NOAA ARL Monthly Activity Report

May 2001

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Contents

Highlights

1. The ARL 2001 Review is Over. ARL scientists from each of our six Divisions gathered on 10/11 May at Research Triangle Park, for the formal OAR review of the laboratory. Six reviewers participated, and were joined by a small number of representatives from OAR and elsewhere. Reviewers' comments are being eagerly awaited. Initial feedback was quite promising. (bruce.hicks@noaa.gov)

2. Mercury Speciation and Deposition in the Arctic. In the first airborne measurement of mercury speciation in the Arctic, manual denuder tubes for reactive gaseous mercury (RGM) were attached to the outer strut of a Cessna 207, to collect one-hour samples. Flights on three midday periods in late March and early April sampled first at 1000m (above the boundary layer), then at 100m (within the boundary layer) just north-east of Point Barrow. RGM averaged 1.53 pg m^{-3} at 1000m and 18.33 pg m^{-3} at 100m, independently verifying for the first time the restriction of both production and significant concentration of RGM to the atmospheric boundary layer.

The world's first Relaxed-Eddy-Accumulation (REA) flux measurements for dry deposition of RGM were conducted at Barrow in late March and early April. A tower-based REA system with manual RGM denuder tubes was placed 3m above the snowpack. Significant RGM fluxes measured during March 29 - April 12 were directed towards the snow surface (mean net deposition = 2 ± 1 ngHg m^{-2} hr^{-1}; N=11). Computed dry deposition velocities for RGM were high as expected (~1-3 cm/s), agreeing with those predicted by an inverse boundary layer model, by the flux rates derived from snowpack Hg measurements, and by multiple resistance theory. (brooks@atdd.noaa.gov) , Goodsite visiting from Denmark, Lindberg ORNL, Meyers)

To elucidate the mechanisms of the mercury cycle at the onset of annual snow melt, we combined surface-chamber monitoring, interstitial gas sampling in the snowpack, atmospheric monitoring of Hg0 and RGM, and the analysis of snow samples collected at the main measurement site. From May 26, 2001 to initial snow melt on May 30, air temperature increased steadily from -10.8 C to 0.0 C under 24- hour sunlight. We are awaiting the mercury analysis from the melt samples. The chamber Hg0 measurements increased from 2.2 ng m^{-3} (near ambient) to 14.6 ng m^{-3} during this period. Interstitial mercury concentrations within the snowpack on May 30 were strongly correlated with temperature and depth, ranging from 1.1 ng(Hg0) m^{-3} at 70 cm depth and -5.2 C, to 14.9 ng(Hg0) m^{-3} at 15cm depth and 0.0 C. Overall interstitial mercury concentrations at the shallowest depth (15cm) nearly matched the surface chamber measurements throughout the study. (brooks@atdd.noaa.gov , Scott University of Manitoba)

Mercury instrumentation will be transported to Lavrentiya, Russia on the US Coast Guard Polar Sea icebreaker August 10-19. Set-up in Lavrentiya will occur from August 14-16. (brooks@atdd.noaa.gov)

Silver Spring

3. The Atmospheric Transport and Deposition of Mercury. Work has started on a new atmospheric mercury project, to study the linkages between known sources and critical sinks of environmental importance. The work is in collaboration between ARL, the USEPA, and the Commission for Environmental Cooperation. Sources of ambient Hg data collected in 1996 have been identified and data have been requested from the principal investigators involved. Some data have already been received. EPA inventories for Hg have been obtained and updated emissions inventories from Canada and Mexico are awaited. The literature on the atmospheric chemistry of mercury has been carefully reviewed, and an initial modeling strategy is being developed for the incorporation of this chemistry into HYSPLIT_4. Of primary importance is the adequate description of droplet phase chemistry in clouds. (mark.cohen@noaa.gov)

4. Atmospheric Arsenic and Dioxin. A screening level analysis has been performed to estimate the deposition rate of atmospheric arsenic. To carry out this preliminary analysis, arsenic data from the IMPROVE particulate sampling network in the US were assembled and summarized. (IMPROVE is the national visibility network, sponsored by EPA and NPS, but with ARL scientific guidance.) Typical wet and dry deposition algorithms were used to estimate deposition rates. When considered in light of a simple drinking water reservoir model, the estimated fluxes did not appear to be able to contribute significantly to the contamination of drinking water, i.e., the potential concentrations arising from the estimated deposition were orders of magnitude below the drinking water standard for arsenic. The IMPROVE sampling sites are in relatively remote areas, generally far from intense sources. Thus, while this analysis suggests that "background" arsenic deposition may be relatively insignificant as a pathway for drinking water contamination, areas near significant sources may still be affected. Also, this analysis ignored other exposure pathways, e.g., soil ingestion.

The 1996 dioxin emissions inventory used in a series of modeling analyses with HYSPLIT has been assembled into an easily transportable, more "user-friendly" data set. This newly configured data set has been transferred to EPA/NERL for their use in modeling dioxin with the Models-3 system. Eventually, it is hoped that a model intercomparison study for dioxin will be feasible. (mark.cohen@noaa.gov)

5. Kilauea Ensemble. A methodology for ensemble forecasting plume dispersion is being developed in conjunction with the Maui High Performance Computing Center (MHPCC) in Hawaii. In May, the ensemble dispersion modeling code was enhanced to include both SO_2 emissions and conversion to SO_4. Operational scripts were reconfigured to produce simulations on both 10 km and 4 km grids. The meteorological fields are automatically archived to ARL's computer system directly from MHPCC. Source term variation was added to the ensemble system based upon measurements from the Hawaiian Volcano Office. Further refinement of the operational procedures and modification of the graphics will be required as the customer and their requirements become more clearly defined. A paper describing the generic dispersion modeling ensemble procedure is in preparation. (roland.draxler@noaa.gov)

6. Source-Receptor Matrix Updated. A site visit to AFTAC was conducted last month to upgrade their UNIX version of Hysplit to the most recent release. Considerable interest was expressed in the new ensemble and multiple processor versions of the model. There was also interest in Hysplit's capability to run simultaneous simulations from multiple sources while maintaining the identity of the release point within the output concentration file. This approach permits the computation of a source-receptor matrix. The source-receptor methodology was updated to conform with the new version's dynamic allocation and multiple processor capabilities. An operational script was developed and a test version is now running at ARL for 710 source locations over the eastern U.S. After further testing and documentation, this option will be provided with the next release of the model. (roland.draxler@noaa.gov)

7. Global Temperature Update Through the Winter of 2001. Compared to the previous winter, the most spectacular feature of the most recent update was the increase of several degrees Celsius in the low-stratospheric temperature of both polar zones. These warmer temperatures were associated with unusually high values of ozone in the north polar zone as well as an unusually early termination of the Antarctic ozone hole. This large warming of the polar stratosphere did not translate into a warming of the global stratosphere from a year ago because it was more than compensated by a 2°C cooling of the tropical low stratosphere. In this interval between El Nino and La Nina, global surface and tropospheric temperatures warmed only slightly from the previous winter, but with the surface warming indicated as less than the tropospheric warming, the opposite of the trend for the last two decades. (Jim Angell, 301 713 0295, x127)

8. Radiosonde Errors – Meeting Summary Submitted to BAMS. An article entitled "CARDS Workshop on Adjusting Radiosonde Temperature Data for Climate Monitoring: Meeting Summary" by Melissa Free and 14 coauthors from 8 other organizations was submitted to the Bulletin of the American Meteorological Society. Reporting on a meeting held in October 2000, the article describes methods for adjusting upper-air temperature data to account for instrument and other changes, and compares the results of applying several such methods to data from selected radiosonde stations. We conclude that the limited extent of agreement among results from the methods presented and the potential impact of these adjustments on upper-air trend estimates indicate a need for further work in this area and for greater attention to homogeneity issues in planning future changes in radiosonde observations. (Melissa.free@noaa.gov)

9. CAPE Trends Study. In collaboration with colleagues of the Australian Bureau of Meteorology, a study has been made of the climatology and multidecadal trends in convective available potential energy (CAPE) in the tropics. Radiosonde observations have been compared with outputs of the NCAR Climate System Model (CSM), showing reasonably good agreement in average CAPE values, but substantially larger trends in the observations than in the model. Because an accurate representation of convective processes is considered key to realistic simulation of climate feedbacks and sensitivity to external forcings, this discrepancy may indicate an important shortcoming of the CSM, and, potentially, other

climate models with similar convective parameterizations. A manuscript is in preparation for *J. Geophys. Res.*). (dian.seidel@noaa.gov and Becky Ross)

10. Climate Research Committee Workshop Preparations. The Climate Research Committee (CRC) of the National Research Council is planning a workshop, to be held in Boulder, Aug. 13-17, 2001, to discuss U.S. climate research priorities in light of the recent Intergovernmental Panel on Climate Change report. The workshop will address how best to reduce uncertainties in climate predictions for the next century by focusing on climate feedback processes. The CRC has been working over the past few months to structure the workshop, identify relevant feedbacks, prepare a white paper on the subject, and select workshop participants. (dian.seidel@noaa.gov)

Boulder

11. The Climate Reference Network and SURFRAD. Instruments were exchanged at the Bondville, IL SURFRAD station on May 20-21, 2001. The diffuse pyranometer was replaced with newer instrument. The old diffuse pyranometer remains at the station with its data being recorded in a separate file. The concurrent diffuse solar measurements will be made for one year. This has also been done in the two previous instrument exchanges this year at Desert Rock and Bondville.

All SURFRAD hosting institutions are now working directly with the real property office that services NCDC to negotiate long term leases for CRN stations at their locations.

12. Atmospheric Modeling of Radiation Experiment (AMORE). Momentum in making preparations for the Atmospheric Modeling of Radiation Experiment (AMORE) summer experiment has been picking up as participating radiometric instruments supplied by cooperating parties are beginning to arrive in Boulder. The radiometric instruments that will be operating in the experiment will include one of almost every type used in the United States, with the exception of the NSF spectroradiometer that is used primarily in polar regions. Measurement protocols have been established and information on these will be publicized shortly. A web site to allow access to radiometric data acquired from the experiment is being developed by the USDA group at Fort Collins. A meeting of USDA, NOAA, CIRES and NCAR scientists to organize the radiative transfer calculation part of the experiment has been scheduled for June 5th, at NCAR.

The first phase of the experiment is to accumulate a set of best quality UV and visible radiometric measurements to be used for the second phase comparison of the measurements with radiative transfer computer code results. To capture measurements at the highest solar elevation, the ideal schedule is roughly June 8th to July 6th. However, to be assured of several or more clear sky cases and to accommodate late arriving instruments, the experiment is expected to continue until at least the end of July. Many SRRB personnel are participating in the experiment. Patrick Disterhoft is in charge of operations at the Table Mt. Test Facility. (John DeLuisi, 303 497 6824 and Patrick Disterhoft, 303 497 6355)

Oak Ridge

13. Urban Dispersion. Subsequent to the VTMX study in Salt Lake City last October, some improvements of the ATDD microbarograph system have been made. The electronics were re-packaged in a smaller environmental enclosure, and the reference cell is now external. Normal installations will have the reference chamber in a cooler filled with ice to help maintain a constant temperature. An on-board re-chargeable battery is used for the high current pulse needed to energize the solenoid valve that zeros the reference pressure. This eliminates the need for very long lengths of expensive heavy gauge wire. (auble@atdd.noaa.gov, Nappo)

Work continued on selecting a suitable city for a major intra-urban dispersion study in 2003. Oklahoma City and Phoenix were each visited for two days, for meetings with local university, civic, and regulatory officials to discuss the possibility of performing such a study with local assistance. Reactions in both cities were predominantly positive. A summary of findings is being prepared for a planning committee meeting in Salt Lake City in mid-June. (hosker@atdd.noaa.gov)

14. Canaan Valley. A computer cluster has been assembled to run high resolution meteorological forecast models focusing on the Canaan Valley region. The cluster is housed at the Canaan Valley Institute in Thomas, WV. Also, a series of meetings was held at NOAA/ATDD discussing upcoming studies in the Canaan Valley area. The NOAA Twin Otter is scheduled to visit the area for a preliminary study of spatial differences in air-surface exchange, early in August. (vogel@atdd.noaa.gov), Meyers, Pendergrass, Wood)

15. Climate Reference Network. Development and testing of the CRN system continued during May. A DC power system was developed to remove reliance on continuous AC power; the new system, with DC-powered aspiration fans, will operate through a multi-hour power outage. The fans also have a tachometer output, so the data logger can record any periods when the fans are not rotating. A major refit of the two North Carolina sites was carried out; the DC fans and power supplies were added, the tower bases were changed, and new towers capable of accepting additional sections were installed. The new 1200 bps GOES transmitters were installed, and some problems with synchronization of clocks were discovered; these are being solved. Work is under way to fully test and document all aspects of the quite complex data logger program. Work with NCDC staff on Web-based data entry forms is continuing; we are almost ready to enter data from the field. A second high-accuracy heating and cooling bath has arrived for temperature sensor calibrations. Most equipment items have been ordered and delivery is pending. Storage space for the equipment has been arranged at ORAU. IPIX camera systems and software are on hand for 360° documentation photos of each site. Two field engineers were hired through ORAU to assist in assembly, testing, and field installation of the CRN stations. And two additional vehicles have been leased for this purpose, and will be delivered in early July. (hosker@atdd.noaa.gov , Meyers, Hall, Auble, Shifflett, Conger, Ridenour, Black, French, Mayhew, and Brewer)

16. East Tennessee Ozone Study (ETOS). Flight planning and instrument calibration was started for the ETOS 2001 flight campaign, which will begin in June, 2001 and extend through September, 2001. Seven major flight tracks have been planned, including several tracks across the Smoky Mountains. (dumas@atdd.noaa.gov , White, Pendergrass)

17. Italian National Research Council Sky Arrow. The Italian CNRC Sky Arrow experimental aircraft made its first flight in early May of 2001. Data collected from the MFP system during the test flight have been sent to ATDD for analysis. Initial inspection shows all channels of the MFP system to be performing well. (dumas@atdd.noaa.gov , Brooks)

18. Office of Naval Research Extreme Turbulence Probe. The Extreme Turbulence (ET) Probe is under development to determine turbulent fluxes in hurricane-force winds. It exposes only a spherical surface to the elements, with thirty ports, each of 1 mm diameter, distributed over the surface. The ports are defended by air forced through them by a small pump, the only moving part. They connect to pressure and temperature sensors within, providing 27 streams of analog signal. Two precisely synchronized A/D converters provide 1000 samples per second (S/s) from each channel. Software has been developed to retrieve the high-frequency streams, filtering and sub-sampling them at 50 S/s. A test with a signal generator verified synchrony between the two converters and indicated successful retrieval of 1000 S/s from 32 channels with no dropped data points. An alias-free signal is thus provided for conversion to wind velocity and temperature appropriate for eddy-correlation studies. (dobosy@atdd.noaa.gov , Auble)

Research Triangle Park

19. CMAQ Meteorology-Chemistry Interface Processor Reconstruction. The CMAQ Meteorology-Chemistry Interface Processor (MCIP) is being rewritten and updated to include new features. MCIP, originally developed by Dr. Daewon Byun, uses meteorology model output (e.g., from MM5) and provides a complete set of meteorological variables required for the CMAQ Chemistry Transport Model (CCTM). MCIP is being rewritten to be a fully dynamically allocatable Fortran 90 code that will allow users to re-run the executable for any domain and set of user options without recompiling the program. New features that are being added are a capability to directly use MM5 Version 3 output, a compatibility with the Pleim-Xiu land-surface model (including dry deposition), a compatibility with additional planetary boundary layer models from MM5, and additional output fields. The new version of MCIP will be released in conjunction with the Models-3/CMAQ system release scheduled for November 2001. However, an interim version with the MM5v3 compatibility should be available this summer. (Tanya L. Otte, 919 541 7533)

20. Second Internal Release of the Multimedia Integrated Modeling System. The second internal release of the Multimedia Integrated Modeling System (MIMS) is set for June 15. This release is an important step in that it allows initial testing of actual modeling functionality, as well as enhanced framework capabilities added since the March 2001 internal release. Key framework enhancements include the ability to specify chemical mechanisms used in model components, the ability to edit, create and export modules, and increased options to view model components and data. MIMS is now capable of sequentially running (on a test basis only) the Community Multi-scale Air Quality Model (CMAQ) and Sparse Matrix Operator Kernel Emission (SMOKE) model. Before the next internal release, plans are to install the Dynamic Information Architecture System (DIAS) from the Argonne National Laboratory. DIAS is the communication controller which will allow simultaneous execution of interdependent programs on a time step basis. In other words, feedback loops will be supported for related programs within the system. There will at least one more internal

release of MIMS prior to its first public release scheduled for November 2001. (William Benjey, 919 541 0821)

21. Use of Surface Reflectance for Ecological Monitoring in the Lower Neuse River Basin. Ecological change detection research using NASA's Airborne Visible and Infrared Imaging Spectrometer (AVIRIS) based land cover classification is being undertaken for the Lower Neuse River Basin, North Carolina. Surface reflectance, as a land cover parameter, may be used in both a classification and, when monitored over time, land use transformation and ecosystem health assessment. Atmospheric correction for reflectance retrieval was accomplished using MODTRAN radiative transfer code. Column water vapor was determined using a 3 channel rationing technique (940 nm relative to 865 nm and 1240 nm). Preliminary land cover classification is proceeding with cross referencing to an extensive field reference data base for this biologically diverse watershed. Ground truth calibration of the retrieved reflectance for selected homogeneous pixels was performed using a hand-held field spectral radiometer. Methods development for processing remotely sensed data to construct indicators of ecological vitality is a long term objective of this work. Remote sensing provides the best opportunity for watershed-scale (or greater) assessment and detection of land cover transformation and ecological change. (John Striecher, 919 541 3255)

Idaho Falls

22. Air-Sea Exchange – CBLAST-Low. The LongEZ research aircraft and its suite of *in situ* and remote sensors are being prepared 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. A full project description is available at http://www.noaa.inel.gov/projects/cblast/

In preparation, a Riegl LD90-450 slow response laser altimeter is being tested as a supplemental reference instrument for the autopilot system on the LongEZ. Currently, a pressure transducer controls the autopilot system. However, small changes in barometric pressure over long flux legs can cause the LongEZ to slowly increase or decrease its altitude with respect to the Earth's surface. This may introduce biases in mean and turbulent flux data, especially in stable boundary layers where strong gradients in the surface layer are commonly observed. The laser, on the other hand, is completely independent of these pressure effects. Early testing of this laser system have proved promising.

Along-track changes in the integrated roughness of short ocean waves on the order of 2 to 100 cm will be defined using a nadir-pointing 36-GHz Ka-band (0.8 cm) and 96-GHz Ku-band (2.3 cm) scatterometers. By relating backscatter intensity to the surface slope variance at the two frequencies, short wave characteristics are observed. Coincident laser altimeter measurements provide the precise range information for computation of the normalized radar cross section. The Ku-band scatterometer is a new addition to the LongEZ instrument suite and has been specifically designed for CBLAST-Low. (jerry.crescenti@noaa.gov and Tim Crawford)

After testing several designs (see the July 2000 and November 2000 reports) it has been concluded a 50-μm thermocouple exposed sensing element would meet the fast response temperature design goal of 100 Hz response with 0.01°C measurement resolution. This is goal is critical to the success of CBLAST-Low. Under very stable atmospheric conditions, the sensible heat flux is very weak. This new responsive probe will be able to quantify the weak turbulent signals occurring at short wavelengths in stable marine atmospheric boundary layers. (jeff.French@noaa.gov , Tim Crawford, Randy Johnson, Jerry Crescenti, and Dave Auble)

23. Hurricane Balloon. The first Smart Balloon (http://www.noaa.inel.gov/capabilities/smartballoon/) is being readied for deployment under the USWRP-Hurricane landfall experiment this year. Critical to deployment is the satellite communications link. We have received a Qualcomm Globalstar 1620 satellite data modem and have an account on the Qualcomm test gateway in San Diego, California. Since this gateway is for testing purposes, we have experienced extended periods of the gateway being out of service for other tests and upgrades but we have been able to originate a data call between the satellite modem and one of our systems connected to a regular modem here in our offices. Thus far, the Globalstar system does not allow the satellite data modem to receive a data call. All data calls must originate with the satellite modem. To minimize the smart balloon software and complexity, our original plans were to have the satellite modem operate in an automatic answer mode and have the ground based data gathering systems originate the calls to the smart balloons. Changes will be

made to the smart balloon software and we do not believe this will be a problem if the situation does not change prior to our first launch. (randy.Johnson@noaa.gov , Roger Carter, Shane Beard, Eric Egan)

24. Urban Dispersion – VTMX/URBAN. The final gas chromatography analysis report for the Salt Lake City VTMX study was completed. Included in the report is a thorough quality control/quality assurance discussion of all laboratory blanks, duplicates and controls as well as all field blanks, duplicates and controls. All quality control data indicated there were no significant contamination problems associated with the field or analytical methods. Precision of both the field and analytical methods was very good while bias was minimal and at levels expected for the sampling, handling and storage of samples. Field duplicates however, indicated some discrepancies especially at higher concentrations. A study will be conducted to pinpoint the cause of the discrepancies, which may have been due to turbulence in the downtown areas that were closer to the release site. (Debbie.lacroix@noaa.gov)

SF_6 tracer data from the Programmable Integrated Bag Samplers (PIGS) and the real-time mobile SF_6 analyzers were distributed to the project sponsors and cooperators. This is a major milestone in completion of the project. (kirk.clawson@noaa.gov and staff)

25. Tracer Gas Technology. The break between field projects provides an opportunity to improve our atmospheric tracer technology. For the real time SF_6 analyzers, we are testing ways to reduce the audible pump noise which is a significant source of operator stress. We are also looking at improvements in the cleaning procedure, better power connectors, and hopefully ways to reduce the electrical noise in the output signal. A new version of the Automated Tracer Gas Analysis System (ATGAS) has been built and software is being developed for it. The new system is about 70 per cent smaller than the old system and should be about 30 per cent faster. Testing will begin in the next couple of months. We are also looking at possibilities for new types of analyzers for commonly used atmospheric tracers. (roger.carter@noaa.gov , Debbie Lacroix, Shane Beard)

26. INEEL Mesoscale Meteorological Network. The semi-annual inspections of meteorological instruments on the network towers were completed this month. During the inspections, all instruments are examined to verify they are operating properly and are calibrated to traceable NIST standards. (tom.strong@noaa.gov)

The data collection system for the INEEL Mesoscale Meteorological Network received some long needed attention. Several minor software updates were completed and several information files were updated to reflect recent changes. Data for the year 2000 were archived to CD for long term storage. An ailing floppy disk drive was also replaced in one of the server computers. We are also doing testing on radio links through the station located on the top of Big Southern Butte. This station was installed last fall and will be used as a back up radio repeater to keep the system operational when the primary repeater fails. The link testing is needed to determine the network topology that will used when the Big Southern station is brought on line. (roger.carter@noaa.gov)

27. INELVIZ Training and INEEL Support. INELVIZ is a user-friendly model that interprets data obtained from the INEEL Network and provides an improves basis for detailed

forecasting of dispersion. A training course for INELVIZ users was on held May 15. This course is conducted periodically for new users and for refreshing current users. Brad Reese discussed the use and operation of the system, Roger Carter talked about potential problems and how to deal with them, and Jerry Sagendorf presented a description of the model and how it works. (brad.reese@noaa.gov, Roger Carter)

A surprise "no-schedule" drill was conducted on May 15 to simulate a 2500-acre range fire near the Naval Research Facility (NRF) on the Idaho National Engineering and Environmental Laboratory (INEEL). NOAA personnel quickly responded to this notification and provided meteorological support to the INEEL planning bridge. (jerry.crescenti@noaa.gov , Brad Reese)

28. INEEL Mesoscale Modeling. The mesoscale modeling at FRD went through a somewhat rocky period during the early spring, when a combination of network problems and missing fields in the NCEP Eta model output led to a relatively high number of aborted runs with MM5. By mid May, these problems had been worked out, and the MM5 forecasts for Southeast Idaho were again being consistently produced on a daily basis. The forecasts proved to be particularly useful during some high-wind events in the middle of May. MM5 was predicting higher winds over INEEL than over the eastern side of the Snake River Plain, where the NWS tends to focus its forecasts since that is where most of the people are. The Mesonet winds verified the MM5 forecasts, showing significantly stronger winds at INEEL, including gusts over 20 m/s. (Richard.eckman@noaa.gov)

Las Vegas

29. Mesoscale Maximum Temperature Forecasting. A new project has been started to explore the use of morning radiosonde observations from the Desert Rock site to predict maximum temperatures for locations in the general vicinity. Several observing stations have been chosen, for each of which the MEDA database was utilized to produce daily high/low temperatures. The period of record that has been quality checked is 1983 to 1999. Presently, the DRA radiosonde observations extend through 1993, which shortens the period of record to 11 years. Las Vegas high/low temperatures are available from 1948 onward. The radiosonde record for Southern Nevada starts in 1957 at Las Vegas, then Yucca Flat, and finally at DRA. These data sets are being combined for the present study. (Douglas.soule@noaa.gov)

30. Nuclear Emergencies and Response. SORD personnel participated in the May 16/17 Quarterly Nuclear Regulatory Commission (NRC) Drill. This field drill was at the Palo Verde facility in Arizona and included on-scene Federal Bureau of Investigation participation. Served as the National Oceanographic and Atmospheric Administration representative in the NRC Headquarters office, Rockville, MD. Provided weather data necessary to operate the NRC RASCAL dispersion code, atmospheric dispersion advice, new RASCAL model beta testing, and input to assessment team procedures. Also, developed and presented an overview of NOAA Air Resources Laboratory (ARL) Emergency Response assets. (walter.schalk@noaa.gov)