph array at the surface and airborne turbulence measurements 350 m above ground are beginning to show interesting patterns. Gravity-wave activity, correlated with turbulence intensity, was found from the microbarographs and sonic anemometers at the surface on one night. A possible case of turbulence generated

not locally, but several kilometers upstream in the lee of a mountain ridge, was found from the airborne measurements. These cases provide basic information to help advance quantitative understanding of the processes which generate turbulence at night in high-relief complex terrain. dobosy@atdd.noaa.gov, Nappo

9. Bay Regional Atmospheric Chemistry Experiment. On October 26, a second intensive experiment was initiated at the Sydney facility near Tampa, Florida. The objective is to compare measured nitrogen concentrations and deposition with those from the intensive experiment conducted during the month of May. The NOAA Relaxed Eddy Accumulation (REA) system was again set up to measure the fluxes of aerosol and gas phase sulfur and nitrogen, along with the standard set of meteorological data and fluxes. Ms. Latoya Luse will be operating the flux and sampling system for the two week intensive experiment. meyers@atdd.noaa.gov, Luse

10. Canaan Valley. A joint paper with Bob Leffler of the National Weather Service was presented at the Canaan Celebration Conference, Canaan Valley State Park, 16 - 19 October 2002. The paper, "Winds of Change: A Description of Trends in Climate in Canaan Valley, West Virginia," described unique aspects of climate in this high-altitude valley. It also touched on correlations or absences thereof with the El Niño Southern Oscillation. An intensive experiment was recently conducted in Canaan Valley using a Relaxed Eddy Accumulation (REA) System. Analysis of these data and plans for future Canaan Valley studies are proceeding in collaboration with colleagues in Oak Ridge. vogel@atdd.noaa.gov, Meyers, Klemenz

11. GEWEX/GCIP. Preparations were made for field visits to the Bondville, Black Hills, and Fort Peck sites to prepare for winter. A new soil moisture probe (Delta-T PR1/6) will replace the one damaged by lightning at Bondville last July. The trip is expected to take approximately two weeks. The data processing continues on a daily basis. Daily automation of the processing is expected to be completed by the end of November. meyers@atdd.noaa.gov, Heuer

Modifications were made this month to existing Linux data acquisition software to allow serial data from the LiCor-7500 IRGA to be collected simultaneously with data from a variety of sonic anemometers. The development was completed successfully and the software is currently being beta tested. Thanks go to Mark Fischer of Lawrence Berkeley Labs for loaning ATDD a LiCor-7500 for the development work. dumas@atdd.noaa.gov, Meyers, Heuer

12. Italian National Research Council Sky Arrow. Work has begun on the MFP system for the second Italian Sky Arrow 650 ERA ordered by the Italian National Research Council's Irrigation Institute (ISAM-CNR) in Naples, Italy. In addition, a Javad attitude GPS system was received on loan for evaluation as a replacement for the Trimble TANS Vector GPS, no longer in production. Javad performance will be evaluated next month. brooks@atdd.noaa.gov, Dumas

Research Triangle Park

13. CMAQ Model Developments. The CMAQ mercury model is being prepared for inclusion in the next public release of the Models-3/CMAQ software system. An assessment of the current mercury simulation codes has begun to determine the necessary additions and/or modifications required to bring them into compliance with the Models-3 coding standards. It appears that the mercury chemistry codes for both aqueous and gaseous chemistry will require minimal work. However, the science codes related to aerosol dynamics and the interaction of mercury aerosols with the previously modeled aerosol species will require more extensive modification to bring them into compliance. A number of additional simulation tests and demonstration applications might also be required. (Russ Bullock, 919 541 1349)

During October, the summer 1999 CMAQ model evaluation runs executed in two streams: June 15 to July 17, 1999, and July 30 to August 31, 1999. The June-July runs are at three resolutions: a continental 32-km, a SE 8-km, and two 2-km domains covering Nashville and Atlanta. During the investigation of the Atlanta 2-km

domain, it was discovered that the SMOKE emissions processor introduces an error in the placement of point sources. This stems from the IO/API tool assuming the earth is an oblate spheroid, whereas the MM5 map projection assumes the earth is spherical. The SMOKE tool developed under ASMD direction for gridding area and mobile sources correctly assumes the earth is spherical and does not have this problem. Also uncovered is a problem with the new 1999 ammonia emissions; therefore, the Division instituted an ammonia inverse modeling series at 32-km to better establish appropriate levels of ammonia emissions for the evaluation of PM fine predictions for summer 1999. (Robin Dennis, 919 541 2870)

Because of questions raised by the EPA Office of Air Quality Planning and Standards, a review has been completed of available literature on yields of Secondary Organic Aerosols (SOA) formed from gas-phase reactions of organic precursors. Since the results presented in the literature are expressed in several different ways and in different units, Jerry tried to summarize the data in a common format. The derivation of the yields used in CMAQ are relatively clear, but there appear to be discrepancies in some of the yield data reported in the literature. Jerry is working with EPA colleagues to assess these data for use in CMAQ. (Jerry Gipson, 919 541 4181)

14. Urban Canopy Parameterization. The urban canopy parameterization (UCP) in MM5 has been updated with contributions to the energy budget from heat emitted by roofs of buildings. The UCP now contains a fairly complete representation of thermodynamic and dynamic effects from urban areas. The UCP has been run for a summer case for Philadelphia, and it was compared to a simulation without the UCP. The simulation with the UCP generates superior vertical profiles in the urban environment, and it is statistically superior to the simulation without the UCP. The results of this work are being prepared for publication. (Tanya Otte, 919 541 7533)

15. Soil Moisture Parameterization. A study of the soil moisture data assimilation scheme in the Pleim-Xiu Land Surface Model (PX LSM) has been completed. The PX LSM is an option in the latest release of MM5 (version 3.5.3). The assimilation scheme uses model biases of 2-m air temperature and relative humidity as compared to analyses of observed surface data to nudge surface and deep soil moisture. The nudging strengths are computed from model parameters, such as solar radiation, temperature, leaf area, vegetation coverage, and aerodynamic resistance. The rationale is that nudging soil moisture according to model biases in air temperature and humidity should depend on the degree of coupling across the land-atmosphere interface. Thus, nudging strengths are designed to reflect the potential for the surface and root zone soil moisture to affect air temperature and humidity. Model test cases are used to examine relationships between the nudging strengths and modeled physical parameters, and then to demonstrate the effects of the nudging scheme on model results. A paper describing this study is being submitted for publication. (Jon Pleim, 919 541 1336)

16. AERMOD Screening Model. Development is underway for software that can generate worst-case meteorology for use in developing a screening method for use prior to running a new plume dispersion model (AERMOD) in a refined mode. Meteorological conditions generated would be in accord with surface-layer similarity theory (the basis of the refined meteorological processor for AERMOD). The software was delivered for review in September. (John S. Irwin, 919 541 5682)

During the Regional/State Modelers Workshop, how to define the surface characteristics (roughness length, Bowen ratio, albedo) for use in processing the meteorology for a new plume dispersion model (AERMOD) was addressed. AirSurface software creates “regional” averages of these surface characteristics. The software review addressed the needed precision of these values as defined for use in AERMOD. The review summary provided the 1) equations to be used in computing the “regional” averages, and 2) results of a sensitivity analysis to address the issue of precision needed. Using papers published by Sven-Erik Gryning and Ekaterina Batchvarova, scientists associated with the Danish Riso National Laboratory, specific equations to be used in computing the “regional” averages for surface-roughness length and Bowen ratio were recommended. It was determined that a simple weighted average would not work for the surface-roughness length and Bowen ratio,

but would work for albedo. The sensitivity results suggest that citing the results to one significant figure is sufficient for use in AERMOD. (John S. Irwin, 919 541 5682)

17. Evaluation of Regional-Scale Models. The ad-hoc regional-scale model evaluation group (composed of C. Hogrefe, E. Gego, and P.S. Porter of the State University of New York at Albany; G. Kallos and A. Voudouri of the University of Athens, Greece; and S.T. Rao of ASMD/NOAA) continued discussions on model evaluation of regional-scale models of secondary species. The basic premise is that all models only characterize certain scales of temporal (generally low frequency variations of order 3 to 7 days or longer) and spatial variations (generally low frequency variations of order 50 to 150 km or larger), whereas the observations contain temporal and spatial variations at all scales. Investigation continues on geostatistical methods for creating "block" averages from irregularly spaced observations, such that the spatial scales represented in these "observed block-average" concentration values are similar to that contained in the modeled concentration values for each grid volume. An abstract summarizing these ideas was submitted for consideration for the 26th NATO/CCMS International Technical Meeting on Air Pollution Modelling and its Application to be held May 26-30, 2003, in Istanbul, Turkey. (John S. Irwin, 919 541 5682)

18. Simulating Significant Emissions Changes with CALPUFF. The results of modeling to determine the increase in emissions needed to affect a significant increase in $PM_{2.5}$ concentrations for a range of point, area, and volume sources were analyzed and results presented to EPA policy staff. Estimates were provided for primary particulate emissions and precursor emissions (SO_2 for ammonium sulfate and NO_X for particulate nitrate). This is possibly the first application of the precursor option in CALPUFF. These analyses were in support of policy making for the EPA New Source Review (NSR). (Desmond Bailey, 919-541 5248)

19. Sensitivity Study for Air Toxics. Division scientists met with industry scientists to review mutual activities in air toxics modeling research. Industry is very interested in a local scale air toxics modeling study using the Industrial Source Complex model and possible sensitivity analysis to determine how to select the input parameters warranting further data collection and research. The group is also interested in the model uncertainty analysis study being conducted on the National Air Toxics Assessment and is eager to collaborate on these efforts. (Joe Touma, 919-541 5381)

20. Effect of Additional VOC/NO_x Reductions in 2010 Clear Skies Control Scenario. A series of modeling analyses were completed to examine the impact of further precursor reductions on the future levels of 8-hour ozone over the eastern United States. The air quality model used to conduct the analyses was version 3.10 of the Comprehensive Air Quality Model with Extensions (CAMx). Three sets of additional precursor reductions were layered atop the 2010 Clear Skies Initiative control scenario. This case represents the levels projected to occur in 2010 after implementation of existing and planned national and regional controls, including the initial phase of the Clear Skies Initiative. The three sets of across-the-board emissions reductions were 1) a 35% reduction in the low-level anthropogenic volatile organic compounds (aVOC) emissions from selected metropolitan areas, 2) a 35% reduction in low-level anthropogenic nitrogen oxides (aNO_x) emissions domain wide, and 3) a combination of the controls in #1 and #2. The modeling analyses were intended to answer three main questions. One, how effective will additional low-level aNO_x, aVOC or combined emissions reductions be in reducing 8-hour ozone concentrations from the levels to be achieved through existing and planned regional and national controls? Two, will the reduction of aVOC help to reduce ozone in all projected ambient 8-hour ozone areas? Three, are there areas where further NO_x reductions beyond existing and planned controls might result in increased ozone? (Pat Dolwick, 919 541 5346)

21. NARSTO. The principal authors of the NARSTO state-of-science suspended particulate matter assessment met at the University of Minnesota in Minneapolis to discuss the comments resulting from the National Research Council's (NRC) review of the draft NARSTO report. NARSTO received the NRC review report in September and together with all the comments received, the Assessment team began the process of producing a final report. All comments were discussed at the intensive meeting and each author was given the task of responding to the comments as determined by the team. The 500 page report, to be available on

CD, will be formally released in March 2003 at the annual NARSTO Executive Assembly meeting in Washington, DC. (Jeff West, 919 541 4635)

22. Models-3 Users Workshop. Several members of the Division participated in the first annual Models-3 Users Workshop held October 21-23, 2002, at the EPA in Research Triangle Park, North Carolina. There were Workshop sessions devoted to CMAQ model development, application, and evaluation. Jeff Holmstead, Assistant Administrator for the EPA's Office of Air and Radiation, gave a keynote speech on the use of models in the regulatory context and the need for scientific basis for regulatory policies. The services of the new Community Modeling and Analysis System (CMAS) center for support of Models-3/CMAQ in the community were described and illustrated during the Workshop. The Workshop was preceded by emissions model training sessions. Approximately 150 persons attended the Workshop. (Ken Schere, 919 541 3795).

Steve Fine presented *Introduction to EPA's Multimedia Integrated Modeling System Software Suite: A New Framework for Models-3* at the Workshop and provided input to the Community Modeling and Analysis System Center on training materials for a course on using MIMS for Models-3. Brian Eder presented the preliminary evaluation results of the June 2002 release of CMAQ. (Steven Fine, 919 541 0757; Brian Eder, 919 541 3994)

Robin Dennis attended and helped to facilitate, with Terry Keating of EPA Headquarters, the BMU/UBA-USEPA-EMEP (European Long-Range Transport Monitoring and Evaluation Program) Workshop, *Hemispheric Air Pollution --Trends and Intercontinental Transport of Photo-Oxidants, Particles and their Precursors across the Northern Hemisphere (Observations, Models, Policy Implications*, held October 9-11, 2002, in Bad Breisig, Germany. A summary and conclusions will be drafted for EMEP this fall. Robin participated in the follow-on U.S.-German Workshop, *Ozone and Particles: Policy and Science--Recent Developments and Controversial Issues (Regional and Urban Air Pollution)*, and presented results of a sensitivity analysis with CMAQ on the effectiveness of emission reductions of NO_x and VOC. An important finding for model application is that, in a relative sense, the most up-to-date chemical mechanism, SAPRC99, predicts greater benefits from NO_x emission reductions than those predicted by the older CB-IV mechanism. The difference is the order of 15%, which could affect conclusions from current EPA regulatory analyses using CB-IV regarding the number of counties still not attaining the ozone standard by 2020. In addition, Robin visited with Jan Willem Erisman of the Energy Research Center of The Netherlands to discuss dry deposition algorithms, establish collaboration between ASMD and the Dutch, and see their ammonia measurement system. After expressing a strong interest in collaboration, active collaboration has commenced, which will help ASMD in extending the M3Dry algorithms to cold weather seasons for sulfur and nitrogen species. Robin presented two seminars at the Ministry of the Environment at The Hague about CMAQ and multi-media work with the Extended RADM. The seminars created a major interest in CMAQ, and the Dutch expressed an interest in exploring the possibility of using CMAQ to give them more advanced modeling capability at the country scale. (Robin Dennis, 919 541 2870)

Idaho Falls

23. Hurricane Balloon. In late October, as Hurricane Kenna approached the west coast of Mexico, a newly developed FRD hurricane balloon was launched from a weather station in Mazatlan, Mexico. This launch was our first attempt to insert a balloon into an actual hurricane. The hurricane balloon was launched shortly after midnight on October 25, 2002 from a Mexican government weather observatory and balloon launch facility in the west coast city of Mazatlan. The balloon was launched at 12:27 a.m. local time and headed in a SSE direction at an average speed of about 4.9 m s^{-1}. Communication with the balloon and data acquisition was maintained through an onboard satellite telephone. While the balloon was ascending through the 300 to 700 m altitude, it experienced horizontal speeds of about 8.7 m s^{-1}. The balloon was ballasted to rise to 600 to 700 m ASL with 500 m of extra lift added in anticipation of precipitation that had been experienced during inflation and ballasting. No precipitation was encountered, however, and the balloon rose to 1196 m ASL within 15 minutes after launch. Since this altitude was higher than the configured window of operation, the

ballast pump turned on and started pumping. Over a period of 23 minutes the balloon altitude decreased about 164 m to 1032 m ASL.

About 38 minutes after balloon launch, the balloon altitude suddenly began increasing while the internal pressure of the balloon decreased to zero in less than one minute. It quickly became apparent that we had experienced a failure of the outer or ballast bladder, thus causing the sudden increase in altitude. In 19 minutes the balloon altitude increased from 1032 m to 2893 m. At the higher altitude the balloon direction changed by about 180 degrees and headed back toward the launch site in Mazatlan. One hour and 10 minutes after launching the balloon, when it had become obvious that the balloon was not going to make it into the center of Hurricane Kenna, the computerized command was sent to bring the balloon down. This command opened a 10 cm diameter valve in the top of the balloon to quickly release the helium and start the balloon descent. Ten minutes after the helium release valve was opened, the balloon landed about 6 km northwest of the launch facility. The average descent rate was 4.7 m s^{-1} and the maximum descent rate as the balloon approached the ground was about 8.3 m s^{-1}.

Although the balloon was unable to make it into Hurricane Kenna, we were able to accomplish a great deal with our first attempted launch into a hurricane. For example:

• We were able to quickly obtain Mexican government permission to go to a alternate launch site that better suited the trajectory of hurricane Kenna.

• With less than a day's notice, we were able to make all of the travel arrangements and, with all of our balloons and launch equipment, travel to Mazatlan, Mexico.

• With help from the Mexican personnel at the Mazatlan weather station, we were able to successfully procure the necessary helium to inflate and launch the balloon.

• We had what appeared to be a good forecast and timing on the balloon launch trajectory to intercept hurricane Kenna.

• We were able to track and control the balloon continuously during flight all the way from launch to bringing the balloon down successfully.

With the experience we gained on this deployment, we are better prepared for any future launch. randy.Johnson@noaa.inel.gov, Shane Beard, Tom Strong, Roger Carter

24. Joint URBAN 2003. Planning for the July 2003 field deployment to Oklahoma City, Oklahoma, continued during the month of October. A decision was made by the science committee to fund the construction of an additional set of programmable integrated gas samplers (PIGS). Research and development of a new generation bag sampler dubbed PIGS-II is proceeding. The chairman of the science committee briefed the Oklahoma City mayor and city council and received their endorsement to conduct the experiment in their city. In conjunction with that presentation, potential sodar sites were selected and permissions from building owners and managers were secured for placement of real-time samplers and PIGS. Building managers were very friendly and helpful, even giving permission to place samplers on roofs and on external fire exit stairways. This will provide a unique opportunity for vertical sampling of an intentionally released atmospheric tracer. kirk.clawson@noaa.gov, Jerry Crescenti, and staff

The additional 65 new generation samplers will be added to the existing inventory of 140 samplers to give us the quantity of samplers required for the Joint Urban 2003 experiment. randy.johnson@noaa.gov, Roger Carter, Shane Beard

25. Perlan Project. Funding was awarded for a joint NASA/NOAA project to measure turbulence and investigate stratospheric gravity waves as part of the NASA-supported Perlan project. The Perlan project is an ongoing effort, begun in 2001, to use a specially designed sailplane to soar to 100,000 ft within upward propagating stratospheric mountain waves (http://www.firnspiegel.com/perlan). In the first phase of the NASA/NOAA joint effort, we will build and mount a BAT probe on the sailplane and consult with NASA scientists and engineers to design and build a data system capable of operating under extreme conditions (very low pressure, temperatures to -65 C). Initial flight tests are scheduled for February of 2003 in the lee of the Sierra Mountains in California. A second deployment is scheduled for June/July of 2003 in New Zealand. jeff.french@noaa.gov, Randy Johnson

26. CLAST-High. The newly developed FRD aluminum version of the BAT probe is now mounted on one of the NOAA P3's and is awaiting flight testing. The aluminum BAT probe face was developed to overcome the pitting problems encountered on a carbon fiber probe face during flight in heavy precipitation. We expect a flight test to be conducted in mid-November, with more extensive testing in December and early January, before the BAT is returned to FRD in mid-winter.

Work continues on data processing from the three flights during which data was collected from the NOAA P3 BAT probe system earlier this year. Preliminary results are promising and indicate that the equipment was operating properly. Analysis still needs to be conducted to verify the frequency response of the instruments to determine how vibration on the nose boom affected our measurements. jeff.french@noaa.gov

27. Refractive Turbulence Study (RTS). Work continues on data processing for this year's field campaign that was conducted in Australia. The data are being reduced with the final product written to CD-ROM. Of primary interest to the sponsor are values of C_T^2 and C_n^2. Also of interest is the strength and isotropicity of the turbulence and thus we are investigating spectra of U', V', W' and co-spectra of these quantities. jeff.french@noaa.gov

28. INEEL Support. FRD was invited to participate as a player in the regional emergency exercise known as "Silent Thunder." The exercise was sponsored by the U.S. Dept. of Energy and the FBI with over 100 participants/observers in attendance. Other players included representatives from the two agencies listed above, plus representatives from the State of Idaho Bureau of Disaster Services and INEEL Oversight, the city of Idaho Falls (mayoral, police, and fire department representatives), the INEEL Maintenance and Operations contractor, and the Idaho State Police. Mayors, police chiefs, fire department chiefs, and county BDS personnel from many of the cities and counties in Eastern Idaho were also present. The scenario was designed to test the coordination of the various agencies in the event of a terrorist attack on a nuclear facility such as the INEEL. More specifically, it tested the handoff of emergency response responsibilities in the case of a terrorist threat to a nuclear facility from the DOE to the FBI. kirk.clawson@noaa.gov and Rick Eckman

29. AMS Short Course. Jerry Crescenti will be one of several instructors for the American Meteorological Society (AMS) *Short Course on the Fundamentals of Boundary Layer Wind and Turbulence Profiling using Radar and Acoustic Techniques*. This two-day course is sponsored by the AMS Measurements Committee and will be held on February 8-9, 2003 in Long Beach, California, in conjunction with the 83rd AMS Annual Meeting and the Twelfth Symposium on Meteorological Observations and Instrumentation. Crescenti will provide instruction on sodar siting considerations, interference sources (i.e., ambient noise), installation, and maintenance. See http://www.noaa.inel.gov/docs/sodar.pps. jerry.crescenti@noaa.gov

Las Vegas

30. 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 "atom" 7 of 9 days (78%). The model ran to completion on the UNLV super computer system "elko" 10 of 22 days (45%) [Total month: 17 of 31 (55%)]. Data are continuing to be renamed and saved daily, and backed up to CD monthly

(2 CDs). On October 10, the NV-RAMS was moved to a new, faster, super computer (elko) at UNLV. The UNLV computer system administrator has worked with SORD personnel to iron out bugs on their new system so that RAMS would run properly. Some initial start-up problems were resolved and by the end of the month consistent model runs were produced. We have seen model wall clock time reductions on the order of one-third to one-half. (Walt Schalk, 702 295 1262)

31. Cloud-to-Ground (CG) Lightning Study. On October 1, several CG flashes struck the U1a Complex between 12:45 and 13:00 PDT, injuring two people. The first CG flash within the 20-mi Lightning Alert Area, but not on the NTS, was detected at 11:42 PDT. At that time, the Duty Forecaster assessed the developing weather conditions and took prompt action to prepare and issue a Lightning Alert for the NTS. The Lightning Alert was automatically posted on the SORD Website at 11:58 PDT and individuals on the "NTS Hazardous Weather Notification List" were contacted via telephone between 12:00 PDT and 12:07 PDT. Prior to the strikes, several people at U1a were monitoring the SORD Lightning Data website, as is the normal U1a safety procedure during Lightning Alerts and when thunderstorms near the complex. The NTS Lightning Detection System worked in accordance with specifications and the SORD Duty Forecaster issued a timely NTS Lightning Alert in accordance with operational procedures. The flash that injured personnel was detected by the LDS at 12:55 PDT. Several reports were prepared documenting the meteorological conditions and lightning activity. (Walt Schalk, 702 295 1262, and Darryl Randerson, 702 295 1231)