



NOAA ARL Monthly Activity Report



June 2001

Bruce B. Hicks, Director
Air Resources Laboratory

Contents

1. *HIGHLIGHT – Forest Fire Smoke Forecasting*
2. *HIGHLIGHT – East Tennessee Ozone Study (ETOS).*
3. *Anomalous Radiosonde-Station Temperature Affecting Climate Trends*
4. *The Atmospheric Transport and Deposition of Mercury*
5. *Dispersion Ensembles*
6. *NWS/NCEP Dispersion Modeling Integration*
7. *SURFRAD*
8. *Atmospheric Modeling of Radiation Experiment (AMORE)*
9. *Terrestrial Carbon Sequestration Program*
10. *Canaan Valley*
11. *Climate Reference Network*
12. *Urban Dispersion*
13. *Roadway Dispersion*
14. *Dynamical/Photochemical Modeling*
15. *INSRP (Interagency Nuclear Safety Review Panel)*
16. *Extreme Turbulence Probe*
17. *SURFRAD and ISIS*
18. *Dispersion Model Validation Program (MVP)*
19. *U.S.-Russia Atmospheric Mercury Study*
20. *Plume-in-Grid Photochemical Modeling of Major Point Source Emissions*
21. *Computational Fluid Dynamic Tools for Air Pollution Modeling*
22. *Release of Models-3/CMAQ Version 4.1*
23. *Air-Sea Exchange Studies*
24. *Model Validation Program (MVP)*
25. *Tracer Technology*
26. *INEEL Transport and Dispersion Modeling*
27. *Safety*
28. *Climate Reference Network at Desert Rock.*
29. *Central States Regional Air Partnership (CENRAP)*
30. *Climatology Studies*

Highlights

1. Forest Fire Smoke Forecasting. Three ARL Divisions are collaborating with two ASFS groups in developing an improved capability to forecast the downwind spread smoke from forest fires. Workers at Oak Ridge will be collaborating with the USFS North Central Research Station, to provide an operational mesoscale weather forecast model coupled with a dispersion model. The initial effort will use NOAA ARL's version of RAMS coupled with ARL's HYSPLIT4 trajectory and dispersion model. Silver Spring and Idaho Falls personnel will be collaborating with the USFS Rocky Mountains Research Center in developing a dispersion

code that incorporates improved source term descriptions. These developments will serve as base-line systems for eventual transfer to the new WRF model, coupled with HYSPLIT4 and parallel developments in plume rise, smoke source characterization, and fire dynamics in development under the national Fire Plan. (pendergrass@atdd.noaa.gov, Herwehe, Eckman)

Work on the Program to Address ASEAN Regional Transboundary Smoke (PARTS) is nearing completion, with field deployment now planned for November (in advance of next year's fire season in Indonesia, which is expected to be severe). A recent web search has revealed that there are no fresh developments in the vegetation data base for SE Asia or Indonesia. In the lack of such data, source-term algorithms will be severely limited. (rao@atdd.noaa.gov)

2. East Tennessee Ozone Study (ETOS). The East Tennessee Ozone Study is well underway. Currently 15 ozone monitors have been deployed across the East Tennessee Valley. The latest addition to ATDD's RAMAN (Regional Atmospheric Monitoring and Analytical Network) is a site at the NWS office in Morristown TN. This provides a much needed monitoring site downwind of Knoxville, TN. Two additional sites are planned for the network. These sites will be integrated with observations conducted by the Cherokee Indian Nation and the State of North Carolina on the eastern side of the Great Smoky Mountains. These sites should be installed by mid-July and operational for the Twin Otter research aircraft program which begins August 5th. Flight trajectories are planned to cover both the Eastern and Western ranges of the Smoky Mountains. (pendergrass@atdd.noaa.gov, White)

Data collection flights have been started for the ETOS 2001 flight campaign. Two flights were made in June, with ozone data collected on June 12 and June 25, 2001. Ozone concentrations were fairly low compared to those found in previous airborne campaigns. Flights will continue through October 2001. Additional instrumentation will be added to the aircraft, including an upward looking PAR instrument and a downward looking Ocean Optics spectrometer. (dumas@atdd.noaa.gov, White, Pendergrass)

Hourly data observations from the network are provided on ATDD's web site at <http://www.atdd.noaa.gov/easttnmap.php3>. A number of comparisons have begun using the regional network and forecast products available on the NOAA/ARL/SS web site <http://www.arl.noaa.gov/ready/cmnet.html>. For example, sounding from both the AFMM5 (15 km) and ETA40 models are compared with data collected with the ATDD REMTECH sodar located within the East Tennessee Valley. Beginning in late June, a record of maximum ozone readings across the RAMAN network was initiated; this will be used to evaluate output from the Southeast Center for Mesoscale Environmental Prediction 45 km MAQSIP CONUS forecast <http://envpro.ncsc.org/projects/SECMEP>. (pendergrass@atdd.noaa.gov, White)

Silver Spring

3. Anomalous Radiosonde-Station Temperature Affecting Climate Trends. Temperature trends, and confidence intervals, for the 43-year period 1958-2000 have been estimated at the surface, for the troposphere, tropopause layer and low stratosphere, for each of the 63 stations in a global network. This permits examination of the impact of anomalous station trends on the apparent trends for climate zones, hemispheres and the globe. Most of the radiosonde stations having anomalously large trends in temperature, and anomalously large year-to-year variations in temperature (large confidence intervals) are in the tropics (30S-30N). Elimination of the 11 tropical radiosonde stations (out of 31) whose 95% confidence intervals exceed 0.2°C/decade results in a decrease in the tropical surface warming during 1958-2000 from 0.16 to 0.09°C/decade, but an increase in tropospheric warming from 0.07 to 0.13°C/decade, i.e., a change from the surface warming relative to the troposphere, to the troposphere warming relative to the surface. Not surprisingly, delicate issues such as the relation between surface and tropospheric warming appear very

sensitive to the radiosonde stations used, and presumably in the future to the way in which the radiosonde data are adjusted. The finding that elimination of these 11 stations also resulted in a significant change from a 1958-2000 cooling of 0.16°C/decade in the tropical high troposphere to a warming of 0.06°C/decades in this layer also has important implications, especially since the surface area of the tropics is half that of the globe. Such results may be germane to those being obtained by adjusting the inhomogeneities in radiosonde temperature on a year-to-year basis. (Jim Angell, 301 713 0295, x127)

4. *The Atmospheric Transport and Deposition of Mercury.* As a first step in configuring the HYSPLIT model for mercury, algorithms to simulate the atmospheric chemistry of mercury are being developed. Difficulties have arisen in the solutions of the vapor-droplet equilibrium problem. Detailed studies of the reactions affecting mercury in the atmosphere have indicated that the atmospheric chemistry of mercury appears to be essentially linear with respect to mercury concentrations (in the range of expected ambient concentrations). One of the underlying reasons for this linearity is that the concentrations of mercury are generally low enough relative to other key species in the system that the fates of these other species are essentially unaffected by the concentrations of mercury in the system. Because of this linearity, emissions from one source of mercury are not expected to influence the fate and transport of emissions from another source. It is therefore expected that an interpolation-based approach (similar to that used with dioxin and atrazine) will be suitable for mercury. (mark.cohen@noaa.gov)

5. *Dispersion Ensembles.* A paper has been completed to describe the results of a modified version of HYSPLIT used to generate multiple simulations from a single meteorological data set. Although a cumulative distribution of the ensemble probabilities compared with the measurement data was quite favorable, the resulting distribution was not uniform. This was attributed to release height sensitivity. Using the ensemble member concentration that provided the best fit with each measurement resulted in a dramatic reduction in the discrepancy between measured and calculated values and demonstrated the residual uncertainty in the model calculation. This residual uncertainty is caused by other model and data errors not included in the ensemble design. (roland.draxler@noaa.gov)

6. *NWS/NCEP Dispersion Modeling Integration.* HYSPLIT will be the single dispersion model used at NCEP, replacing VAFTAD for volcanic ash modeling, in addition to the current HYSPLIT RSMC radiological application. The PC-based tcl/tk HYSPLIT interface GUI and associated programs were ported to the NCEP IBM-SP. A demonstration was given to the SDMs, who run the model, and the Production Management Branch (PMB) staff, who are responsible for the NCEP production jobs. (barbara.stunder@noaa.gov)

Boulder

7. *SURFRAD.* Software to identify clear sky conditions was debugged and modified to work with SURFRAD data and applied to the four original stations' data from January 1997 to the present. That start time was chosen because the method requires solar component data, preferably independently measured direct and diffuse. It was not until the 1996 instrument exchanges that diffuse measurements were added at SURFRAD stations. The technique was subsequently applied to the two newest stations (Penn State and Desert Rock) for their whole tenure (mid1998 - present). This work was done to satisfy requirements of the NASA EOS program. Results will be given to collaborators at NASA Langley to be entered on their EOS validation CAVE web site (<http://www-cave.larc.nasa.gov/cave>) for distribution. (John Augustine, 303 497 6415)

8. *Atmospheric Modeling of Radiation Experiment (AMORE).* Substantial improvements have been made to the Table Mesa facility in preparation for the AMORE radiation sensor intercomparison program. The AMORE project is a radiative transfer modeling exercise that compares results with measurements obtained from various UV instruments. Should some of the participants wish to compare their measurements with

others, then it is important that the interested parties make arrangements among themselves for such comparison exercises. New Kipp and Zonen broadband UV instruments shipped from Europe have arrived. The Smithsonian instrument had to be returned for repair. Jim Slusser has been formalizing the guidelines for the modelers and the experimenters. A draft will soon be sent around to the participants. (John DeLuisi, 303 497 6824)

Oak Ridge

9. Terrestrial Carbon Sequestration Program. New instrumentation to measure soil respiration has been tested at Walker Branch. Preliminary studies of spatial variability and temporal stability of the measurements were performed. Work on an energy balance study at all FLUXNET sites also continued. Eddy covariance measurements above and below the canopy at Walker Branch continued. (wilson@atdd.noaa.gov)

10. Canaan Valley. An open house was held at the Canaan Valley Institute on June 30th. Attendees included Congressman Alan B. Mollohan (D-WV), West Virginia State Senator Sarah Minear ®), State Delegate Stan Shaver (D), and a number of local VIPs. Response to the NOAA ARL studies in the Canaan Valley, WV region was very positive. (vogel@atdd.noaa.gov, Pendergrass, Wood)

Field studies on the temporal and spatial variation of the fluxes of heat, moisture, ozone and nitrogen in the Canaan Valley region are in final planning. Research flights of the NOAA Twin Otter are scheduled for the first week in August. (vogel@atdd.noaa.gov, Meyers, McMillen, Gunter)

11. Climate Reference Network. Safety training (first aid, CPR, fall prevention) was provided for the CRN field engineers. Meta data for the field sites has been successfully entered into the NCDC data base via a Web form; this should be a big time-saver in the field. A CRN system has been set up at ATDD for system development work, and the field site at Bondville, IL was visited to get ready for setting up multiple systems at this site for side-by-side testing. A Geonor rain gauge was set up at Bondville for comparison to the rain gauges at the NADP site there. Work is under way on automating the anemometer calibration procedures using the programming capabilities and analog signal outputs of a Campbell 23X data logger to control our wind tunnel. Automation of the temperature calibration procedures has already been accomplished, and a second precision bath (-60°C to +60°C) and electronic calibration standard thermometer have been added to speed the process. Shipments of components are arriving frequently, many in large boxes, creating the anticipated bit of a storage problem. The first group of solar shields for the temperature sensors arrived with the wrong fans and mounting flanges; the manufacturer has promised to ship the correct parts. However, the first group of data loggers arrived with the new “plug-together” two-piece terminal strips to facilitate field replacements already installed, so these will not have to be retrofitted later as originally anticipated. (hosker@atdd.noaa.gov, Meyers, Hall, Black, French, Brewer, Mayhew, Ludwig, Auble, Shifflett, Conger, Ridenour)

12. Urban Dispersion. ATDD and Los Alamos National Laboratory are studying Oklahoma City and Phoenix, as potential sites for a major urban dispersion study by DTRA in 2003. Additional contact with city officials in both locations will be sought before a final decision is made. (hosker@atdd.noaa.gov)

DTRA will be coordinating a multi-organizational field study during July to measure the winds, surface energy budgets, soil moisture, surface temperature and its variation, and other key variables across a 1° x 1° region centered on the lower Chesapeake Bay. The object is to provide data for running and testing current and future generation mesoscale wind field models. ATDD will be operating three surface energy flux stations, about 20 soil moisture profile probes, and collaborating in airborne measurements using the NOAA Twin Otter.

Planning and associated teleconferences occurred all month long. (hosker@atdd.noaa.gov, Meyers, Brooks, McMillen, Gunter)

13. Roadway Dispersion. Analysis of ATDD's turbulence measurements in the wake behind a vehicle was continued for the paper for the Tenth Symposium on Transport and Pollution, Sept '01, in Boulder. Analysis was restricted to parallel opposing wind cases. The lateral and vertical variations of TKE field data were plotted and their best-fit functions were used to determine the weighting functions for reducing the scatter; the velocity deficit data were not weighted. The field decay rates are much smaller than the corresponding laboratory values. (rao@atdd.noaa.gov, Gunter)

14. Dynamical/Photochemical Modeling. A new program has been written to extract vertical and horizontal slices from the LESchem model trace gas output for all saved times (simulated fields are currently saved at two-minute intervals). These sequential slices will be used to create high-quality animated contour plots of trace gas mixing ratios or meteorological variables. The current version of the LESchem model has been ported to its third operating system, a LINUX-based workstation provided by the University of Alabama in Huntsville. Statistical analysis of dynamical and thermal mean and turbulent properties from the LINUX simulation's output compared favorably with previous simulations and to real world observations. (decker@atdd.noaa.gov, Herwehe)

15. INSRP (Interagency Nuclear Safety Review Panel). A "quick look" at possible offsite or fence-line consequences of on-pad accidents for the Mars '03 mission was conducted. The purpose of this analysis was to provide a framework of estimated population exposure at the upper limit. This analysis assumed extremely conservative estimates for the release environments and source terms. While real material would be released over a wide range of particle sizes, all released material was assumed to be small particulate less than 1.0 micron with no surface deposition. The estimated diameter of the initial release puff was then reduced by a factor of three, and very conservative dispersion estimates were used. Using health-related dose conversion factors developed for the Cassini Mission and extremely conservative transport and dispersion methodologies, the fence-line (3 mile) health effect was estimated at less than 0.5 latent cancers. The next step in this process is to employ realistic source and dispersion environments to estimate more plausible and probable exposure estimates. As indicated, the initial released puff is estimated at least 3 times the diameter set in this analysis. Simply using the accepted actual puff dimension will reduce the fence-line estimate by at least two orders of magnitude. (pendergrass@atdd.noaa.gov)

16. Extreme Turbulence Probe. The Extreme Turbulence (ET) Probe is being developed for application in extreme conditions. It derives the incident wind velocity from the pressure distribution over its spherical surface. The sphere serves as both sensing surface and protective cover in its hurricane-force environment. To accept winds from any angle, sensor ports cover its entire circumference. However, for any given wind direction, only a few ports, facing into the wind, are used. Software to select the appropriate sensors fifty times per second, has been completed and debugged. (dobosy@atdd.noaa.gov)

17. SURFRAD and ISIS. The standard operations of the ISIS Network continued. The regular processing of June ISIS level 1 and level 2 data is underway. Fifteen minute and hourly averaged data have been transmitted to NCDC and placed on the WWW. Recent lightning storms have caused data outages at several stations. Limited spare parts and slow repair by the manufacturer have resulted in some data loss. (matt@atdd.noaa.gov)

18. Dispersion Model Validation Program (MVP). Several computer programs developed by ATDD for processing MVP tracer data were revised, streamlined, and tested. A large number of comments were inserted

to make the codes self-explanatory. A one-page *ReadNow.txt* file, which lists the program descriptions, acknowledgements, and a User's Agreement, was prepared. Data are currently being used to test HPAC, CALPUFF, and VLSTRACK models for the DTRA. (rao@atdd.noaa.gov)

19. U.S.-Russia Atmospheric Mercury Study. Dr. Dmitri Zamolodchikov (Russian Academy of Sciences) arrived in Lavrentiya, Russia to help install and operate the NOAA mercury monitoring instrumentation. The mercury sensors are on order, with installation in Lavrentiya still scheduled for August 14-16. (brooks@atdd.noaa.gov)

Research Triangle Park

20. Plume-in-Grid Photochemical Modeling of Major Point Source Emissions. The plume-in-grid (PinG) treatment, originally designed to simulate the dynamic and photochemical processes of gaseous pollutants in point source plumes within the Community Multiscale Air Quality (CMAQ) modeling system, has been upgraded to also model aerosols and particulates. The aerosol modal model approach currently employed in the CMAQ chemical transport model (CTM) has been incorporated into the PinG algorithm to make it capable of treating aerosol processes in plumes. Code testing of the upgraded PinG gas/aerosol model is underway and simulations of the July 1999 period during the Nashville field study are planned in order to compare model results with various particulate/aerosol plume measurements. In addition, selected results from simulations of the coupled CTM/PinG Lagrangian plume model on a group of major point sources exhibiting a wide range of NO_x emission rates from the summer 1995 Southern Oxidant Study in the Nashville region were presented at the AMS Symposium on Atmospheric Chemistry. Modeled results for various gaseous species were compared against pollutant data collected during airborne traverses across power plant plumes at various downwind distances by the NOAA WP-3, DOE G-1, and CASA lidar aircraft and the TVA helicopter. The evolution of modeled plume ozone and NO_x concentrations displayed the same behavior as in the observed plume data collected by the airborne platforms. The ozone recovery and the rate of NO_x oxidation in modeled plumes were strongly related to the NO_x emission rate, which were also found in the plume measurements. (James Godowitch, 919 541 4802)

21. Computational Fluid Dynamic Tools for Air Pollution Modeling. In June, a Cooperative Research and Development Agreement (CRADA) was signed between Fluent, Inc. and the US EPA National Exposure Research Laboratory to work cooperatively to help make Computational Fluid Dynamics (CFD) a proven and applied tool to support air pollution concentrations modeling within building and roadway human exposure microenvironments. This will be achieved through:

1. Comparison to experimental data and to other established methodologies used for environmental exposure modeling;
2. Identification of desirable custom software tools that would simplify the CFD process for environmental scientists and reduce the risk of user error in the application of CFD;
3. Determination of best-practice methodologies that document the recommended usage of CFD software for environmental exposure modeling;
4. Identification of research topics and/or future software development that should be pursued in order to extend the state of the art in CFD modeling of environmental exposure to air pollutants.

Some preliminary results of evaluation studies and an outline of research plans were presented at the annual AWMA Conference in Orlando, Florida, June 24-28, 2001. Application should start by demonstrating that CFD results are comparable to an appropriate set of base case situations that are supported by measurement

data and, perhaps, non-CFD analytical solutions. It is recommended that these base cases be established through a working group of commercial and government CFD practitioners. Standard cases for different types of microenvironments (for example, roadway, a building cluster) would be based on databases from field and wind tunnel studies. (Alan Huber, 919 541 1338)

22. Release of Models-3/CMAQ Version 4.1. Models_3/CMAQ version 4.1 for the Sun workstation has been shipped to users who are able to process Digital Linear Tapes (DLT). A copy of the installation manual is shipped with each copy. The most significant additions since the last release are the inclusion of the Sparse Matrix Operator Kernel (SMOKE) for processing emissions and the SMOKE Tool for preparing (using SAS and ARC/INFO) some of the input files for SMOKE. SMOKE does not use SAS or ARC/INFO. There are other improvements which have been made to correct known problems, such as the inability of the File Converter to make some conversions, or to add new science options, such as the addition of the Modified Euler Backward Iterative (MEBI) solver for the carbon bond IV gas_pphase chemical mechanism. This solver improves the speed of the simulations. For Sun users of Models_3/CMAQ who do not have DLT, the version 4.1 will be shipped in August. Version 4.1 for Windows NT is complete. The installation CDROM and installation manual are being prepared. The NT version will still be distributed by the National Technical Information Service (NTIS) although patches for those who have installed version 4.0 will be distributed by the Models_3 Helpdesk. (Gary Walter, 919 541 0573)

Idaho Falls

23. Air-Sea Exchange Studies. The LongEZ research aircraft and its suite of *in situ* and remote sensors are in final preparation for the upcoming Coupled Boundary Layer Air-Sea Transfer (CBLAST-Low) light-wind research pilot study which will be conducted in Martha's Vineyard, Massachusetts, from July 20 to August 10, 2001. Following are summaries of the progress made over the last month on hardware and software modifications. A project description is available at <http://www.noaa.inel.gov/projects/cblast/>. (jerry.crescenti@noaa.gov, Jeff French, and Tim Crawford)

Laser Altimeter Array. In previous air-sea interaction research studies, the LongEZ has carried three high speed (2 kHz) laser altimeters. These sensors form an equilateral triangular array 0.9 m on each side. The data acquired by this array has been used to quantify sea surface long waves (>1 m) which include height, frequency, phase, and speed. A fourth laser has been added to this array to further improve longwave quantification. A new ultra-fast (12 kHz) laser altimeter has arrived at FRD. This new laser will be placed in the nose cone of the instrument pod to improve 1-D wave spectra fidelity; the original laser has been moved to under the left wing of the LongEZ. This laser is oriented at an angle of 15° from vertical. This oblique angle laser will “look” at the texture of very short capillary waves under very light wind conditions to quantify “slick” surface fraction. Finally, a fifth slow response laser altimeter has also been added to the LongEZ as a supplemental altitude reference for the autopilot system. This laser will allow precise flight altitudes to be maintained. This is critical to understanding the stable marine atmospheric boundary layer which tends to be very stratified. Thus, better altitude control will reduce the variance in turbulent flux measurements.

Global Positioning Systems (GPS). For the first time, we will have a fully integrated dual-frequency differential carrier-phase global positioning system (GPS) on the LongEZ. This Ashtech GPS marks a dramatic improvement over the previous single-frequency system used in prior air-sea interaction field studies. Fixed position and velocity information will be acquired at a rate of 5 Hz and extended to 50 Hz with fast-response accelerometers. The new GPS hardware improves position accuracy to a few millimeters and velocity accuracy to better than 2 cm s⁻¹. In addition, many of the GPS antenna cables required enhanced shielding in order to minimize any radio frequency interference problems with the Ashtech dual-frequency system.

Software modifications are also complete for the new Ashtech ground station computer used for differential corrections. These data are collected at a rate of 5 Hz while the LongEZ is in flight and are used to differentially correct the aircraft GPS data. Finally, a new self-survey and line bias calibration was conducted with the TANS Vector GPS system. These procedures allow the TANS to determine aircraft attitude (i.e., pitch, roll, and heading) to $\pm 0.05^\circ$ at 10 Hz. Like the Ashtech GPS data, the aircraft attitude data determined by the TANS is also extended to 50 Hz with accelerometers.

Infrared Sea Surface Temperature (SST) Sensor. The difference between air and sea surface temperature is one factor that controls heat flux. The Everest 4000.4GXL infrared surface temperature sensor, now insulated and temperature-controlled at a constant value of 30°C , has been moved from its traditional location in the strake of the LongEZ to the nose cone of the instrument pod. We are confident that this infrared sensor will be able to acquire sea surface temperature to an accuracy of better than 0.25°C .

Radar Scatterometers. The 36-GHz Ka-band radar scatterometer (developed by Doug Vandemark of NASA) has been “repackaged” and delivered to FRD. Electronics for the new 96-GHz Ku-band radar scatterometer are still being developed; however, they are expected to be ready for the CBLAST-Low pilot study. The Ku-band antenna has been incorporated into a fiberglass mount and will be mounted beneath the fuselage of the LongEZ just forward of the instrument pod.

Infrared Gas Analyzer (IRGA). Measurement of latent heat and carbon dioxide flux depends on accurate high-frequency water vapor and carbon dioxide observations. Data acquired by the infrared gas analyzer (IRGA) exhibited a 2-Hz voltage increase and decrease of ~ 0.5 volt about the baseline of the signal. After testing of the instrument and data acquisition system, it was learned that the power supply was injecting a small, but not insignificant AC voltage signal over the 15 volt DC power to the sensor. The power supply has been repaired. Data from subsequent test flights has shown the IRGA to reliably acquire water vapor data.

LongEZ Test Flight. A test flight of the LongEZ and its instrument suite was conducted on June 15. With the exception of a couple of minor problems, the data acquisition system and all of the sensors worked flawlessly. At least two more test flights are anticipated in early July before deploying for the CBLAST-Low pilot field study.

24. Model Validation Program (MVP). Processing of the MVP Session 4 Long-EZ data was completed in June. The final data set contains 23 different flights. These data have been sent to ATDD in Oak Ridge for archiving on the MVP server. The one remaining task with the MVP Session 4 data set is to write a data report. There is a good chance that this will end the FRD involvement in the MVP. Overall, funding for the MVP is winding down. The Air Force is searching for additional funding to keep it going, but current indications are not promising. One reason for declining interest within the Air Force is that they are developing a new generation of rockets that are supposed to produce less toxic effluent than current rockets such as the Titan IV. (richard.eckman@noaa.gov)

25. Tracer Technology. We are continuing our efforts to improve our tracer measurement technology. Our existing continuous SF_6 analyzers have always had a baseline drift problem which appeared to be related to instrument temperature. This required careful environmental control during field experiments. We have now isolated the problem to the Electron Capture Detector and the electronics packaged with it. The instrument baseline tracks the temperature of these very well. Since these are both housed in a closed aluminum box, they tend to change temperature slowly, so the problem appears as slow baseline drifts. We are currently experimenting with ventilating the box or temperature controlling it to reduce this problem. (roger.carter@noaa.gov, Shane Beard)

We are also investigating new technology for tracer measurements. With support from the Army, we will be working with the scientists from the INEEL to examine the feasibility of using Ion Mobility Spectrometry to detect SF₆ and perfluorocarbons. (roger.carter@noaa.gov)

26. INEEL Transport and Dispersion Modeling. Additional discussions were held with INEEL personnel in June regarding the maximum ground-level concentrations that can be expected from a proposed effluent stack at the site. For surface releases, the “worst-case” dispersion scenario is usually associated with stable conditions and light winds. However, the stack in question is expected to produce a plume with an effective centerline height of nearly 300 m. Close in to the source, standard Gaussian modeling for such a plume actually gives the highest ground-level concentrations under unstable conditions rather than stable conditions. The reason for this is that the stable stratification keeps the plume from reaching the ground close to the stack, even though the centerline concentrations are high. A two-page memo outlining these issues was sent to INEEL. (richard.eckman@noaa.gov)

With the MM5 forecasts for Southeast Idaho now running on a daily basis at FRD, focus is shifting to upgrading the output graphics and integrating the output into other aspects of the INEEL support, such as the dispersion modeling. A series of MM5 animations are available on the FRD web site at <http://www.noaa.inel.gov/frd/Personnel/Rick/MM5/>, but there has been no public link to these images during the development stages of the FRD modeling effort. A public link will be added in the near future under the “Weather” menu of FRD’s main web page. Some investigations are also being made into providing some enhanced graphics, possibly including some 3D visualization. One possibility being investigated is a software library called The Visualization Toolkit, which provides some advanced 3D visualization techniques for fluid flow. (richard.eckman@noaa.gov)

27. Safety. FRD’s safety officer worked with NRC and Idaho Department of Environmental Quality to dispose of used tritium foils from the trace gas analyzers (TGA’s) that were refurbished. A NOAA Corporate Assessment Team teleconference focused on budgetary issues concerning assessment visits, training for NOAA personnel to perform assessment visits, and findings from the NOAA Environmental Compliance and Safety Assessment System (NECSAS) visit. (debbie@noaa.inel.gov)

Las Vegas

28. Climate Reference Network at Desert Rock. Discussions have been held with representatives of NCDC regarding installation of Climate Reference stations at the Desert Rock Meteorological Observatory (DRA). Plans have been made for a site survey in August. Digital photographs of the DRA area were sent to NCDC for assessment. (darryl.randerson@noaa.gov)

29. Central States Regional Air Partnership (CENRAP). Staff from ARL/SORD participated in a meeting of CENRAP in St. Louis, MO. CENRAP, like the other four Regional Air Partnerships, is planning to use air quality and meteorological monitoring data and models to determine the extent and causes of haze at 156 national parks and wilderness areas that have federal visibility protection so that they can determine appropriate emission controls to reduce the haze over the next 60 years to natural levels. The CENRAP region includes nine states (TX, LA, OK, AR, KS, MO, NE, IA, and MN) and has participation of air quality organizations from each of the states and the tribal nations within those states, as well as a number of federal agencies and non-government stake holders. ARL staff briefed the CENRAP meeting participants on the Interagency Monitoring of PROtected Visual Environment (IMPROVE) network during the plenary session and participated in a breakout session of the Monitoring Working Group. Due to the scarcity of visibility protected

areas in the CENRAP region, additional IMPROVE Protocol particle monitoring at 14 locations in the region has been commissioned and will be started early next year. Upper-air meteorological monitoring data has also been identified as a critical need that is currently insufficiently met. As a member of the CENRAP Monitoring Working Group, ARL staff will continue to assist in meeting its atmospheric monitoring and assessment mission. (marc.pitchford@noaa.gov)

30. *Climatology Studies.* A number of approaches were reviewed for utilizing the morning radiosonde observations from Desert Rock to help predict afternoon maximum temperatures at several locations on the NTS. The initial experiment utilized only the 500-mb heights as a predictor of afternoon temperatures. The results showed that the 500 mb heights were generally a good predictor for spring and fall temperatures, but not very useful for summertime temperatures or wintertime temperatures. Apparently the main factor influencing the usefulness of the 500-mb heights as a predictor is whether or not there is a significant chance of precipitation. The main time of the year in which precipitation occurs on the NTS is during the winter and summer months.

The next approach involved using a multiple regression technique to include selected radiosonde parameters concurrently for predictors. The initial selection of parameters did not yield results that were statistically more significant than using only the 500-mb heights. In fact, using only the 500-mb heights generally gave better results than the initial multiple parameter approach. The initial technique with 500-mb height generally explained about 80 percent of the variance in the spring and fall, but explained only about 40 to 50 percent of the variance in mid-summer and mid-winter. Further study of this approach to predicting maximum temperatures will be expanded to include several predictors that have the higher correlations by month. (douglas.soule@noaa.gov)