



NOAA ARL Monthly Activity Report



May 1999

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Highlights

1. *The East Tennessee Ozone Study (ETOS)*. ETOS is about to get started. The program has been generated in response to the need for better ozone forecasts for tourist and recreational areas of the mid-Atlantic Appalachians. The attached brochure summarizes the program that is planned.

2. *READY Update*. The READY site has been upgraded, and is well worth visiting. During May, several changes were made, including the addition of severe weather watch indicators (updated every five minutes), the provision of pre-computed back trajectories for the Northeastern USA, the display of 4 km RAMS forecasts for the Chesapeake Bay region, and trial ozone forecasts based on HYSPLIT using the CB-4 chemical code. The popularity of READY as a mechanism for outsiders to gain access to NOAA products continues to grow. In May, about 600,000 visitors looked at READY. It has been reported that about 1,400,000 visited all destinations associated with NOAA, during the same month. There must be something wrong here! READY probably has a lot of repeat customers.

3. *Special Issue of Boundary-Layer Meteorology*. Selected papers from a Workshop on the Stable Planetary Boundary Layer held on 21 to 24 October 1997 at Lövånger in Sweden, have been published as a special issue of B-LM, co-edited by C. J. Nappo and Per-Erik Johansson. In follow-up activity, work has started on a monograph, *An Introduction to Atmospheric Gravity Waves*. (nappo, hill@atdd.noaa.gov)

General

A note of special interest relates to new commercial space ventures. Two ARL groups are closely involved — Idaho Falls (see item #33) and Las Vegas (item 34).

The topics that are presented are sorted according to their contribution to the NOAA Strategic Plan, as follows

Sustain Health Coasts: 6, 14

Short-term Forecasting and Warnings: 1, 2, 3, 4, 5, 25, 31, 32, 33, 34, 35, 36, 37

Seasonal to Interannual: 10, 11, 12

Decadal to Centennial: 7, 8, 9, 13, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30

Crosscutting: 18

Silver Spring

4. Quasi-Operational Ozone Forecast. The experimental ozone forecast used for the last two summers has been completely revised and a new system is now operational for 1999 (<http://www.arl.noaa.gov/ready/ozone>). Ozone concentrations are forecast for the eastern U.S. based upon a 50 km resolution grid and a 1 km vertical layer. Emissions of VOC and NO_x are based upon the 1995 OTAG inventory with a resolution of 12 km. Transport and dispersion are computed using HYSPLIT and meteorological fields are from the Eta model (resolution: 40 km, 3 hr, 25 mb) based upon the 0000 UTC forecast. The time evolution of concentration is solved using the Carbon Bond IV mechanism of 92 reactions involving 38 species between each HYSPLIT advection-dispersion step. (roland.draxler@noaa.gov and Ariel Stein, ais5@psu.edu)

5. RAMS Forecasts Drive Chesapeake Bay Wave and Oceanographic Models. The ARL RAMS forecast system is now producing 4 km and 16 km resolution forecasts for the Chesapeake Bay region. The model is run at 00 and 12 UTC on an 8 processor SGI Origin 2000 workstation with 30 hr forecasts completing in less than 3 hours. Additional fields have been added to the RAMS files for interactive visualization (cloud water mixing ratio, moisture affected visibility, short and long wave radiation) with READY. The latest forecasts and more information can be found at: <http://www.arl.noaa.gov/ready/chbmdl.html>. These predictions represent an early and experimental attempt at non-hydrostatic atmospheric model forecasting of a coastal region.

The predictions are used regularly by the Wakefield, VA, Sterling VA, and Mt. Holly, NJ NWS WFO forecast offices, for their coastal wind/wave forecasts. Preliminary comments are favorable for predicting the onset and strength of local-scale topographically and thermally induced forcings (i.e., sea, bay river breezes and channeling) for specific areas. On the other side, RAMS has had a tendency to overpredict local-scale circulations when regional-scale forcings would normally subdue these local-scales.

The forecast model configuration includes 2nd order closure turbulent kinetic energy boundary layer parameterization, explicit prediction of cloud microphysics, fully interactive two-way nesting, a soil and vegetation parameterization, and improvements for air-sea exchange. The NCEP EDAS is used for initialization and work is ongoing to ingest the Chesapeake Bay LAPS analyses. (jeff.mcqueen@noaa.gov, glenn.rolph@noaa.gov, Jay Titlow, Wind Hotline)

6. Progress with the Precipitation Chemistry Quality Assurance Program. The U.S. Geological Survey operates a five laboratory precipitation chemistry interlaboratory comparison. The Illinois State Water Survey, the Atmospheric Environment Service, and the Ontario Ministry of the Environment routinely participate in the program. In March we reported that we were successful in adding the East Asia Network coordinating laboratory at the Japan Environmental Sanitation Center to the program. In May we were able to add the Norwegian Institute for Air Research (NILU) as the European representative to the program. NILU serves as the coordination center for the Co-operative Programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollutants in Europe. (richard.artz@noaa.gov)

7. The Sensitivity of Temperature Trend to Length of Record. Data from the 63-station global radiosonde network have been used to assess the difference (and significance of the difference) in surface, tropospheric and stratospheric temperature trends resulting from a doubling of the record length from the period 1991-1996 of Microwave Sounding Unit (MSU) data to the period 1961-1996 -- twice as long. Globally, the surface

warming is the same for the two periods, but the tropospheric warming is significantly less during 1979-1996 than during 1961-1996, adding to the evidence that the surface has warmed more than the troposphere during the last two decades. The consistency of the radiosonde-station temperature trends is found to be quite dependent on length of record, doubling of the record length resulting in about a halving of the variability of the station trends, with the consequence that there is much more confidence in mean temperature trends for the longer period. These significant differences in temperature trend for a doubling of the record length show that caution should be used in applying the temperature trends for the period of MSU data to global-warming issues. (Jim Angell, 301 713 0295, x127)

8. Tropical Tropopause Study. A radiosonde-based climatology of the tropical tropopause has been completed. Previous work in this area has been limited by the temporal and spatial coverage of the data and the number of tropopause characteristics studied. The present study is based on the most recent climatic normal period 1961-90, with time series data covering 1948-97. Comparisons have been made among various definitions of the tropopause, including one based on lapse rate, the cold point of the sounding, and the 100 mb level, which is often taken as representative of the tropical tropopause. This dataset will be used to study the long-term variability of the tropical tropopause, which is related to variability in tropical tropospheric temperature and in cross-tropopause fluxes of water vapor and other trace gases. (dian.gaffen, becky.ross@noaa.gov, J. Angell, 301 713 0295, x125)

9. VAFTAD. VAFTAD was presented to the NWS Committee for Analysis and Forecast Technical Implementation (CAFTI) many years ago, before implementation on the semi-operational (not fully supported 24 hours a day) arlrisc workstation. In parallel with the recent transition of operations to the fully-supported NCEP computers, the NWS presented VAFTAD to CAFTI in May and published a Technical Procedures Bulletin (TPB) regarding VAFTAD implementation on the NCEP computer systems. The TPB may be seen at <http://www.nws.noaa.gov/om/tpb/457.htm>.

During May 6, VAFTAD forecasts were issued by NOAA for eruptions of Colima and Popocatepetl, Mexico, Soufriere Hills, Montserrat, and Shishaldin, Alaska — a relatively quiet month volcano-wise! (barbara.stunder@noaa.gov)

Boulder

10. SURFRAD. Dennis Wellman and Gary Hodges performed the annual SURFRAD instrument swap-out at SRRB's Desert Rock SURFRAD site, and in addition installed a Total Sky Imager (TSI) to complement the instrument array there. (Pictures of the installed TSI can be viewed at <http://www.srrb.noaa.gov/highlights/highlights.html>). (Gary Hodges, 303 497 6460, Dennis Wellman, 303 497 6266 and John Augustine, 303 497 6415)

11. Photochemical Activity and Ultraviolet Radiation Modulation Factors (PAUR II). The Central UV Calibration Facility (CUCF) participated in the PAUR II campaign in several locations around the Mediterranean Sea. The CUCF provided the irradiance standard to calibrate all of the UV spectral equipment that was operating during the campaign. The three sites were Lampedusa, Italy (a double monochromator Brewer spectrophotometer); Rome, Italy (a single monochromator Brewer spectrophotometer); and Crete, Greece (a double monochromator Bentham instrument and a double Brewer spectrophotometer). Also, NASA was operating two GUV-511 filter instruments on Crete. All of these

instruments were calibrated by the CUCF using the same irradiance standard in the CUCF's portable field calibration system. Scientifically, this will provide all participants with the same baseline reference from which they can compare their measurements. In addition to the instruments used in the PAUR II campaign, the single monochromator Brewer operated by the Joint Research Center at Ispra, Italy was calibrated. (Patrick Disterhoft, 303 497 6355)

12. Table Mountain Test Facility (TMTF). The TMTF communication upgrade project is nearly complete. The project called for the interconnection of the main research buildings on Table Mountain with a fiber optic cable. The fiber optic cable was to replace the current copper wire infrastructure that is badly deteriorating. The cable was then to be connected to a high-speed digital data line, which was to be installed by the local telephone provider, US West. The final part of the project was to upgrade the hardware at each of the research buildings to take advantage of the new communications network.

The first two portions of the project are finally completed. The fiber optic cable was totally installed in April, 1999, which was about the same time that US West completed their installation of the T-1 digital data line. All that remains is the interfacing of the computers and data acquisition systems with the backbone of the LAN. (Patrick Disterhoft, 303 497 6355)

13. Umkehr Ozone Record. Long-term time series of stratospheric aerosol optical depths have been generated from satellite, lidar, and pyrhelimeter data. These time series are the result of many analysis and quality control procedures and provide information on volcanic influences on the stratosphere from the 1950s to present. The data are being used to obtain improved aerosol error corrections for the Umkehr ozone record. (Amy Stevermer, 303 497 6417 and Irina Petropavlovskikh, 303 497 6279)

Oak Ridge

14. Deposition in the mid-Atlantic Highlands -- Canaan Valley. Plans are nearly complete to install a wet and a dry deposition site to assess air pollutant transfer into the Canaan Valley, WV region. The sites will be part of NOAA's Atmospheric Integrated Research Monitoring Network (AIRMoN) and will serve to monitor pollutant deposition and to test improvements in monitoring techniques. The wet deposition site will also be part of the National Atmospheric Deposition Program (NADP). Operation in a National Wildlife Refuge is being negotiated with the U. S. Fish and Wildlife Service. (vogel@atdd.noaa.gov)

15. Dynamical/Photochemical Modeling. More numerical experiments were conducted during May using the coupled large-eddy simulation (LES) dynamical/photochemical LESchem model in order to better assess its capabilities. A repeat of March's 2-hour midday LESchem simulation with segregated NO and isoprene surface emissions was performed, but this time a 5 m s^{-1} mean westerly wind was imposed. The presence of a mean wind deepened the convective boundary layer (CBL) depth a bit, and noticeably reduced the effects of the segregated emissions. The initial trace gas profiles fed into LESchem were then improved by using smoothed versions of the midday 30-hr results from the 1-D UAHCTM photochemical model. The next LESchem simulation used these new initial conditions, no mean winds, homogeneous emissions of NO and isoprene, an initial random perturbation to the surface potential temperature field within the range of $\pm 1 \text{ K}$, and a surface roughness specification of 1.0 m (up from 5 cm) to represent a tall, dense forest.

Programs were modified to analyze and plot the turbulence statistics (convective velocity scale, vertical velocity variance, kinematic heat flux, etc.) from the convective boundary layer (CBL) generated by the

RAMS-LES portion of the LESchem model. This software was then used to examine and compare several previous LESchem simulations in order to check the validity and “realism” of the simulated idealized CBLs. To speed up the process of achieving a realistic CBL, the LESchem model was slightly modified to run with no additional scalar quantities (*i.e.*, no trace gases nor passive contaminants); it only computes the necessary LES dynamics. Without the chemistry and without advecting around the 45 trace gases, a 2-hr LESchem run requires only about 7.5 hr (instead of over 5 days) on the fast PC. At the end of May, the first LES-only LESchem simulation was done using a surface roughness of 20 cm and a 20% smaller specified surface temperature differential to drive the convection. Results looked encouraging, with more LES-only runs scheduled for June until the desired CBL characteristics are achieved. (herwehe@atdd.noaa.gov)

16. Study of Land-Surface Hydrology — Collaboration with NASA. A two-year study is about to start, addressing the spatial variation of penetrative convection at the top of the convective mixed layer, and drawing on a highly synergistic set of data and modeling from the NASA Southern Great Plains Experiment of 1997 (SGP97). The central question asks to what extent and in what way the variation in land cover and surface soil moisture affect the mixed-layer development. This covers a number of hydrological issues such as evaporation rates and the influence of storms on further storm development. Land cover has long been observable from satellite. The SGP97 was organized around a demonstration of practical remote sensing of surface soil moisture, using the Electronically-Scanned Thinned-Array Radiometer (ESTAR). Investigators from three institutions will collaborate on the program (the University of Minnesota and Pennsylvania State University, as well as ATDD). The period selected for detailed scrutiny includes strong convective mixed layer growth during drying after widespread rains. (dobosy@atdd.noaa.gov)

17. Alaskan Studies. Once again, ATDD systems will be underpinning the NSF-sponsored study of the North Slope of Alaska undertaken by San Diego State University. A new Sky Arrow aircraft will be used, for which ATDD will provide the turbulence-sensing instrumentation. The data acquisition system for the aircraft is in final assembly this month. The pressure sphere and BAT data acquisition system are also in final assembly, with delivery of the aircraft to the North Slope of Alaska scheduled for June 9, 1999. (brooks_dumas@atdd.noaa.gov)

SURFRAD and ISIS. Processed Bondville, IL SURFRAD data through June 1, 1999 are to be included in GEWEX data files.

Six UVB sensors were returned to ATDD from the Solar Radiation Research Branch (SRRB) after comparison with the SRRB UVB Solar Light reference set. Calibration factors continue to change, with the reference set also appearing to lose some sensitivity. Direct comparison to a spectral radiometer is still to be accomplished. (matt@atdd.noaa.gov)

Research Triangle Park

18. Scientific Achievement Awards for ASMD. Sharon LeDuc and Donna Schwede have received the Team Excellence Award from the EPA Office of Solid Waste and Emergency Response (OSWER). This award is in recognition of their efforts in implementing the Hazardous Waste Identification Rule (HWIR) Risk Assessment. The HWIR assessment utilizes a site-based approach to model over fifty hazardous pollutants for 200 nationally representative solid waste disposal sites. Sharon is the team statistician and conducted the analysis leading to the site selection scheme. Donna is the leader of the air modeling team and developed a specialized version of the Industrial Source Complex (ISCST3) Model for use in the assessment.

These two awards are in addition to the recent receipt from the EPA of one Gold Medal, three Silver Medals, fifteen Bronze Medals, one Scientific Achievement Award, one James Akerman Award, and one Exceptional Support to ORD Award, marking a very productive past eight months for ASMD scientists. (Frank Schiermeier, 919 541 4542)

19. 5th International Conference on Mercury as a Global Pollutant. Russ Bullock attended the 5th International Conference on Mercury as a Global Pollutant held May 23-28, 1999, in Rio de Janeiro, Brazil. For the first time, a majority of the attendees appeared to be from outside western Europe, the United States and Canada.

A major topic for presentation and discussion was the importance of reactive gaseous mercury in wet and dry deposition fluxes from the atmosphere. Methods to discriminate between elemental mercury and oxidized mercury compounds in the total gaseous mercury content of ambient air have only recently been developed. Differing theories about the existence of gaseous oxidized mercury, its source, and its possible importance to atmospheric deposition of mercury have been put forth during the past decade. These new “mercury speciation” methods should provide some very enlightening data during the next few years. There was general agreement during the atmospheric chemistry and modeling sessions that advanced numerical modeling techniques alone will not provide confident assessments of mercury source-receptor relationships, but that modeling and monitoring should be used in an iterative fashion to guide and advance our understanding of mercury behavior in the atmosphere. (Russ Bullock, 919 541 1349)

20. Spatial Statistics of Dry Deposition Data. Dr. Monserrat Fuentes, a member of the faculty at the Statistics Department of North Carolina State University will be working on spatial statistical problems associated with dry deposition data from CASTNET and AIRMoN, and its linkage with regional scale model output. Dr Fuentes is a UCAR visiting scholar. (Pete Finkelstein, 919 541 4553)

21. Solar Radiation Exposure Modeling. One of the major technical obstacles to calculating the solar flux onto a surface (leaf, skin, eye, etc.) has been with the complexity of the surface geometry. While the slope and aspect of a flat building structure or level ground surface are easily quantified in calculating a radiative energy balance in microclimatology, the curvature of plant and animal surfaces has eluded a detailed mapping of their surface solar flux. Advances in computer graphics - including high-resolution, three-dimensional mathematical representations of the human form - have enabled calculation of incident broadband solar flux with sub-centimeter anatomical resolution.

Software is now available to assess solar radiation exposure with independent specification of human model posture, aspect orientation, latitude, date, and time of day. The distinct treatment of simulated beam and diffuse skylight sources allows independent attribution of these components. Effect-specific spectral weighting functions may then be applied to generate a biologically-effective exposure - and create exposure isopleths mapped onto the anatomy. Cumulative exposure scenarios may be investigated using solar trajectory models to determine solar zenith and azimuth angles as functions of time, and summing (over time) the instantaneous point fluxes. Anatomically-resolved biologically-effective exposures may then be integrated over time — using an effect-specific dose metric — to determine the anatomically-resolved, biologically-effective potential dose. Plans are underway to integrate this model with real-time measurements in a series of pilot study cities. The integrated model and data will be uploaded to a dedicated internet web site. (John Streicher, 919 541 3521)

22. Resuspension. The Fluid Modeling Facility (FMF) has been conducting experiments to evaluate the suitability of Sensit™ instruments for application in measuring energy exchange among blades of grass which are moving in response to a turbulent flow. Calibration of two instruments using small glass spheres showed that the Sensit, which is based on a piezoceramic sensor, produced a measurable output for mechanical inputs above 10^{-9} joules and became saturated for mechanical inputs which exceeded 10^{-7} joules. The output was linear between these extremes. Four organic filaments (three natural grass blades and one pine needle) were tested to determine whether the energy exchange which occurred when such grass blades either sharply impacted each other or rubbed against each other was within the measurement range of the Sensits. Three of the samples produced satisfactory results, while the fourth, a soft, pliable grass, failed to produce a usable indication. The ultimate objective of these tests is to determine how particulate resuspension from grass or grass-like surfaces might take place, i.e., is it primarily a result of aerodynamic interaction with the flow or does resuspension take place mainly due to mechanical interaction of the grass blades in a canopy? (Dale Gillette, 919 541 1883, Bob Lawson, 919 541 1199)

23. Preparation of a Sparse Matrix Emission Data Processor. Initial design for implementation of the Sparse Matrix Operator Kernel Emission (SMOKE) system in the Models-3 air quality modeling system is in place, and implementation of a preliminary version of SMOKE in Models-3 is scheduled for September 1999. SMOKE is a highly efficient air quality emissions data processor developed by the North Carolina Supercomputing Center partly under an EPA cooperative research agreement. SMOKE will be crucial in air quality modeling, both in speeding computation (by at least an order of magnitude - from hours to minutes), and in allowing iterative calculations with different combinations of specific emitted volatile organic chemical species. SMOKE will be completely integrated within the Models-3 framework and avoids the cumbersome use of third party commercial software (e.g., SAS) within the computations. Full implementation of SMOKE, including all capabilities of the current emission processing system, is expected to be in the June 2000 release of Models-3/CMAQ, contingent upon resources. (Bill Benjey, 919 541 0821)

Idaho Falls

24. BRAVO Source/Receptor Tracer Experiment. The Big Bend Regional Aerosol and Visibility (BRAVO) tracer experiment will help determine the sources of sulfate aerosol which is reducing visibility at Big Bend National Park. FRD will release tracers at Eagle Pass Texas, the Big Brown Power Plant in the Dallas-Ft. Worth area, Houston, and San Antonio. During July and August, three tracers will be released from the Eagle Pass location. One tracer will be released continuously, and the other two will be released for 12 hours on alternate days. The purpose of this staggered release schedule is to differentiate between different nighttime periods at the receptor sites. During September and October, two of the Eagle Pass systems will be relocated -- one to the Houston area, and the other near San Antonio. The length of the study, the modulated release at Eagle Pass, and the release from multiple sites required a new type of fully automated release system. The new systems are self contained and have multiple redundant components.

This month, the final equipment purchases and assembly of the four release systems were completed. As shown in the photo below, each system is housed in an air-conditioned weatherproof cabinet which contains all the release material for the four-month study. Data will be telemetered back to the FRD office. Further, there are multiple sensors to measure diagnostic parameters. A microprocessor compares the various parameters and will notify both the local operator and our office if there are any discrepancies. Finally, the system is capable of switching to a backup pump or vaporizer if it detects a failure. The equipment is now

ready for deployment in mid-June. Until then, the systems will undergo operational tests at FRD. The releases will begin in July and continue through the end of October. ([tom.watson](mailto:tom.watson@noaa.gov) and randy.johnson@noaa.gov)



25. Short-term Forecast and Dispersion Model Testing. Sulfur hexafluoride, tri-ethyl phosphate, and di-isopropyl methyl phosphonate were released from the FRD Grid-3 Tracer Stack at the Idaho National Engineering and Environmental Laboratory in a program to test dispersion models developed by the Department of Defense.. Mobile real-time analyzers were used to determine the location and concentration of the SF₆ plume.

DOD personnel sampled the TEP and DIMP plumes. The MDIFF model was used to calculate real-time plume locations and to forecast wind vector changes up to two hours into the future. Report preparation and the process of assembling the data from the different subsystems are both underway. (kirk.clawson@noaa.gov and staff)

26. San Joaquin Ozone Study. The deployment of ten surface meteorology stations and the mobile meteorological monitoring system has been approved for the summer of 2000 in support of an ozone study in the San Joaquin Valley sponsored by the California Air Resources Board (CARB). The surface meteorology stations will measure wind speed, wind direction, air temperature and relative humidity. The mobile meteorological monitoring system consists of a phased-array Doppler sodar, radar wind profiler, and radio acoustic sounding system. These ground-based remote sensors will be used to acquire wind and temperature profiles in the boundary layer on a continuous basis. All data will also be telemetered to the FRD office and will be available for analysis via FTP downloads. (jerry.crescenti and randy.johnson@noaa.gov)

29. BAO Technical Report. A NOAA technical memorandum entitled *A Study to Characterize Performance Statistics of Various Ground-Based Remote Sensors* (ERL ARL-229) has been published and is being released to the scientific community. This report examines the characteristics of Doppler sodars, radar wind profilers, and radio acoustic sounding systems as a function of atmospheric conditions and stability. Requests for a copy of this report can be made to Jerry Crescenti. (jerry.crescenti@noaa.gov)

30. Best Aircraft Turbulence (BAT) Flies on WSU Convair. A BAT probe was shipped and is now being installed on the Washington State University Convair aircraft. For information on the WSU Cloud and Aerosol Research Group (CARG) and their Convair aircraft visit <http://cargsun2.atmos.washington.edu>. To support the increasing use of the BAT probes, a sensor users guide has been added to the BAT home page -- see [http:// www.noaa.inel.gov/frd/Capabilities/Bat/](http://www.noaa.inel.gov/frd/Capabilities/Bat/). (tim.crawford, david.auble, and randy.johnson@noaa.gov)

31. Building Wake Study. A study of building wake effects (with Lawrence Livermore National Laboratory -- LLNL) has been postponed until at least the new fiscal year. The experiment calls for SF₆ to

be released from a 100-ft line source upwind from two buildings on the LLNL campus. Five of FRD's mobile analyzers will be used to measure SF₆ concentrations. Four vans will be mobile, while the fifth will be stationary and will sample SF₆ from multiple heights in the building wake. LLNL will simultaneously be evaluating SF₆ plume IR imaging cameras in the near wake of the buildings. (kirk.clawson@noaa.gov)

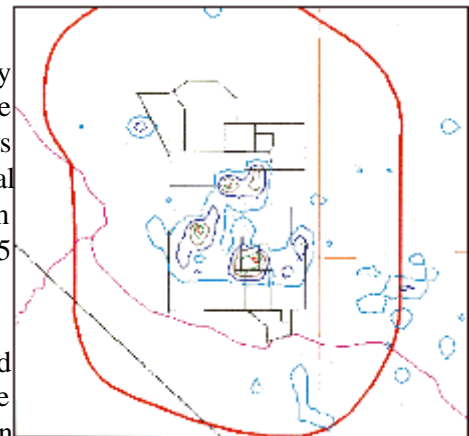
32. INEEL Mesoscale Meteorological Network. Three electric field mills were added to the Idaho National Engineering and Environmental Laboratory (INEEL) Meteorological Network. Data from the field mills are collected every five minutes along with the other data from the network. The electric field measurements help improve the FRD forecasts and warnings of thunderstorm and lightning on the network. (roger.carter@noaa.gov)

33. Meteorological Support for Proposed Space Port. FRD personnel met with a consortium of scientists and engineers attempting to bring a new space port to Idaho. This facility, if approved and built, will be located at the northern end of the Idaho Engineering and Environmental Laboratory (INEEL) near the Test Area North (TAN) research facility. Surface and upper-air meteorological data acquired over the years at the INEEL will be used to develop assessments and environmental impact statements for the launch facility. In addition, the deployment of additional ground-based remote sensors such as Doppler sodars and radar wind profilers will be necessary at TAN to further characterize the drainage flows of Birch Creek Canyon which empties into the Upper Snake River Plain. ([kirk.clawson](mailto:kirk.clawson@noaa.gov) and jerry.crescenti@noaa.gov)

Las Vegas

34. Kistler Aerospace Program. The Kistler space launch facility will make use of Area 18 of the Nevada Test Sites. The goal is to use recoverable Russian-built rockets to inject communications satellites into low earth orbit. SORD is providing the necessary meteorological guidance. Surface meteorological data continue to be collected in Area 18 to support the planned programs. (Darryl Randerson, 702 295 1231)

35. Cloud-to-Ground (CG) Lightning Study. The cloud-to-ground lightning climatology for Southern Nevada was updated to include June through September 1998. A flash density contour chart has been prepared. This displays several "hot spots" near where key studies are now being planned. The accompanying figure illustrates the sort of result obtained, for a storm period in May 1999. (Darryl Randerson, 702 295 1231, and Jim Sanders, 702 295 2348)



Cloud-to-ground lightning flash density contour analysis for May 26, 1999 (1200 PDT), to May 29, 1999 (0200 PDT). Maximum measured flash density was 4.8 fl/km².

36. Nuclear Emergency Search Team (NEST)/Federal Radiological Monitoring and Assessment Center (FRMAC)/Accident Response Group (ARG) Involvements. The SORD mobile emergency response capability was field tested during April and May. The Handar wind tower with sonic anemometers at the 2-m and 10-m levels was set up and connected to microprocessors that display the data. Also, our three AIR GPS sounding systems were tested and were demonstrated to be Y2K compliant. (Ray Dennis, 702 295 1263)

37. Hazardous Materials (HAZMAT) Spills Center (HSC) Mission. SORD has been collaborating with Project OSPREY I, a test series to assess alternative collection techniques for target chemicals when they are released at known rates as stack emissions. The test series was conducted during the weeks of May 3-7, and May 17-21, 1999. (Jim Sanders, 702 295 2348)