



NOAA ARL Monthly Activity Report



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Highlights

1. *Mercury in the Arctic.* Soon after arctic sunrise, record concentrations in air of reactive gaseous mercury have been detected. The transition from Elemental Gaseous Mercury (EGM) to Reactive Gaseous Mercury (RGM) under sunlit conditions was clearly evident in the new data from Barrow. RGM concentrations at midday on low-wind days reached 870 pg-m^{-3} , accounting for 80% of the depleted EGM. Such midday RGM concentrations were the highest ever measured in the atmosphere. The daily RGM peak was found to be highly correlated with wind speed and aerodynamic resistance, with the highest RGM concentrations on days of lowest wind speed. Brooks, Meyers@atdd.noaa.gov, Lindberg-ORNL

Silver Spring

2. *Impact on the North Polar Vortex of El Niño, QB0, and Sunspot Number.* The size of the 300 mb north circumpolar vortex has been related to El Niño, the quasi-biennial oscillation (QBO), and sunspot number, for the period 1963-2000. There is a significant tendency for the vortex to be expanded near the time of sea surface temperature maximum, and to be contracted 3-4 seasons later. Not unexpectedly, this tendency is best expressed in the El Niño quadrant 90W-180. A relation between vortex size and equatorial QBO is not so obvious, though there is a significant tendency for the vortex to be contracted one season before the 50 mb east-wind maximum at Singapore, best expressed in the quadrant 90E-180. The record is still too short to claim that the tendency for the vortex to be contracted near sunspot maximum is meaningful. (Jim Angell, 301 713 0295, x127)

3. *AFTAC Collaborations.* The Air Force Technical Applications Command is a routine user of the ARL Hysplit model. The most recent version of Hysplit was installed on the AFTAC Sun computer system and at their contractor's site. This last installation was critical in that for several months the contractor has been trying to link RAMS output fields with Hysplit. After the new installation was completed everything worked correctly. Previous problems were assumed to be due to a faulty installation by their staff. Trajectory and concentration display programs have been revised to handle more complex simulations. roland.draxler@noaa.gov

4. *PARTS Project.* A customized version of Hysplit has been developed that includes a data acquisition interface specifically designed to link with our southeast Asian (ASEAN) regional forecast grid extraction. These fields are now routinely placed on our web server for download. Plotting programs have been modified to permit customization by local ASEAN regional meteorological services. Sample meteorological data for the region have been extracted from our global archives and the whole system will be installed on computers to be provided to the participating organizations. Information is being provided on how each service may set up its own operational smoke forecasting system. roland.draxler@noaa.gov

5. *Climate Research Committee.* The National Research Council's Climate Research Committee (CRC) met March 13-14, 2000 in Boulder, CO. Topics of discussion included: several current and potential future CRC studies; the impact of the recent report on reconciling observations of global temperature change; the status of the U.S. Global Change Research Program; NOAA plans and initiatives addressing climate services; the potential effects of Senate bill 1776 on U.S. climate research; and critical problem areas in climatology that may benefit from NRC input. Dian Gaffen was recently appointed to three-year term on the committee. dian.gaffen@noaa.gov

6. *Bilateral Volcanic Ash Meeting.* The Washington Volcanic Ash Advisory Center (VAAC) hosted a 3-day meeting with representatives from the Buenos Aires, Argentina, VAAC to develop a partnership for future coordination between the two adjacent VAACs. The first two days were held at the Washington VAAC in Camp Springs and included presentations and discussions by the VAACs on their operational procedures and modeling capabilities, a tour of the NESDIS and NCEP operational work areas, and a VAFTAD Internet demonstration. The final day of the meeting, in Silver Spring, included an NWS Office of Systems Operations (OSO) presentation on their communication capabilities and a tour of the NWS Telecommunication Gateway (NWSTG). Since the Buenos Aires VAAC does not have a dispersion modeling capability, preliminary plans include having the Washington VAAC run VAFTAD for them as needed. Longer range plans include transferring ARL dispersion modeling capability to Buenos Aires. barbarba.stunder@noaa.gov

Boulder

7. *SURFRAD.* On March 6-7, 2000, John Augustine attended a joint two-day meeting in Atlanta of OGP's Climate Observing System Council and NOAA's Long Term Observations Committee. This was the third stage of the SURFRAD review process, which included the writing of a five-year proposal for the continuation of the SURFRAD Network to establish it as one of NOAA's long-term observing systems, and a review of the program in January by Prof. Ehrhard Raschke from the Max Planck Institute. SURFRAD was given the most time on the agenda, and received nothing but positive feedback, even from oceanographers. Unfortunately there was not a quorum of OGP's Climate Observing System Council, and the decision of whether to continue funding SURFRAD was put off until July at another OGP meeting to be held in Silver Spring.

In response to discussions at the ARM Scientific Team Meeting held in San Antonio, TX in March, the recommendation of Chuck Long, and on tests conducted by Joe Michalsky; the decision was made to purchase new instruments for the measurement of diffuse radiation at SURFRAD stations. It has been shown that the thermopile pyranometers presently used have a negative nighttime offset owing to thermal properties of the inner dome and its effect on the thermopile. How this error is propagated into the daytime is unknown. Changing to a new instrument seems an optimal solution.

The decision was also made to move the SURFRAD downwelling PIR measurement from the main platform to the solar tracker so that the sensor may be shaded to avoid direct-beam heating of the dome. This is in response to recommendations by the BSRN and World Radiation Center. These instruments will be moved during the annual instrument exchanges this year.

8. Central UV Calibration Facility (CUCF). The field and laboratory calibration of spectroradiometers and shadowband instruments has been put on hold at the Central UV Calibration Facility. The cause of this is due to a discrepancy in the irradiance scale of the CUCF's working standard lamps. The CUCF noticed that there was an approximate 1% difference in irradiance scales on each of their working standard lamps when comparing to older calibration files that were performed at the previous laboratory location, building RL3. The differences are attributed to the change in environments between the old laboratory location and the new NOAA building. Weeks of characterization tests have been performed to track down the problem. Once the problem has been fully isolated the CUCF will resume its field and laboratory calibration operations.

An effort to improve the CUCF's ability to measure the angular response of rotating shadow band radiometers is nearing completion. The hardware and preliminary software has been constructed for the system, satisfying the requirement for seven - 2 nanometer wide channels from 300 to 368 nanometers. The seven channels plus a lamp monitoring channel are required to make the measurement. The skew introduced in scanning each channel individually contributes a large uncertainty and noise factor into the previous system. The new system will incorporate a state-of-the-art 8-channel, simultaneous sample and hold system that will acquire all 7 UVMFRSR channels and the lamp monitor signal simultaneously. The initial characterization work has been encouraging. Tests will proceed through April and May to determine the feasibility of the system to accomplish its intended goals. (Patrick Disterhoft, 303-497-6355 and Kathleen Lantz, 303-497-7280)

9. Umkehr Ozone Profile. The information content of the Umkehr ozone profile retrieval algorithm has been investigated. The sensitivity study was done to assess the noisiness of the retrieval. Three retrieval methods have been compared. Among them, TOAP 99 (Total Ozone Adjusted a priori, 1999), FAP 10 (10-layer fixed a priori), FAP 5 (5-layer fixed a priori). The term "fixed" implies that the a priori varies with season and latitude but not with Dobson total ozone. The effect of the covariance matrix of a priori information and measurement errors on the Umkehr retrieval was studied to improve ozone profile information. De-seasonalized time-series (DTS) of the Umkehr retrieved ozone profiles were compared to ozone-sonde and SAGE II data. This study shows that we are reaching the limit of ozone information content contained in Dobson ground-based zenith-sky radiance measurements. There is very little difference in the ozone amounts derived by the 3 algorithms that were inter-compared. The noise in retrieval Umkehr profiles was found to be far greater than the year-to-year variability of the DTS. However, there appears to be virtually no long-term drift between SAGE and Umkehr, suggesting reliable long term observing stability. On average, correlation between FAP DTS and ozone-sonde and SAGE data is higher than for TOAP results. Another important advantage of the FAP instead of TOAP is that it removes AP bias from the Umkehr retrieved ozone trend derived in layers 1-4. TOAP introduces a fictitious trend in AP ozone information and, thus, influences ozone retrieval in layers 1-4. The FAP5 retrieval algorithm seems to be better resolved in altitude than FAP10.

A theoretical study will be conducted to decide which of the above methods is best. The test ozone profiles (monthly mean SAGE and collocated ozone-sonde data) will be used to calculate theoretical Umkehr measurements using a state-of-the-art radiative transfer code. The retrieved ozone profiles (using three methods) will be compared with test ozone profiles. (Irina Petropavlovsk, 303 497 6279 and John DeLuisi, 303 497 6824).

10. Project to Assess Regional Transport of Smoke (PARTS). Preparations have begun for Gary Hodges's trip to Jakarta, Indonesia to train local weather observers on the operation of Solar Light Microtops II instruments. These will be used to validate satellite and model data as part of the Project to Assess Regional Transport of Smoke (PARTS). (Gary Hodges, 303 497 6460).

11. UV Meters. An intercomparison of hand-held UV meters is coming to a close in Boulder. This project was taken on to assist EPA in its UV education program. The meters will be used by teachers and children in middle school to determine such things as the difference between noontime and mid-afternoon UV levels. The intercomparison evaluated over 20 instruments. (Betsy Weatherhead, 303 497 6653).

Oak Ridge

12. Terrestrial Carbon Program. Replication of the Walker Branch facilities at a new location in the watershed is progressing. Cost estimates to establish the new site, away from the influence of the planned Spallation Neutron Source (SNS) facility, are being acquired. It is of interest that a now-planned improvement of the SNS accelerator to a cryogenic facility will significantly improve energy efficiency, and reduce waste heat emissions that would affect our Walker Branch site. Wilson, Hosker@atdd.noaa.gov

Annual sums of carbon flux at Walker Branch are being computed for 1995-1999. Techniques have been developed to fill gaps when eddy covariance data are missing or rejected. A biophysical model has been parameterized for each year based on leaf area data and independent physiological measurements. Wilson@atdd.noaa.gov

13. Canaan Valley. Meetings have been held among NOAA/ARL and CVI staff to further discuss science plans for the Canaan Valley air quality research and monitoring site. The infrastructure supporting the AIRMoN measurement systems is close to being in place and the site is nearing operational status. A great deal of assistance in locating and constructing the site has been given by the U.S. Fish and Wildlife Service, managers of the Canaan Valley National Wildlife Refuge upon which the site is located. Vogel, Hall@atdd.noaa.gov

14. East Tennessee Ozone Study (ETOS). Preparations continued toward the upcoming ETOS 2000 measurement campaign. Equipment was being organized and a deployment plan was prepared for existing and new sites. Data formats at all sites were converted to monitor both 15 and 60-minute data and to better accommodate a wide range of ozone measurements. Additionally, discussions with regional National Forest managers have identified other potential high elevation monitoring locations north and south of the East Tennessee region. Pendergrass, Birdwell@atdd.noaa.gov

15. Federal Highway Administration. A report of the light wind data analysis for Eastern Tennessee (ETOS and ASOS network), the Snake River Basin (INEEL network), and Cape Canaveral, Florida has been finalized. The study focused on the ability of currently used ASOS-type meteorological systems to correctly simulate meteorological conditions with respect to air quality modeling. The analysis showed that current meteorological input parameters are often inadequate. Higher altitude (mountain and plateau locations) showed the most promise with respect to the ability to correctly model local air flow. However, since most population and transportation centers tend to be located in lower terrain, this modeling ability may be of limited effect. Clearly, the higher terrain locations are important to modeling techniques in terms of establishing a

general or regional flow of air or pollutants in and out of an area. However, sub-regional or local effects are also quite important. This research showed that air quality modeling using current ASOS-type wind data for input is quite lacking with regard to effects on a local scale. Current input sites failed to measure important winds below certain thresholds. It has been shown that these “missed” winds often behave in different patterns than those measured during stronger measurable winds. This research has also demonstrated the spatial variation of winds within complex terrain. Therefore, not only is it important to devise means of making better measurements at current observation sites, it is also important to account for the lack of “representativeness” of some sites with respect to nearby surrounding areas. The quality of measurements at existing meteorological sites could be improved by outfitting current meteorological sites to measure winds at air quality standards (0.3 to 0.5 m/s) with modest cost at each location. Also, the addition of numerous sites for use in model input should be considered. This is particularly true for areas of significant complex terrain. New locations should be outfitted with real-time communication capability in order to expedite the modeling process. Current technology exists to place and outfit meteorological systems of this kind with modest cost (far below the cost of many existing ASOS-type systems). Birdwell@atdd.noaa.gov

16. GEWEX/GCIP. Progress continued on the analysis and summary of water and carbon flux data collected at the GCIP site in central Illinois. A manuscript is being written, describing the annual cycle of both the water and carbon fluxes. The instrumentation at the site in Oklahoma was removed in March. The equipment will eventually be installed at a site in the Black Hills in South Dakota. Meyers@atdd.noaa.gov

17. NASA/Land Surface Hydrology. The influence of surface moisture on the entrainment at the top of a cloud-free mixed layer is being examined using a combination of remote sensing, *in-situ* sensing, and mesoscale modeling. We had our first opportunity to compare results of computations with these three different approaches. Simulated mixed-layer depths from the model made an encouraging match to both *in-situ* and remote observations. Simulated soil moisture properties also matched encouragingly well with measurements. These results give us confidence in our tools and hope for a significant outcome. Dobosy@atdd.noaa.gov

18. Urban Dispersion. The ATDD Remtech Sodar which was initially installed at the National Arboretum in Washington, DC, was moved in mid-March to a quieter site (less background noise) at the White House Nursery, operated by the National Park Service. Background noise levels at the National Arboretum were over 85 db, which severely limited the measurement capability of the sodar. Operations at the White House Nursery were again limited by background noise levels. Measurements indicated levels between 75 and 80 db. Due to the relatively high ambient noise levels, the return rate for the sodar was approximately 30%. The basic conclusion was that the Remtech PA1/LR should not be deployed in an urban environment. In contrast, other sodars (PA2's) were quite successful operating in the urban environment. Pendergrass@atdd.noaa.gov

A sonic anemometer system with RF modem data telemetry was successfully installed on one of the masts at the Navy Memorial on Pennsylvania Avenue in downtown Washington, D.C. The system operated without pause throughout March, providing wind and turbulence data. Meyers, White, Hosker@atdd.noaa.gov

Another sonic anemometer system was installed on an adjustable tripod in the back of a pickup truck, and used to make wind and turbulence measurements at various locations along Pennsylvania Avenue and its cross streets. Data were collected for about one week. Meyers, Hall, Mayhew@atdd.noaa.gov

19. *Refractive Turbulence in the Sub-Tropical Jet.* Turbulence around the core of the subtropical jet was measured *in-situ* from a unique, high-altitude, low-speed airplane. The primary interest was in temperature variance, which causes variations in the index of refraction, affecting propagation of electromagnetic radiation. This variance, along with heat and momentum fluxes, up to third moments, have been calculated and transmitted to the Air Force for their interpretation. Dobosy@atdd.noaa.gov

Research Triangle Park

20. *NATO/CCMS International Technical Meeting.* Frank Schiermeier presented a briefing on March 21 at NATO Headquarters in Brussels, Belgium, to the plenary meeting of the NATO Committee on the Challenges of Modern Society (CCMS). The NATO/CCMS Pilot Study on Air Pollution was begun in 1969 and has evolved into a series of International Technical Meetings (ITMs) on Air Pollution Modeling and Its Application. These highly successful meetings, held every eighteen months, are based on a rotation of twice in Europe and once in North America. Frank has been the U.S. representative to the ITM Scientific Committee since 1983 and will chair the Millennium (24th) Technical Meeting in Boulder during May 15-19, 2000. For information on attendance, refer to the published agenda in the March issue of the AMS Bulletin. (Frank Schiermeier, 919-541-4542)

21. *Modeling Assistance to Krakow, Poland.* The purpose of this project is to teach air pollution modeling techniques to air quality specialists in Poland, such that they can plan and manage a program to reduce air pollution impacts. The CALPUFF modeling system is being used, given the transport issues arising from emissions from a heavily industrialized region 100 km west of Krakow, and the air stagnation episodes that commonly occur in the southwest of Poland. Several goals were achieved during a recent trip to Krakow: (1) completion of multi-day simulations for January and July 1998 using meteorological data supplied by the Krakow Meteorological Institute along with recently corrected SO₂ emission inventories for point and mobile sources; 2) comparison of the 24-hour average SO₂ simulation results with measurements, which were reasonable considering the lack of a home heating/small sources emission inventory; and 3) testing newly acquired computer hardware purchased for this project. The next major events will be a comparison of the CALPUFF simulation results with measurements over an extended period (4 to 8 months of 1998) for several pollutants (including SO₂, CO and particulate), and completion of training of the air quality specialists from the Voivodship of Malopolska and the city of Krakow. (John Irwin, 919 541 5682)

22. *Models-3 Ported to Personal Computers and SGI Workstations.* The Models-3 framework is successfully functioning on a personal computer with a Windows NT operating system. All the execution steps have been completed: converting MM5 output, generating emission inputs, and simulating chemistry and transport with the Community Multiscale Air Quality (CMAQ) model. The Windows NT platform is the first non-UNIX implementation of Models-3 and will be used for training. Significant progress has also been made to make Models-3/CMAQ available on the Silicon Graphics incorporated workstations with the June 2000 release. The first "Annual Models-3 Workshop" will be held June 12-14, 2000, in Arlington, Virginia. (Sharon LeDuc, 919 541 1335)

23. *New Models-3/CMAQ Particle Matter Collaborations.* ASMD has recently established several science collaborations to extend and apply the Models-3/ Community Multiscale Air Quality (CMAQ) modeling system. A cooperative agreement with the University of Alabama-Huntsville will focus on conducting model evaluation studies on Models-3/CMAQ predictions of Particulate Matter (PM) and

photochemical oxidants. The basis for this effort is the database from both the Southern Oxidant Study Field Study in the Nashville area and the EPA PM Supersite study in Atlanta, GA, both of which occurred during the summer of 1999. A collaboration with the Cooperative Institute for Research in the Atmosphere (CIRA) will study and evaluate the role of smoke emissions from natural and prescribed fires on visibility and PM impacts, primarily for western U.S. conditions. This effort is implemented through an Interagency Agreement between the EPA and the National Park Service. Another cooperative agreement with the Center for Air Pollution Impacts and Trends Analyses (CAPITA) will conduct evaluation studies on Models-3/CMAQ predictions of PM, using CAPITA's extensive data base and analyses capabilities. The Models-3/CMAQ system will also be used to address the requirements of the new Regional Haze Rule (RHR). One regional planning body, the Western Regional Air Partnership (WRAP), has begun to address the RHR requirements with an implementation of Models-3/CMAQ for the western United States. (Jason Ching, 919 541 4801)

24. Emission Factor Model for CO for Predicting Motor Vehicle Emissions. Development of a new microscale emission factor model for CO (MicroFacCO) for predicting real-time motor vehicle emissions has been completed and supported by papers for journal publication.. The algorithm used to calculate emission rates in MicroFacCO is dis-aggregated based on the on-road vehicle fleet, and calculates emission rates from a real-time site-specific fleet. The model requires only a few input variables that are necessary to characterize the real-time fleet. The main input variables required are the description or characterization of on-road vehicle fleet, time and day of the year, ambient temperature, relative humidity, and percentage of vehicles exceeding emission standards. Current motor vehicle emission models are designed to estimate regional-scale (county or other area) emission factors, and emission inventories based on vehicle miles traveled. These models are not reliable for real-time emission estimates needed to support studies of human exposure. MicroFacCO is designed to estimate emission factors from the U.S. motor vehicle fleet, and is suitable for estimating real-time emission factors in micro-environments of human exposure near roadways. The MicroFacCO emissions model will be incorporated into roadway air dispersion models and evaluated in comparison to field measurement studies being conducted in Research Triangle Park. The MicroFacCO algorithm will also be used to develop models for other regulated emissions (NO_x, HC, PM10 and PM2.5) and unregulated (important for health effects on humans) emissions from vehicle exhaust. (Alan Huber, 919 541 1338)

Idaho Falls

25. Doppler Sodar Upgrade. A new high power sodar has been permanently installed at the Grid-III research facility on the INEEL. Questions have been raised about the overall reliability and accuracy of this sodar (see the December monthly summary at <http://www.noaa.inel.gov/news/>). In response, the following changes have been made.

⌄ The sodar processing software has been upgraded. One of the more obvious differences is the acoustic beam firing pattern. Originally, the beam firing sequence was: SE-NE-SE-NE-V, where SE and NE are the oblique angle beams oriented toward the southeast and northeast, respectively, and V is the vertical beam. With the upgraded software, the beam sequence is now: SE-NW-NE-SW-SE-NW-NE-SW-V.

⌄ Because of the long acoustic pulse lengths, the first measurement height (or range gate) has been changed from 50 m to 100 m above ground level.

⌄ New DC signal cable has been installed to link the sodar antenna array to the electronics processing box.

Even though this signal cable has two shields, great care was taken to make sure that this cable was at least six inches from any AC power cable. Several other modifications to wiring have been made.

In practice, early indications show that the upgrade has done little to improve the performance of the sodar. Jerry.Crescenti@noaa.gov

26. Central California Ozone Study. ARL will be heavily involved in the upcoming Central California Ozone Study (CCOS). This four-month field study is scheduled to start on June 1, 2000 and end on September 30, 2000. Preparations are under way for deployment of eight meteorological towers. Measurements from these towers include wind speed and wind direction, air temperature, and relative humidity. The data will be recorded as 5-min averages and will be transmitted back to FRD several times per day via phone lines for quality control (QC) screening and distribution to CCOS principle investigators.

The 915-MHZ radar wind profiler, radio acoustic sounding system (RASS), and Radian 600PA phased-array Doppler sodar will be deployed on the Carizzo Plain located in the California Valley. Wind profiles acquired by the radar and sodar will be acquired as one-hour averages while temperature profiles obtained from the RASS will be reported once per hour as 5-min averages. These data will also be transmitted to FRD for QC screening and availability to the CCOS community. Jerry.Crescenti@noaa.gov (Randy Johnson)

27. Hurricane Balloons. The primary means of communications planned for the hurricane balloons is no longer an option. Plans to use the Iridium satellite system have been canceled, due to the company's insolvency. We are presently looking into Globalstar as an alternative to Iridium. In February 2000 Globalstar announced full commercial availability of voice communications in the United States with data capability expected to be available in the latter part of 2000. We are presently planning to use Globalstar for satellite data communications and are planning to test it out in the latter part of this year. Further into the future, ICO Communications, Teledesic and possibly others, are additional alternatives for smart balloon satellite communications. Randy.Johnson@noaa.gov

28. Model Validation Program. Turbulence data collected at Cape Canaveral using both sonic anemometers and the LongEZ were used to test the turbulence algorithm used in the REEDM dispersion model. REEDM is used both at the Cape and at Vandenburg Air Force Base in California to estimate to dispersion of rocket effluent. A final report entitled "Evaluation of the REEDM Climatological Turbulence Algorithm Using Aircraft Measurements" is now in press as a NOAA Technical Memorandum. Richard.Eckman@noaa.gov

29. Aircraft Hardware Additions and Improvements. Improved GPS technology utilizing a dual frequency receiver has been obtained. These Ashtech radar sensors receive signals at both the L1 and L2 bands. This, combined with the recently upgraded DGPS correction software (FLYKIN), will provide accuracy to the sub cm level in position and improve surface velocities to roughly 1 cm s⁻¹. Two additional instruments for use in aerosol research were recently purchased. A Passive Cavity Aerosol Spectrometer Probe (PCASP) model 100-X manufactured by Particle Measuring Systems in Boulder, CO, will be used to measure particle size distributions of aerosols ranging from 0.1 to 3.0 microns in diameter. This probe sizes aerosols into one of 15 bins based on the total light scattered from a particle illuminated with a HE-NE laser. A three-wavelength nephelometer manufactured by TSI will provide the total and back-scattering coefficient due to aerosols at three wavelengths. Jeff.French@noaa.gov

30. VTMX - CBNP 2000. The sponsors of the Vertical Transport and Mixing Experiment (VTMX) - Chemical and Biological Nonproliferation Program (CBNP) 2000 have invited FRD to participate. We plan to bring our SF6 release and analysis capability to bear on the project. Current plans call for the use of the entire set of FRD SF6 samplers and mobile analyzers during the field deployment. In addition, 40 of FRD's SF6 samplers will be modified to pump into carbon absorption (CATS) tubes as well as into Tedlar® sample bags. A study is underway to determine the feasibility of using CATS tubes in this manner. The study includes the analysis of possible perfluorocarbon (PFT) contamination of the SF6 pumps and bags. Inquiries have also been received to use the mobile radar profiler with RASS system, and sonic anemometers during the study. Kirk.Clawson@noaa.gov

31. Collaboration With WY-MT-ID Departments of Environmental Quality. The heads of the Departments of Environmental Quality from the states of Wyoming, Montana, and Idaho visited the Idaho National Engineering and Environmental Laboratory in March. They were looking for areas where their departments might interact and collaborate with INEEL entities. FRD gave a presentation about its mesonet, modeling, and airborne geosciences capabilities. Kirk.Clawson@noaa.gov

32. Sagebrush Steppe Ecosystem Eddy Correlation/Bowen Ratio Intercomparison. The intercomparison of the eddy correlation and Bowen Ratio methods of calculating the fluxes of water vapor and carbon dioxide is continuing. The eddy correlation system is based around the ATDD open path H2O and CO2 sensor. The monitoring site was established in November of last year. Next month, Campbell Scientific, Inc., will join the intercomparison with the installation of its sonic anemometer and LI-Cor Inc.'s new open path H2O and CO2 sensor. Kirk.Clawson@noaa.gov

33. INEEL Mesoscale Meteorological Network Support. Data from the INEEL Mesoscale Meteorological Network are collected via radio link by a computer located in the FRD offices. To improve the reliability of the system, a watch dog program runs on the collection computer and monitors the incoming data. If data collection stops for any reason, the watch dog program initiates a software reboot of the computer. The watch dog program has worked very well for several years, but we have had occasional problems with the software reboot. Several times, the reboot process did not complete and left the computer inoperable. We have added a hardware power controller to the computer to prevent this. The power controller timer is started prior to the initiating the software reboot. If the computer reboot does not complete normally, the power controller will cycle the power on the computer, forcing a hardware reboot. Roger.Carter@noaa.gov

Routine inspection and maintenance of the 915MHz radar profiler located on the INEEL found two of the four RASS speakers on the profiler damaged. The speakers were sent in for repair and have been re-installed. Roger.Carter@noaa.gov

34. INEEL Mesoscale Modeling. A new project has been initiated to develop a mesoscale modeling capability at FRD. The intention of this effort is to eventually provide high-resolution forecasts of winds and turbulence over the INEEL region. Additionally, the model forecasts could be combined with the MDIFF dispersion model (or another dispersion model) to provide forecasts of contaminant dispersion from INEEL. Some initial flow simulations of the INEEL region have been performed using the MM5 mesoscale model on a Compaq/DEC Alpha computer. These used a 36 km coarse grid covering a 2100 x 1950 km domain and a nested grid centered over INEEL with a 12 km grid spacing. The initial and boundary conditions for the

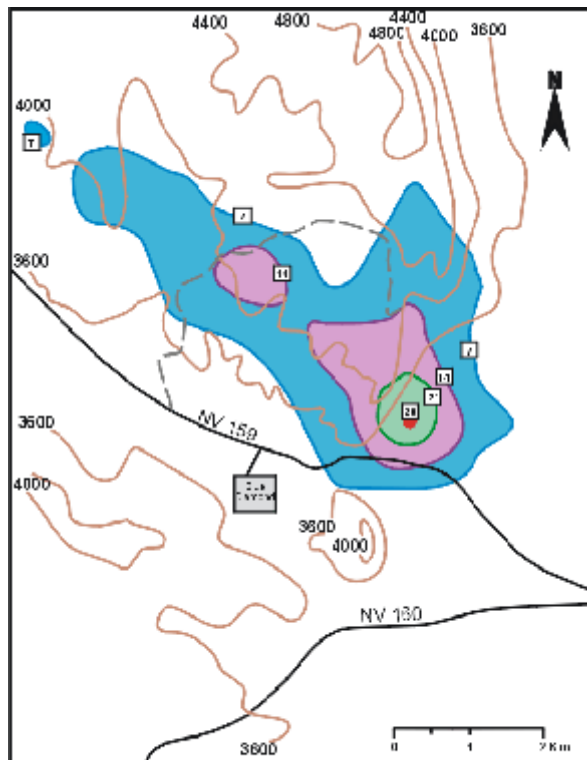
simulations were provided by output from the Eta model, which is available from the National Centers for Environmental Prediction (NCEP). The 12 km grid spacing allows the model to resolve the overall geometry of the Snake River Plain and surrounding mountains, but it does not resolve the individual mountain ranges surrounding INEEL. A higher resolution nested grid will be required to resolve these more local terrain features. Richard.Eckman@noaa.gov

35. FRD Educational Outreach. FRD has been actively developing, with the State of Idaho INEEL Oversight Program, a meteorological/radiological workbook for public schools. The workbook is designed to give students hands-on experience with meteorological instruments and data collection. The in-class reading materials, class activities and cross-curricular projects will give students the fundamentals to begin exploring the many ways meteorological events influence human life. The workbook has been completed and is available on the web (<http://oversite.inel.gov/Education/>). The workbook is generating some interest from school teachers in the local schools for a meteorologist to visit the classroom. We have attempted to satisfy this demand, but have exhausted the small amount of money we could scrape together to fund this effort. After checking with the NOAA Outreach Program Office, we determined that although NOAA encourages this type of outreach, it does not fund it. Therefore, we must sharply curtail our efforts or seek funding through other avenues. Timothy.Crawford@noaa.gov (Kirk Clawson, and Jerry Crescenti)

Las Vegas

36. Cloud-to-Ground (CG) Lightning Study. An area of large flash densities discovered near Blue Diamond, NV, was matched-up with a high resolution topographic map. The results of this analysis are shown in the attached figure. A small area of 28 fl/km² (4 fl/km²/warm season) can be seen approximately 2 km east-northeast of the small community of Blue Diamond. For the seven warm seasons (June through September) from 1993 through 1999, the maximum flash density within this contour is 29 fl/km². This density is comparable to that measured in the eastern United States.

The seven-year data base was also analyzed at 1 km resolution for other episodes or areas of high flash density. To date, ten intense thunderstorms have been identified. The maximum flash density found is 9 fl/km² without correcting for detection efficiency. (Darryl Randerson, 702 295 1231)



Total number of cloud-to-ground flashes for the warm seasons (June through September) 1993 through 1999. Circular area flashes/km²; divided by seven to obtain the average. Maximum flash density is 29 fl/km². Blue oval contour is 28 fl/km². Brown contours represent terrain elevation in feet.

37. NTS Dispersion Model Development. SORD was directed to take the lead in NTS Dispersion Model development and was formally identified by DOE as the Subject Matter Experts. Available mass-consistent wind field models were researched and found. One model was acquired for potential use in dispersion/

trajectory calculations using real-time MEDA station data. Subsequently, SORD staff completed coordination and updating of emergency response model software with all users (SORD, Emergency Operations Center, Hazardous Materials Spill Center, and Emergency Management Center). (Walt Schalk, 702 295 1262)

38. *PM2.5 Super Sites Monitoring Program.* SORD staff participated in a meeting of the principal investigators for the National PM2.5 Super Sites Monitoring Program at Research Triangle Park, NC, on March 23 and 24. SORD is primary NOAA point of contact and is providing technical expertise to this multi year EPA program that involves setting up advanced aerosol and meteorological monitoring systems in eight urban areas (Fresno, CA; Los Angeles, CA; Houston, TX; St. Louis, MO; Pittsburgh, PA; Atlanta, GA; Baltimore, MD; and New York, NY). The program is a collaborative effort with EPA, NOAA, and separate university and non-profit research groups competitively selected to design the research and operate each of the monitoring sites. A primary goal of the PM2.5 Super Sites Program is to determine the utility and feasibility for routine air quality monitoring use of measurement systems that until now have only been used in short-term intensive research monitoring studies. (Marc Pitchford, 702 895 0432)