



# NOAA ARL Monthly Activity Report



February 2002

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**Air Resources Laboratory**

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## Highlights

1. **World Trade Center Modeling Study.** Work was initiated in February on the World Trade Center project at the Fluid Modeling Facility in collaboration with health effects researchers at Rutgers University/EOSHI

(Environmental and Occupational Health Sciences Institute). The primary goals of the eight to ten month study are to obtain laboratory data for evaluation of Computational Fluid Dynamics models and for developing guidelines for estimating near-field concentrations of pollutants emitted within highly urbanized areas. Initial planning has suggested that a 1:600 scale of lower Manhattan will be constructed for purposes of measuring flow characteristics (velocities and turbulence) and concentration distributions within this urban landscape with considerable emphasis on characterizing dispersion within five to ten blocks of the World Trade Center site. Planning and study design will continue in March and April. (Steve Perry, 919 541 1896)

**2. Review of ARL Aircraft Activities Completed.** At the request of the Office of Marine and Aviation Operations (OMAO), GSA's Interagency Committee for Aviation Policy (ICAP) carried out a Aviation Resource Management Survey (ARMS) of ARL research programs utilizing the LongEZ. In addition to the usual review areas, OMAO specifically requested the ARMS include a comprehensive risk analysis, suggest how to best continue the use from an administrative standpoint, and identify other aircraft options suitable to perform the research. We were pleased that the ARMS Team recognized the outstanding mission effectiveness of a "pusher" type aircraft not only for gathering air data but for its fuel efficiency, operating costs, and endurance

### **Silver Spring**

**3. Global Temperatures Updated Through 2001.** An update of global tropospheric and low-stratospheric temperatures through 2001 shows that there has been little change in global temperature during the last 3 years (or since the end of the strong El Nino of 1997-98), surface temperatures remaining about 0.6K above the 1961-90 average and tropospheric temperatures about 0.2K above this average. The "land" and "sea" hemispheres differ in this regard, however, with Northern Hemisphere surface temperatures about 0.7K above the 1961-90 average compared to 0.15K above this average in the troposphere, whereas in the Southern Hemisphere during the last 3 years the surface temperatures have been about 0.5K above the 1961-90 average compared to 0.25K above this average in the troposphere. This tendency for a larger surface than troposphere temperature anomaly has been especially apparent since the Pinatubo volcanic eruption in 1991, and is reflected in the much-discussed tendency for a greater surface than tropospheric warming since about 1980. The change with time and hemisphere of the difference between surface and troposphere temperature anomaly represents a fascinating aspect of the climate puzzle which will be monitored closely. (Jim Angell, 301 713 0295, x127)

**4. The Atmospheric Transport and Deposition of Mercury and Dioxin.** Involvement with the EMEP Hg Model Intercomparison Project continues, under the direction of Alexey Ryaboshapko of MSC-East in Moscow. Russ Bullock of ARL/ASMD is generating MM5 meteorological data for the appropriate time periods in the European domain of the model intercomparison, and has generously agreed to share these data with me for my runs. Discussions regarding a North American Hg model intercomparison project were initiated at the December 2001 mercury meeting noted above and also with the IJC International Air Quality Advisory Board.

A new dioxin atmospheric model intercomparison project is under way, coordinated by the EPA. Several planning meetings have already been held, and the project is proceeding forward. Each of the participating models will simulate emissions from U.S. sources in the year 2000. The model results will be compared against each other and against ambient concentration measurements made during that year. Participating models in the intercomparison include ours (HYSPLIT) and RELMAP from the EPA. Other models may also participate, but, unfortunately, funding has not been made available for any of the modeling participants other than for EPA's RELMAP. This has led to the withdrawal of some potential participants, including Models-3, and possibly REMSAD as well. Thus, the future of the project is not certain. [mark.cohen@noaa.gov](mailto:mark.cohen@noaa.gov)

**5. HYSPLIT Updates.** A multitude of minor and some major changes to HYSPLIT that have been accumulating for the last several months have finally been incorporated into the code: a relative directory pointer for GUI help files, multiple trajectory start times now supported in trajplot, the hysplit model now defaults to subgrid rather than

the global grid for lat-lon input meteo grids, the startup file incompatibility with tcl/tk GUI has been eliminated, a GUI option to support grib conversion of local archived data, added backward concentration option to GUI selection, the metadata utility programs modified to handle lat-lon grids, a version control script developed to track model changes, supplemental text file editing for conc/traj plot added to the GUI, the time step sensitivity to concentration grid with no particles was removed, the main code was modified to support the ensemble calculation on single processor, created a Master makefile to simplify installation on different platforms, added an option to not display source point locations in trajplot, improved plot labels for trajplot and concplot, added window clipping to maps so that short lines extend to the map boundary, created an option for multiple trajectory files in trajplot by reading file with filenames. [roland.draxler@noaa.gov](mailto:roland.draxler@noaa.gov)

A new chemical subroutine was implemented in HYSPLIT-CheM. The Rosenbrock sparse Kaps-Rentrop method is now used instead of the Gear's integrator to solve the complex nonlinear kinetic mechanism within the model. A parallelized code was developed to improve the efficiency of HYSPLIT-CheM. The new code is currently being implemented and tested in a multiprocessor computer. [ariel.stein@noaa.gov](mailto:ariel.stein@noaa.gov)

**6. READY/HYSPLIT.** Since 24 September 2001, ARL has been requiring all users except those with **.noaa.gov** computer domains to register before being permitted to run the HYSPLIT transport and dispersion model on the ARL READY (<http://www.arl.noaa.gov/ready.html>) website. At the end of February, over 700 requests for registration have been processed. A new HYSPLIT interface has been installed on the READY web server that incorporates many new options of the HYSPLIT model recently completed by Roland Draxler. The graphics created from the model are now the same as those produced by the PC version of HYSPLIT. One of the new web options is the ability to save the graphics as vector-oriented PostScript files, which will improve the clarity of the printed graphic on the user's end. [glenn.rolph@noaa.gov](mailto:glenn.rolph@noaa.gov)

**7. Comment on Cloud Trends Paper.** With Imke Durre (NOAA/NCDC), comments were prepared on a recently published paper in which trends in cloud top and base height were deduced using radiosonde data. Our comment suggests that the method used is sensitive to vertical sampling, which has increased over time, and that the reported trends may be artifacts of this change in the archived data. The manuscript is currently in ARL internal review. [dian.seidel@noaa.gov](mailto:dian.seidel@noaa.gov)

## **Boulder**

**8. SURFRAD/ISIS.** Management of the ISIS network of nine surface solar monitoring stations was transferred to SRRB. The conversion to a SURFRAD type of data management to ISIS is nearly complete. Major differences with the previous style are that data files (processed and raw) will be organized in UTC rather than local standard time, and raw voltages from the instruments will be recorded. The calibration factors will be applied to the raw data in post processing. The latter makes it more convenient to reprocess the data. New Campbell data downloading programs are already in place at ISIS stations and data are being collected at SRRB. These files list a history of instruments at the station and their calibration factors. They are accessed in the daily processing, and for reprocessing the ISIS raw data. The calibration information is accessible via the web so that data users may see when the instruments were exchanged and the calibration factors for those instruments. (John Augustine, 303 497 6415)

**9. SURFRAD and ARM.** The submission of SURFRAD and ARM data to the Baseline Surface Radiation Network (BSRN) archives continues. SRRB has submitted data for the six SURFRAD sites through Feb 2002. Data for the four ARM sites SRRB is responsible for has been submitted through Nov 2001. Due to the lag time in getting data from the ARM Tropical Western Pacific (TWP) sites, SURFRAD data submissions will typically lead ARM submissions by as much as several months. (Gary Hodges, 303 497 6460)

**10. Italian-American Bilateral Agreement.** Plans for cooperative research projects between Italian and U.S. research laboratories continue to be developed. Some suggested projects are completing the suite of aerosol and radiometric instruments at the Mediterranean island Lampedusa station and conducting a study of aerosol trends over the U.S. using a large collection of aerosol data obtained in the 1960s and larger yet in the mid 1990s to the present. The Lampedusa station is being groomed as a satellite ground truth station to scale up the local dust studies being conducted at the station and elsewhere. Research products from the PAUR experiment, in which SRRB personnel participated two years ago, are still being generated. The array of measurements taken during the PAUR experiment was sufficiently complete to derive optical properties of nearby desert aerosols. Some aerosol properties such as albedo of single scatter, phase function and optical depth were retrieved from the data. (John DeLuisi, 303 499 1493)

**11. UV – The CUCF.** Patrick Disterhoft and Kathleen Lantz attended the annual review of the USDA's UV Monitoring Program managed by the National Resource Ecology Laboratory (NREL) at Colorado State University. The major accomplishments and research of the Central UV Calibration Facility (CUCF) during 2001 that are related to the USDA's UV Monitoring Network was presented. The CUCF's primary responsibilities as described in the original NREL mission document and by the 2001 Review Panel are for calibrating and characterizing UVB Broadband radiometers, Rotating Shadow Band Radiometers, and the U111 reference spectroradiometer of the USDA UV Monitoring Network. In 2001, the CUCF calibrated and characterized 31 out of the 46 YES UVB-1 broadband radiometers operated by the USDA UV Monitoring Network. This included 31 field tests to determine individual scale factors, and laboratory measurements to determine the cosine response, spectral response, and absolute response. In 2001, the scale factors on average of the individual radiometers (with serial number 940401 and higher) have decreased by 0.6% compared to the first calibration (1997-present) and do not exceed a change of 3%. For broadband radiometers with a serial number lower than 940401 show a larger change of approximately 3% on average. In part this larger change from the new instruments is due to the methodology of calibration as opposed to degradation of the instrument and a modified method of calibration was proposed. The above stated changes are with respect to the CUCF standard UVB broadband radiometers. The total calibration change of the instruments includes the changes in the standard UVB broadband radiometers. Calibration of the standard triad indicates that since 1997, their sensitivity has decreased by approximately 5%. Continued comparisons of the standard triad against the U111 reference spectroradiometer are ongoing. The CUCF in collaboration with NREL is writing two papers on the calibration chain and history of the UVB standard triad and the UVB broadband radiometers of the USDA network.

During 2001, the CUCF performed 42 calibrations of the UV Multi-Filter Rotating Shadowband Radiometers (UVMFRSR). A review by NREL of the performance of the UVMFRSRs in the field through the year 2000 indicated that revisions were needed to channels 3-7. Implementation of this change required a closing calibration on each instrument prior to the upgrade/revision and a second calibration after the revision by the CUCF. 18 UVMFRSRs out of 46 instruments operated by NREL received the upgrades by Yankee Environmental Systems (YES), and closing and subsequent "revision" calibrations by the CUCF prior to returning to the field. In addition to the absolute calibration of each of the seven narrow-band channels, the CUCF provided a check of the dark count, spectral response and cosine response measurements of each instrument. Plots of the spectral response and centroid calculations of the UVMFRSR since 1997 show that the centroids of the seven channels have not changed more than 0.05 nm. This year the CUCF implemented the cosine measurement bench that was developed during the previous two years. Cosine measurements began on the UVMFRSRs that had undergone revision Q and revision P upgrades at YES. Next year, continued revision/upgrades and the necessary calibrations will occur to the remaining filter radiometers. (Kathleen Lantz, 303 497 7280; Patrick Disterhoft)

## **Oak Ridge**

**12. Urban Dispersion.** The Long-EZ made measurements in the nocturnal boundary layer over Salt Lake City during the VTMX study in October 2000. Data were obtained in predawn flights, 0300 LST to 0700 LST (UTC – 7), on six different days. The horizontal structure of turbulence, temperature, and wind are being computed over the straight legs of two north-south racetrack patterns that covered the width of the Salt Lake Valley over its southern half. [dobosy@atdd.noaa.gov](mailto:dobosy@atdd.noaa.gov)

**13. Canaan Valley.** The Canaan Valley Air Quality Research and Monitoring Station will soon have a high-speed cable connection to the Internet and additional instrumentation, including two water quality stations. The web site <http://airmon.canaanvi.org>, showing current weather conditions, has also been upgraded. Computer equipment at the station has been upgraded to better handle the new requirements. The web site is currently averaging over 1600 hits/day and over 100,000 hits since its inception in December. [vogel@atdd.noaa.gov](mailto:vogel@atdd.noaa.gov)

**14. Dynamical/Photochemical Modeling.** For the initial LESchem simulation over a rural site southwest of Houston, a model domain of 20 km x 10 km x 4 km with 200 meter horizontal grid spacing and 100 meter vertical grid spacing was chosen. Biogenic emissions from the surface were horizontally homogeneous throughout the model domain. Embedded within the domain was an elevated point source representing a flare stack, co-emitting nitric oxide (NO) and ethylene (or ethene, C<sub>2</sub>H<sub>4</sub>). All emission rates (flare stack, plus homogeneous biogenic and anthropogenic background emissions) were based upon values, after units conversion, provided by Dr. Michael Trainer (NOAA/Aeronomy Laboratory) from modeling studies of TexAQS 2000 observational data. [herwehe@atdd.noaa.gov](mailto:herwehe@atdd.noaa.gov) (Decker)

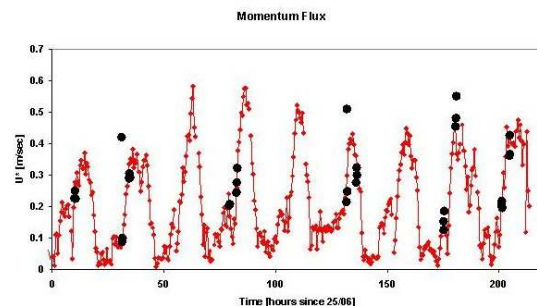
**15. GEWEX/GCIP.** Automation of the data collection procedures for the NOAA GEWEX sites has progressed to the point that data are retrieved each day at 3 am. Programs are being tested that will process, plot and archive the data on the ATDD GEWEX ftp site. The data from 2001 for all of the sites are nearly complete. Plans are underway for installation of the site at Goodwin Creek, Mississippi, then later at the Audubon Research Ranch in southeastern Arizona. An abstract describing the annual cycle of the surface energy balance was submitted for the upcoming GAPP conference to be held in New Orleans in mid May. [meyers@atdd.noaa.gov](mailto:meyers@atdd.noaa.gov), (Heuer)

**16. HARM/Homeland Security.** User-interface development continues for the NOAA/ARL Hazardous Atmospheric Release Model (HARM). A preliminary web site was established and tested to demonstrate the capabilities of the web-based viewer. Next, the process will be automated by which data from the AWOS/ASOS sites are brought into the viewer. [dumas@atdd.noaa.gov](mailto:dumas@atdd.noaa.gov)

A survey of the state of emergency-response modeling seeks to establish a solid base for the application of HARM as a local-to-regional interface between NOAA's CAMEO/ALOHA model for first response, and the HYSPLIT4 model for long-range transport. Two fundamental challenges for emergency response models on HARM's scale are the need for rapid deployment, and the need to assess a single realization of atmospheric transport using the ensemble-average calculations upon which models must be based. Departures from the ensemble average can be addressed with explicit calculation of the concentration variance. We currently prefer providing opportunity for "what-if" calculations, which can be based on bounding conditions determined from the problem at hand. This approach is conceptually simpler and can function from simpler input. [dobosy@atdd.noaa.gov](mailto:dobosy@atdd.noaa.gov)

Transition of the HARM-II model from the previous HP operating environment to PC LINUX continues. Alternatives to the embedded native HP graphics have been explored. The model output has been ported to NCAR Graphics as an interim approach in order to provide realistic delivery times. Output concentration fields and puff update routines have been modified to produce a compatible "pardump" file which can be incorporated into HYSPLIT4 model runs. [pendergrass@atdd.noaa.gov](mailto:pendergrass@atdd.noaa.gov)

**17. Italian National Research Council Sky Arrow.** Exciting results are emerging from the Italian National Research Council's Sky Arrow research aircraft, whose MFP system was designed and built by ATDD. Reproduced below is a diagram shown to the annual RECAP meeting in Budapest in early March, 2002. Franco Miglietta and Beniamino Gioli of the IATA/CNR are the principal investigators. The figure shows momentum flux (U\*) measured by the Sky Arrow (black dots) and by an eddy covariance station in Southern Spain (red dots and line). The



Sky Arrow's data are averages of fluxes, calculated with 40s averaging time in multiple passes during approximately 15 minutes. The underlying surface was homogeneous. Good comparison with fixed towers was also obtained for fluxes of CO<sub>2</sub>, moisture, and sensible heat in Spain (rice), Germany (forest), Sweden (forest), and the Netherlands (forest and agricultural land). [brooks@atdd.noaa.gov](mailto:brooks@atdd.noaa.gov) (Ed Dumas)

**18. Mercury in the Arctic.** The highest levels of Fine Particulate Mercury (FPM) measured in remote air were detected at Barrow just prior to sunrise on February 19, 2002. February 19 also saw the first mercury depletion event of 2002 with Gaseous Elemental Mercury (GEM) concentrations dipping to 0.4 ng m<sup>-3</sup> just after solar noon. These are the most convincing data so far, indicating formation of fine particulate mercury at night followed by rapid conversion to a gas phase after sunrise. (Brooks and Lindberg; ORNL)

**19. Urban Dispersion.** A second tour of Oklahoma City was conducted February 26-28, to acquaint DTRA, NOAA and DOE National Laboratory planners who had missed the initial (October) scouting trip with suggested instrument locations. Meetings were also held with University of Oklahoma and NOAA/NSSL researchers to discuss possible collaborations. The City Engineer of Oklahoma City was briefed on why we want to use OKC as an experimental site, and what we hope to accomplish. He was extremely cooperative, and volunteered to help brief the OKC City Council, as well as providing points of contact to arrange for instrument siting. DOE and DTRA staff will provide draft material to him for this purpose; ATDD's briefing materials, generated earlier, were forwarded as a possible basis for this draft material. As a result of this meeting, the program already has obtained permission to set up sensors on city-owned traffic poles and Oklahoma Gas & Electric Co. lamp posts in the downtown area to provide data within the built-up area. Other contacts are pending. [hosker@atdd.noaa.gov](mailto:hosker@atdd.noaa.gov)

### **Research Triangle Park**

**20. CMAQ Activities.** A series of sensitivity simulations using the CMAQ model for a continental United States grid has indicated that the simulated ozone values in the western United States can be affected by as much as 2-6 ppb based on the boundary assumptions. As for using this platform as a base for an early assessment of intercontinental transport, the sensitivity runs indicated that there appears to be a model artifact involving a rapid exchange of pollutant mass across some of the upper layers. Given that past research has shown that most of the pollutant mass coming off the Asian continent is trapped in thin plumes of about 1-km thickness, it appears that finer vertical resolution and better model performance in terms of vertical mixing will be needed in the CMAQ base case. (Pat Dolwick, 919 541 5346)

The CMAQ mercury model is being used to simulate the dispersion of atmospheric mercury over Europe. Processing of the emissions and terrain data for CMAQ simulations in Europe continues with no major problems encountered. (Russ Bullock, 919 541 1349)

Results of numerous model test simulations of the recently updated PinG gas/aerosol model are being analyzed. Plume concentrations from model runs performed with different combinations of two photochemical mechanisms (CB-IV, RADM2) and three chemical solvers (Gear, QSSA, MEBI) along with the PinG aerosol version 2 module have been examined to assess the impact on aerosol species concentrations for a group of major point sources exhibiting a wide range of NO<sub>x</sub> and SO<sub>x</sub> emission rates. Preliminary results indicated the formation of more fine sulfate in the plumes from high SO<sub>2</sub> point sources with lower NO<sub>x</sub> emission rates than those with the highest NO<sub>x</sub> emissions. (Jim Godowitch, 919 541 4802)

**21. Multimedia Integration Modeling System (MIMS).** The MIMS framework is a software infrastructure or environment for constructing, composing, executing, and evaluating cross-media models. The MIMS team released an interim version of MIMS to over a dozen collaborators in mid-February. A MIMS module developers guide was drafted, along with a new tutorial for users. (Steven Fine, 919 541 0757, Steve Howard, 919 541 3660)

Initial results of the 3-compartment MIMS/DIAS (Dynamic Information Architecture System) pilot have been received from the Argonne National Laboratory. The media compartments are air, water and biota (fish). The initial test chemical is chlorobenzene, prey species is Alewife, predator species is Salmon, and simulation period is 3

summer months (~2160 hours) for the Detroit area of Michigan. We are making use of meteorological input files prepared for HWIR (Hazardous Waste Identification Rule) model. Preliminary review indicates there are problems with the results that indicate a need for more debugging. (Ellen Cooter, 919 541 1334)

**22. Biogenic Emissions Inventory System.** Alternative vegetation databases are being compared, with the long-term objective of having a consistent database suitable for meteorological, dry deposition, and biogenic emissions modeling. Initial findings suggest that the MRLC National Land Cover Database (NLCD) (<http://landcover.usgs.gov/natl/landcover.html>) offers a great deal of promise and deserves consideration for future versions of CMAQ, MM5, and BEIS. (Tom Pierce, 919 541-1375)

**23. Studies of the Lower Neuse River Basin.** Preparations are being made for a spring/summer satellite data collect of the Pamlico Sound. As part of ongoing collaborative research by the UNC Institute of Marine Sciences at Morehead City, NOAA, NASA, EPA, and others, the addition of hyperspectral imaging of the Pamlico Sound at 20m pixel resolution will provide a unique study opportunity to assess the concentration and spacial distribution of Chlorophyl A, and perhaps other mineralogical and biological elements having a unique spectral signature (as may be important in the study of algae blooms, nitrogen cycle, etc). (John Streicher, 919 541 3521)

**24. Resuspension of Particles.** Studies of the roles of aerodynamic and mechanical processes in the resuspension of particles from individual grass stalks have been completed. The main results of the experiments show resuspension inputs increase as the kinetic energy input by mechanical impacts by vibrating grass stalks; mechanical resuspension dominated our 2  $\mu\text{m}$  resuspension, but for larger particles aerodynamic and mechanical mechanisms were equally effective. Both mechanical and aerodynamic resuspension fluxes increased roughly as the cube of mean wind speed. Kinetic energy input by mechanical impactions of the grass stalks was shown to be proportional to the flux of turbulent energy which was also proportional to the cube of mean wind speed. (Dale Gillette, 919 541 1883)

**25. Urban Dispersion – New York.** Four months of surface meteorological data were obtained from NCDC for six NWS stations near the World Trade Center (WTC). This data are being used for a modeling study using the CALPUFF model to track local scale winds and possible dispersion of particles and gases emitted from the WTC site following September 11, 2001. NWS stations used for the project are New York LaGuardia, Newark, New York Central Park, New York JFK, Islip, and Teterboro, NJ. (Dennis Atkinson, 919 541 0518)

**26. Forest Fire Emission Module.** William Benjey, Jason Ching, and Douglas Fox of CIRES collaborated on the design of a forest fire emission module intended to interface with the SMOKE emission processor. Forest fire smoke emissions are difficult to simulate and can play a significant regional role in air quality simulations. (William Benjey, 919 541 5248)

**27. Background Pollution.** To estimate total ambient concentrations, a value for background must be estimated and added to the modeled concentrations. In past national scale applications, estimates of background were determined from the open literature. In future assessments, new and improved values for background and the relative contribution to background from all components will be determined. Work has started on improving estimates of the relative impact of control measures on background concentrations. The intent is to develop a method to estimate background concentrations based on the air toxic monitoring data base. (Joe Touma, 919 541 5381)

## **Idaho Falls**

**28. CBLAST-Low.** The LongEZ conducted three missions to compare satellite-based synthetic aperture radar (SAR) derived winds against surface layer winds acquired by the aircraft. SAR is being used to estimate surface winds ( $U$ ) and friction velocities ( $u_*$ ) over the oceans; however, validation is still needed. Under light wind conditions and smooth seas, SAR fails to provide solutions for  $U$  and  $u_*$ . These aircraft flights were acquired during the Coupled Boundary Layers Air-Sea Transfer light wind (CBLAST-Low) field study conducted over a three week period in July and August 2001 over the waters south of Martha's Vineyard. The purpose of these flights was to

test the lower limits of SAR capabilities. The work is in collaboration with Johns Hopkins University. [jerry.crescenti@noaa.gov](mailto:jerry.crescenti@noaa.gov)

Work has been completed on improving the aircraft measurement of altitude. It is estimated that the new value is accurate within  $\pm 10$  cm. The new algorithm consists of removing the bad points and outliers from three laser data measurements, converting the measurements to earth-based coordinates, and then averaging the three measurements to arrive at a best determination. The laser data are accurate at low altitudes while GPS data are not. However, the GPS data contain no wave effects. By taking 60 second averages of the difference between the laser determination and the GPS data, an offset is computed that is applied to the GPS data. (Tami Grimmer, 208 526 2743)

**29. Drainage Flow in an Urban Area.** During the 2000 VTMX program in Salt Lake City, the LongEZ flew a repeated 13-min north-south "racetrack" pattern at 400 m AGL on the eastern side of the Salt Lake Valley during the predawn hours of 26 October 2000. The data suggest an oscillating drainage flow. The airplane sampled the event centered on 0600 MDT. The east flight leg passed first above the drainage flow, then through the turbulent entrainment layer at its top, and finally within the drainage itself, characterized by northeast wind. The west flight leg, farther into the valley shows only south winds, though there was drainage beneath, revealed in the now southeast flow reported by the tower, sodar, and radar. The data reveal the oscillatory nature of the drainage. More surface and upper air data from the whole Salt Lake Valley will be needed to take this investigation further. [jerry.crescenti@noaa.gov](mailto:jerry.crescenti@noaa.gov) (Ron Dobosy, Ed Dumas)

**30. P-3 Instrumentation from ARL.** A rugged Infrared-Gas Analyzer (IRGA) that will be flown on the NOAA P3s during the upcoming hurricane season has been constructed. The mount will be located in one of the down-facing windows, just aft of the nose of the aircraft. The installation is part of a joint Intercontinental Transport and Chemical Transformation (ITCT) Project involving ARL and Aeronomy Lab scientists. The IRGA is just one of a suite of instruments that ARL will mount this summer on the P3 to obtain measurements of moisture, temperature, and momentum flux in dry slots of hurricanes. [jeff.french@noaa.gov](mailto:jeff.french@noaa.gov) (Shane Beard)

**31. Refractive Turbulence Study.** Preparations for the upcoming measurement campaign as part of the ongoing Refractive Turbulence Study are currently under way. During the March-April campaign, we will focus on turbulence created downwind of mountains in an attempt to measure various turbulence intensities. Direct measurements of these terms is necessary, as we attempt to increase our prognostic capability for strong turbulence regions. Measurements will focus on temperature perturbations using the ARL-designed FUST probe, winds, and static pressure perturbations. Preparations to this point included preparing the data system and instrument calibration. [jeff.french@noaa.gov](mailto:jeff.french@noaa.gov)

**32. Dispersion at INEEL.** As discussed in last month's activity report, FRD is conducting a statistical study of dispersion at INEEL using the MDIFF puff model and nine years of meteorological data from the Mesonet. The idea is to build up an ensemble of concentration estimates on the MDIFF grid. Ten different release scenarios are being investigated, including four different release locations and elevated versus surface releases. Once the MDIFF runs were started, it quickly became clear that the task will require a considerable investment in time and computer resources. With nine years of data and ten release scenarios, it turns out that almost 800,000 runs of MDIFF are required to complete the project. [richard.eckman@noaa.gov](mailto:richard.eckman@noaa.gov)

**33. Review of ARL Aircraft Activities.** At the request of the Office of Marine and Aviation Operations (OMAO), GSA's Interagency Committee for Aviation Policy (ICAP) carried out a Aviation Resource Management Survey (ARMS) of ARL research programs utilizing the LongEZ. In addition to the usual review areas, OMAO specifically requested the ARMS include a comprehensive risk analysis, suggest how to best continue the use from an administrative standpoint, and identify other aircraft options suitable to perform the research. We were pleased that the ARMS Team recognized the outstanding mission effectiveness of a "pusher" type aircraft not only for gathering air data but for its fuel efficiency, operating costs, and endurance.



Major report conclusions were:

- LongEZ N3R is operated and maintained in accordance with all applicable Federal Aviation regulations;
- The pilots that fly the Long EZ meet and comply with all applicable Federal Aviation regulations;
- The operation of the Long EZ by the FRD is safe and efficient, and appears to be quite cost effective; and
- NOAA would be better served if it were to have operational control of flight operations conducted by FRD.

Major report recommendations included:

- AOC should place the Long EZ under their operational control;
- FRD should maintain functional control and continue to develop a LongEZ specific operations manual; and
- AOC should obtain future aircraft as a joint decision between the FRD, NOAA, and the AOC.  
[tim.crawford@noaa.gov](mailto:tim.crawford@noaa.gov)

## Las Vegas

**34. Mesoscale Modelling of Las Vegas and Clark County.** RAMS ran to completion on the University of Nevada-Las Vegas computer system 23 of 28 days (82%) in February. Network hardware problems with the ARL-HQ computer network caused initialization data download failures, and prevented the model from starting 5 times. Graphics were generated automatically 17 of 28 days (61%). Local computer shut-downs led to 5 days of no graphics when data was available. Graphics were generated one day with a manual run. Data are continuing to be renamed and saved daily, and backed up to CD monthly. (Walt Schalk, 702 295 1262)

**35. Test-Readiness/Sub-Critical Tests Mission.** Four SORD meteorologists attended and participated in the Under Ground Testing Table Top IV Exercise in direct support of UGT Readiness activities. The exercise was used to train two employees (Schalk and Sanders) on the duties and responsibilities of serving as the Meteorological Advisory to the Test Controllers SAP. Two of SORD's certified SAP members (Randerson and Soule') served as advisors and tutors. A total of three simulated UGTs were assessed and discussed in the context of the UGT safety criteria as they pertain to a "go/no-go" decision by the National Nuclear Security Administration (NNSA) Test Controller. Meteorology plays a key role in this decision process. (Darryl Randerson, 702 295 1231)

During February a developmental project effort was started to enhance the new fallout pattern display program. R. Titus, Keystone International, requested that the program be made capable of plotting any specified fallout pattern from old under-ground nuclear tests. The program was originally set up for utilizing the wind time-section forecast from the weather briefer to produce projected fallout patterns, which initially did not have flexibility for plotting separate left and right boundaries of the pattern. Changes were made to the program to incorporate these requests. Future changes will be made to the program for labeling and other enhancements. This software is used to construct fallout scenarios for UGT Test Readiness training exercises. (Doug Soule', 702 295 1233)