NOAA Air Resources Laboratory
Quarterly Activity Report
FY2011 Quarter 3
(April-June, 2011)

Contents

DISPERSION AND BOUNDARY LAYER

1. Volcanic Ash HYSPLIT Improvements

The NWS National Centers for Environmental Prediction (NCEP) implemented into operations new capabilities for their HYSPLIT volcanic ash transport and dispersion application following insights from the Eyjafjallajokull volcano in Iceland in spring, 2010. These capabilities were developed by ARL and include options for time-varying ash emission height, ash "rollover" from previous simulations, a first order method to initialize the model from ash observations, and wet deposition. The U.S. Volcanic Ash Advisory Centers use these forecasts, as do the NWS partners in the private sector. The multi-processor version of HYSPLIT was also implemented to improve model run times. The new capability at NWS NCEP, modeling ash from an ongoing eruption in which the ash column's height was changing with time, was successfully applied for the May 2011 Icelandic eruption of Grimsvotn. The London Volcanic Ash Advisory Center was responsible for issuing advisories for this incident. However, in support of NWS internal planning, ARL's Barbara Stunder provided the time-series source term information. This case reinforced training to the NCEP operational staff on this application.
Barbara.Stunder@noaa.gov

2. Model Collaboration between ARL and Office of Response and Restoration

A joint project between ARL and the National Ocean Service's Office of Response & Restoration had been initiated in 2010 to combine the chemical source term of the ALOHA (Areal Locations of Hazardous Atmospheres) model with the HYSPLIT dispersion model with the goal of having a unified NOAA emergency response capability for chemical releases to the atmosphere. The project was funded by the Department of Homeland Security's Geo-Targeted Alerting System project through the NOAA Global Systems Division. Progress to date includes the ability to initiate a HYSPLIT run on ARL's web server using any one of over 1600 chemicals and define the type of release (puddle, tank, gas pipeline, or direct to the atmosphere). Future plans are to include the ability of running with the ALOHA Gaussian dispersion model in addition to or instead of HYSPLIT, depending on the scope of the release. (glenn.rolph@noaa.gov , roland.draxler@noaa.gov)

3. Harvard Collaboration

Atmospheric Turbulence and Diffusion Division (ATDD) continued their work on the Best Aircraft Turbulence (BAT) probe in collaboration with Harvard. A paper for publication as a NOAA Technical Memorandum is being prepared to detail the procedure and results from the Massachusetts Institute of Technology wind tunnel study. A subset of the Technical Memorandum will be submitted to a peer-reviewed scientific journal. Additionally, an abstract for the upcoming American Meteorological Society (AMS) conference in New Orleans in January 2012 is being prepared. ed.dumas@noaa.gov R.Dobosy, E. Dumas, D. Senn, B. Baker.

4. UTSI Collaboration

Additional flights using the University of Tennessee Space Institute's (UTSI) Navajo airplane were made over the Crossville, TN Climate Reference Network (CRN) station. Prior to the flights, a flux tower was added beside the station. In addition, an auxiliary tower was installed to replace a previous tower. The new auxiliary tower includes the two original Apogee infrared temperature sensors, two Photosynthetically Active Radiation sensors, and a Kipp & Zonen CNR-1 4-band radiometer to measure both incoming and reflected long and short-wave radiation. A solar panel was installed on the tower to charge the deep-cycle battery used to run the datalogger and instruments. Data from the auxiliary tower is downloaded to ATDD every hour utilizing a cell modem attached to the CR3000 data logger. A web site http://dataviewer.atdd.noaa.gov/crossville/ was created to display real-time data from the site. ed.dumas@noaa.gov

Auxiliary tower near the Crossville, TN Climate Reference Network station in support of the UTSI program.

5. Duke Energy Ocotillo Wind Farm

ATDD continued to operate its field research laboratory at the Duke Energy Ocotillo Wind Farm in Big Spring, Texas. Results of the analysis of wind data, observations from the Duke Energy site meteorological towers, and site-specific High Resolution Rapid Refresh (HRRR) model forecast of 10m and 80m (hub-height) winds were presented at Duke Energy's quarterly meteorological staff meeting. Discussions at the meeting included a summary of data analysis from the ATDD flux tower and evaluation of the Earth System Research Laboratory's HRRR model covering the Ocotillo Wind Farm. As a step forward, Duke Energy agreed to supply ATDD with its daily forecasting results for the Ocotillo site. ATDD will compare the Duke Energy forecasts with site observations and the HRRR model to identify areas for potential improvement.

Also, an internal (NOAA) program review was held to discuss all observations to-date from ATDD's field laboratory at the Duke Ocotillo Wind Farm. The review was held at ATDD in Oak Ridge, TN and attended by ATDD research staff and invited guests Ray Hosker and Bruce Hicks, former directors of ATDD. Go-To-Meeting was used to join staff from ESRL in Boulder, CO and ARL Headquarters. The goal was to present all materials related to the Ocotillo Project, including both the data collection process and data analysis. There was a lively exchange of ideas concerning potential improvements in the simulation of the atmospheric boundary layer. Recommendations were made for additional data analysis and monitoring. will.pendergrass@noaa.gov

6. NOAA Support for Japanese Earthquake

ARL provided dispersion modeling support to NOAA as part of its response to the Fukushima nuclear crisis in Japan. Steve Fine, acting Deputy Assistant Administrator for Planning and Administration, coordinated the overall OAR response to the crisis. ARL Headquarters (Roland Draxler and Yunsoo Choi) and FRD (Rick Eckman) collaborated in running a series of HYSPLIT model runs to estimate atmospheric radiological doses and deposition from the power plant. One of the major uncertainties was the total emissions of important radionuclides during the event. Some emission scenarios had over one hundred times as much cesium 137 being released as others. Aircraft observations downwind of the plant were used to narrow the modeling to the most plausible scenarios. The HYSPLIT output was coupled with an ocean model to estimate possible oceanic impacts of the radiation. Roland.draxler@noaa.gov

7. NOAA/DOE Wind Forecast Improvement Project

Preparations were made for the Wind Forecast Improvement Project (WFIP) slated to begin July 18 at three locations in Texas (Jayton, Colorado City, and Brady sites). The Texas deployments will be for a full year and each site is to be visited every 6-7 weeks. ARL's Field Research Division will deploy a radar wind profiler, a fully instrumented meteorological tower, a minisodar, and a sonic anemometer at the Brady site. A minisodar and sonic anemometer will be deployed at the Colorado City site, and FRD will also support the communications for a radar wind profiler provided by Sonoma Technology, Inc. FRD will deploy a minisodar and sonic anemometer near an existing permanent NOAA radar profiler installation at the Jayton site. The new minisodar and an upgrade of an old minisodar were delivered in early June. The upgrade makes the older unit essentially identical to the new one. Through testing, FRD has become familiar with their operation. An evaluation of data following the upgrade indicates that the wind speed bias problem we had earlier in the year was resolved by the upgrade. Dennis.Finn@noaa.gov

8. Weather/Hurricane In situ Sea Surface Probe (WHISSP) Project

FRD has developed a preliminary conceptual design of a very lightweight and inexpensive transponder that could be used on a small balloon payload, such as the Weather/Hurricane In situ Sea Surface Probe (WHISSP) balloon. Because of the small size and weight it could also be used as a payload on a small blimp, UAV or tetroon. The Iridium satellite system was selected to provide communications with the transponder. Experience over the years has shown that the Iridium satellite system has excellent reliability in covering the whole earth from pole to pole. In addition, there is no need to get permission when the transponder location moves from satellite to satellite, as is required when the military satellite network is used. The proposed initial transponder performs some basic measurements and returns data via the Iridium Satellite system. Data include transponder number; year, month, day; hours, minutes, seconds; battery voltage; latitude, longitude, and altitude from the GPS unit; very accurate digital barometric pressure; and very accurate digital air temperature and relative humidity. Randy.Johnson@noaa.gov

9. Tracer Sampler New Tubing Tests

Tests of possible candidates to replace the latex tubing used on the tracer sampler boxes continued during the quarter. Testing for the possibility that some of the tracer gas might

adsorb to the walls of the tubing and subsequently contaminate samples in the bag was completed. The results of this testing indicated that latex and Tygoprene were associated with significantly larger contamination artifacts than R-1000 and R-3603 tubing. This was especially true for the three perfluorocarbon (PFC) tracers. Sulfur hexafluoride (SF_6) also exhibited a slight tendency toward more contamination from the latex and Tygoprene tubing, although it was generally negligible in all cases. Sample retention (aging) tests are still in progress. To date, all of the tubing candidates have shown excellent sample retention for SF_6. Some preliminary data suggest the possibility of retention problems for the PFC tracers for R-1000 and R-3603 tubing. Dennis.Finn@noaa.gov

10. Tracer Support for Dust Transport Research

A new tracer research opportunity involving dust transport research was identified in early May, and a proposal was quickly developed and approved in mid-June. The dust research project was conducted by the Pacific Northwest National Laboratory, Desert Research Institute, and the University of Utah on the Hanford Reservation in central Washington. The group asked FRD to provide tracer measurements as a control on the dust measurements being made. The SF_6 tracer was injected into the road dust plume that was generated at wheel level by a vehicle traveling a dirt road. The intent was to provide a simultaneous line source for dust and the tracer. Collocated dust and tracer measurements were then made at stations downwind of the road. Fast response, real-time tracer measurements are required so the tracer gas analyzers (TGAs) were used in this deployment. The first phase of the study was conducted 13-15 June. During the three days of testing, optimal tracer release rates were determined, improvements in the placement of the TGAs were made, and a possible defect in the tracer release mechanism was identified that could potentially result in either post-release leakage and/or delay in achieving equilibrium after initiating the release on each pass along the road. A second, longer phase of work is currently planned for September. Dennis.Finn@noaa.gov

11. High Performance Computing

A proposal from FRD to NOAA's High Performance Computing and Communications Incubator Program was awarded in late June. The proposal calls for accelerating the HYSPLIT dispersion model execution times with the use of Graphical Processing Unit (GPU) computing. This work will be done in collaboration with Dr. Inanc Senocak at Boise State University, a recognized expert in the field of GPU computing who will provide much of the expertise for the project. FRD will provide project oversight as well as consultation based upon our previous work and experience with HYSPLIT. Work will begin after the necessary hardware and software have been acquired and Dr. Senocak has identified a qualified graduate student. Dennis.Finn@noaa.gov, Rick Eckman

12. DOE Meteorological Coordinating Council Annual Meeting

Walt Schalk attended and chaired the annual Department of Energy's (DOE) Meteorological Coordinating Council meeting held in conjunction with the annual Emergency Management Issues Special Interest Group in Charleston, SC. A review of the activities over the past year was conducted as well as on-going activities of the constituents. Information about current activities at all the DOE sites was shared as well as StormReady certifications and Eastern Tennessee

climatology. A special session on Dispersion Meteorology was also conducted. Walt.Schalk@noaa.gov

13. Wind Erosion

Marc Pitchford attended a training session for operation of the Portable In-Situ Wind Erosion Laboratory (PI-SWERL) by the Desert Research Institute Scientists developed this system to determine the wind-blown dust emission characteristics of soil surfaces. The training was offered to employees of an environmental consulting firm who leased the system to evaluate the effectiveness and stability over time of certain soil stabilization treatments for disturbed soils as part of a larger research program. Prior to the availability of the PI-WERL, such work required the use of an open bottom, portable wind-tunnel, which required a crew of three or more to set up and operate and collected only a few measurements per day. PI-SWERL equipment can be set up and operated in a fraction of the time with a crew of one or two people to make 20 or more measurements per day. marc.pitchford@noaa.gov

14. Consequence Assessment

The Special Operations and Research Division (SORD) participated in a full participation Emergency Response Exercise for the Nevada National Security Site (NNSS) called Sidewinder 11, as well as several smaller tabletop exercises conducted in preparation for the main event. These exercises are conducted annually. SORD's participation began with a page from the Operations Communications Center. Kip Smith and Walt Schalk reported to the Emergency Operations Center (EOC) and received an event status briefing and documents about the scenario. Based on the events location, the closest SORD weather station was identified and the EOC Emergency Manager and the Crisis Manager were briefed on the current weather at the site and the forecast for the remainder of the day. Taking the information about the event and using the local weather data from the SORD tower, an atmospheric transport and diffusion model was run to calculate concentrations of hazardous materials. The modeled concentrations were then evaluated against safety criteria and the areas where protective actions are required were identified. This information was briefed to the EOC Emergency Manager and Crisis Manager. As the day went on and events evolved, SORD continued to provide current weather and forecast updates and provided any additional dispersion model results to Emergency Management. Walter.W.Schalk@noaa.gov

15. Weather Services for NNSS Experiments

SORD provided weather services in support of experiments being conducted on the Nevada National Security Site (NNSS). Specific forecasts for the experiment locations were given, multiple high altitude radiosonde balloons were released and tracked, multiple Pilot Balloons were released and tracked, and dispersion models were run. These services were provided to ensure safe execution of the experiments and to provide Principle Investigators with upper atmospheric data. The SORD team members worked several extended days to provide the services. Kip.Smith@noaa.gov, James Wood, Rick Lantrip and Walt Schalk

AIR QUALITY

16. Intensive Atmospheric Measurements at Grand Bay

Steve Brooks, Mark Cohen, Paul Kelley, Winston Luke, and Xinrong Ren participated in an intensive atmospheric measurement project at the ARL mercury monitoring station in the Grand Bay National Estuarine Research Reserve (NERR) in Moss Point, Mississippi from April 19 to May 9. This second and final intensive was designed to answer key questions in atmospheric mercury research, including an assessment of the importance of transport from the upper troposphere in influencing mercury concentrations at the surface; the role of halogen compounds in mercury transformations; and the chemical identities of individual RGM species. For the research intensive, routine ARL measurements of mercury species, meteorological parameters, and ancillary trace gas and aerosols at the site were supplemented with measurements collected (both on the ground and aloft) by other research partners.

During a dense fog event the morning of April 21, gaseous elemental mercury (GEM) depletions were observed at the surface (0.5 m) on the order of 0.3 ng/m^3 compared to the measurements at 10 m. This surface depletion was centered about 5 a.m. (CST) and is, to date, our strongest indicator of GEM deposition to dew covered surfaces. At several other sites we have observed small decreases (~0.05 ng/m^3) in GEM during surface radiation fog/dew events, and GEM deposition to dew surfaces has been suggested by several groups.

ARL scientists will use a newly developed version of a HYSPLIT-based mercury transport, chemistry and deposition model to simulate mercury concentrations at both the NERR and along the aircraft flight tracks, and the combined surface and aircraft data sets will be used for extensive post hoc model evaluation. Winston.Luke@noaa.gov, Steve.Brooks@noaa.gov

17. Air Quality Forecasting Research

Yunsoo Choi gave an invited talk to the Korean-American Scientists and Engineer Association (KSEA) southeastern regional conference 2011, held in Atlanta GA April 22-23. The talk, titled "Weather and Remote Sensing on Air Quality Forecasting," covered the impact of weather change on air quality and application of the satellite-derived O3-NOx-VOC sensitivity indicator for air quality forecasting. The presentation showed how a frontal system, low pressure and high pressure system (using weather map), affects the spatial distribution of the concentration of ozone and particulate matter using the National Air Quality Forecasting Capability (NAQFC). It also showed how the satellite-derived photochemical O_3 indicator (using the ratio of GOME-2 NO_2 versus HCHO column concentrations) can be used to understand the surface O_3 biases from the NAQFC simulation. Yunsoo.Choi@noaa.gov

18. Research at the Nexus of Air Quality and Climate Change (CalNex 2010)

LaToya Myles provided ammonia concentration data collected during CalNex 2010 to a modeling group at the Université Libre de Bruxelles for their satellite validation research. ATDD measured ammonia concentrations and deposition near Modesto, CA, in the northern San Joaquin Valley. The Brussels group is very interested in comparing ATDD's data to their satellite ammonia product from the Infrared Atmospheric Sounding Interferometer (IASI) on board the

meteorological platform MetOp-A. latoya.myles@noaa.gov, M. W. Heuer

19. Atmospheric Integrated Research Monitoring Network at CVI

Steve Brooks and Chris Vogel are preparing a manuscript for submittal to the journal Southeastern Naturalist. The paper describes the deposition measurements collected at Canaan Valley. ARL has conducted daily measurements of acidity and major ions in precipitation as part of the Atmospheric Integrated Research Monitoring Network (AIRMoN) since 2000. Continuous speciated mercury measurements in air have been collected since 2006 (now a part of the Atmospheric Mercury Network), as well as weekly mercury wet deposition (part of the NADP Mercury Deposition Network) since 2008. Since 2000 Canaan Valley has seen a significant increase in the wet deposition of inorganic nitrogen (nitrate and ammonium) and similar to national trends has seen a notable decrease in acidic deposition of sulfate. Wet deposition of mercury is slightly elevated compared to most other monitoring sites in the east central US. This is likely due to the high precipitation quantity unique to Canaan Valley. The dry deposition rate for mercury at Canaan Valley appears typical for the region. steve.brooks@noaa.gov, Chris Vogel

20. Interagency Monitoring of Protected Visual Environments (IMPROVE)

Marc Pitchford started to draft recommendations that will be forwarded to management of the IMPROVE Program and EPA's Chemical Speciation Networks. Both programs are jointly conducting an assessment to determine the merits of changing their current approaches for adjusting the particulate organic mass data for a sampling artifact (i.e., gaseous organic material deposited on the quartz fiber filter during sampling). The goal is to develop an approach that includes 1) reduced uncertainty and bias in the final organic mass concentration data, 2) consistent with the limitations of our understanding of organic artifacts, 3) simple to implement (e.g. uses available information and could be applied to historic data), and 4) applicable to both networks to improve internetwork data comparability.

Marc Pitchford is drafting the scope of work for the next IMPROVE Network particulate matter coordination contractor (PMCC) solicitation by the National Park Service. The PMCC is responsible for operation of the ~165-station national aerosol sampling network, conducting analysis of the Teflon filter, coordination with site operators, distribution of the other filters to separate contract analytical laboratories, application of quality control procedures, data processing, and data transmittal to the government.

Marc Pitchford has been working with colleagues at the University of California-Davis and the Desert Research Institute on recommendations for the IMPROVE Steering Committee concerning how to correct for particulate organic carbon sampling artifacts. The issue is that artifacts can be positive, whereby gaseous material can build up on the sample filters inflating the particle concentration, and negative, whereby particles evaporate or are chemically converted to gaseous form leading to an underestimation of the concentration. IMPROVE has conducted several workshops on the issue over the last three years but more testing is needed before recommendations can be made. Marc.Pitchford@noaa.gov

CLIMATE

21. Strengthening NOAA Science

Dian Seidel completed service on the NOAA Research Council's Ad Hoc Committee addressing science management issues raised by the April 2010 Workshop on Strengthening NOAA Science. The workshop recommendations aimed at ensuring that NOAA attract and retain the best qualified scientists; support them with adequate resources, infrastructure and services to enable rather than hinder their work; and provide an environment in which integrity is the guiding principle of the scientific enterprise and NOAA's relationship with her partners and the public. The ad hoc committee's role was to facilitate action on those recommendations. A prime focus on the committee was to provide input on NOAA's scientific integrity policy; the draft policy is open for comment at http://nrc.noaa.gov/scientificintegrity.html.

22. Local Meteorological Support

The NOAA National Climate Data Center (NCDC) retrieved 80 data files from Climate Reference Network sites through the server ftp.atdd.noaa.gov. Data are passed to NCDC by this path when retrieved episodically by ATDD from individual sites to fill data gaps. A record is maintained of the number of missing hours of retrievable data over the past 12 months. Instruments' characteristics for each site are maintained in the database ISIS (Integrated Station Information System) on NCDC's server, along with a record of events which affect data quality. New events are identified from ATDD's field crew, NCDC's Anomaly Tracking System (ATS), and email messages. lynne.satterfield@noaa.gov

23. U.S. Climate Networks

A total of 75 sites were visited this quarter. There were four stations installed for the U.S. Regional Climate Network (USRCRN) and one station for the U.S. Climate Reference Network (USCRN). Sixty annual maintenance visits were made, with 48 visits for USCRN sites and 12 for USRCRN. A total of 10 unscheduled maintenance visits were completed. Soil moisture/soil temperature sensors were installed at 19 additional sites. In addition, fences were installed at 24 USRCRN sites. mark.e.hall@noaa.gov

ATDD hosted the bi-annual CRN meeting in Oak Ridge on May 28. Discussions included preparation for additional Alaska installations, current state of the soil moisture measurements, and testbed and field activities. It was decided that a select set of locations will be identified to support the NASA Soil Moisture Active Passive (SMAP) mission set to launch in 2015. New field studies for 2012 will include co-locating various shield and gauge configurations at two CRN sites. The data will be collected and analyzed along with the Marshall testbed data to create a larger dataset to start developing transfer functions between the different rain gauge/shield combinations. A new study on how well NOAA/ATDD measure temperature will begin this fall. This study will examine the influence of parking lots and buildings on the measurement of temperature. mark.e.hall@noaa.gov

A USCRN precipitation testbed has been chosen to configure a set of precipitation gauges to define the reference for the upcoming World Meteorological Organization (WMO) Solid

Precipitation Intercomparison. Sites in Norway and Canada were also selected. mark.e.hall@noaa.gov

Tilden Meyers has been invited to Deutscher Wetterdienst, located in Lindenberg, Germany, to explore the possibility of co-locating USCRN climate monitoring instrumentation (air temperature, precipation, relative humidity) at their local installation. While visiting the field site, potential locations to deploy USCRN sensors will be evaluated. The site at Lindenberg currently serves as a reference site for the Global Climate Observing System (GCOS) Reference Upper Air-Network (GRUAN) and is also a reference site for the Global Energy and Water Cycle Experiment (GEWEX) Coordinated Enhanced Observing Period (CEOP) with surface instrumentation that is deployed for climate quality observations of surface meteorological variables. Tilden will give a seminar describing the results obtained from the Marshall Testbed precipitation study, including the experimental design, wind shields, gauge types, and transfer functions. Plans for the upcoming year will also be presented and discussed. tilden.meyers@noaa.gov

24. NASA's Soil Moisture Active Passive

Tim Wilson attended a workshop on the satellite mission of the NASA Soil Moisture Active Passive (SMAP) held in Oxnard, CA, on May 3-5, 2011. The workshop drew many interested partners as a part of the calibration/validation "Cal/Val" plan for the satellite mission to address both pre- and post-launch activities relevant for high-value SMAP products. Activities discussed include field campaigns to provide needed data sets for the SMAP algorithm and scaling issues associated with using the diverse insitu data sets available for SMAP calibration and validation. SAMP is scheduled to be launched in 2014, and will provide two to three days' measurements of the global land surface soil moisture at a spatial resolution of 10 km and freeze-thaw state at a spatial resolution of 1-3 km. The NOAA USCRN program is supporting the SMAP Cal/Val effort with robust and standardized in situ soil moisture measurements at the USCRN sites across the U.S. tim.wilson@noaa.gov

25. 45th Canadian Meteorological and Oceanographic Society Meeting

Bruce Baker and John Kochendorfer attended the 45th Canadian Meteorological and Oceanographic Society meeting in Victoria, BC, June 5-10, where ATDD personnel were primary or co-authors on six presentations:

- The NOAA/FAA/NCAR Winter Precipitation Test Bed: How Well Are We Measuring Snow?, presented by R. Rasmussen;
- NCAR; Precipitation Gauge Performance During High-Wind/High-Rate Snowfall Events, presented by S. Landolt;
- NCAR; Field Estimates of Sonic Anemometer Angle of Attack Errors, presented by J. Kochendorfer;
- Windshield Efficacy at the NOAA/FAA/NCAR Winter Precipitation Testbed, presented by J. Kochendorfer;
- Using Sonic Anemometers for Design and Testing of Wind Shields, presented by T. Meyers; and

- How do we Maintain Sustainable High-Quality Climate Observation Networks That can Answer the Question: How Has the Climate Changed Over the Past Fifty Years? presented by C.B. Baker.

ARL 3rd Quarter Publications

Published:

Two companion "Advanced Review" articles were published in the new journal Wiley Interdisciplinary Reviews: Climate Change. They each survey the scientific literature since the 1960s to examine the evolution of modeling tools and observations that have advanced understanding of global temperature changes.

> Thorne, P. W., J. R. Lanzante, T. C. Peterson, **D. J. Seidel**, and K. P. Shine, 2011: Tropospheric temperature trends: history of an ongoing controversy. Wiley Interdisciplinary Reviews: Climate Change, 2, 66-88, doi: 10.1002/wcc.80.
>
> **Seidel, D. J**., N. P. Gillett, J. R. Lanzante, K. P. Shine, P. W. Thorne, 2011: Stratospheric temperature trends: Our evolving understanding. Published on-line in Wiley Interdisciplinary Reviews: Climate Change, 2, 592-616, DOI: 10.1002/wcc.125.

Allen, R., **Myles, L., and Heuer, M.W**. (2011). Ambient ammonia in terrestrial ecosystems: A comparative study in the Tennessee Valley, USA. Science of the Total Environment 409, 2768–2772, doi:10.1016/j.scitotenv.2011.04.017.

Castell, Nuria, Enrique Mantilla, **Ariel F. Stein**, Rosa Salvador and Millán Millán (2011). Simulation and Evaluation of Control Strategies for Ozone Reduction in a Complex Terrain in Southwestern Spain. PUBLISHED ON-LINE in May, 2011 in Environmental Modeling and Assessment, DOI: 10.1007/s10666-011-9265-3.

Denkenberger, Joseph S, Charles T. Driscoll, Brian A. Branfireun, Chris S. Eckley, **Mark Cohen**, and Pranesh Selvendiran. (2011) A Synthesis of Rates and Controls on Elemental Mercury Evasion in the Great Lakes Basin. Published On-Line June 2011 in Environmental Pollution, doi: 10.1016/j.envpol.2011.06.007

de la Campa, AMS, J. de la Rosa, Y. González-Castanedo, R. Fernández-Camacho, A. Alastuey, X. Querol, **A. F. Stein**, J. L. Ramos, S. Rodríguez, I. García Orellana and S. Nava. (2011) Levels and chemical composition of PM in a city near a large Cu-smelter in Spain. Journal of Environmental Monitoring, 13, 1276-1287, doi10.1039/c0em00708k.

Kochendorfer, J., and K. Tha Paw U (2011). Field estimates of scalar advection across a canopy edge. Agricultural and Forest Meteorology, Hardcopy: Volume 151, Issue 5, Pages 585-594 DOI: 10.1016/j.agrformet.2011.01.003.

Kochendorfer, J., E. G. Castillo, E. Haas, W. C. Oechel, and K. Tha Paw U (2011). Net ecosystem exchange, evapotranspiration and canopy conductance in a riparian forest. Agricultural and Forest Meteorology, Hardcopy: Volume 151, Issue 5, Pages 544-553, DOI: 10.1016/j.agrformet.2010.12.012.

Lee, Daegyun, **Daewon W. Byun**, **Hyuncheol Kim, Fong Ngan**, Soontae Kim, Chongbum Lee, Changrae Cho (2011). Improved CMAQ predictions of particulate matter utilizing the satellite-derived aerosol optical depth. doi:10.1016/j.atmosenv.2011.04.018 Atmospheric Environment 45 (2011) 3730-3741.

Murphy, D.M., J. C. Chow, E. M. Leibensperger, W. C. Malm, **M. Pitchford**, B. A. Schichtel, J. G. Watson, and W. H. White. Decreases in elemental carbon and fine particle mass in the United States. Atmospheric Chemistry and Physics 11, 4679–4686 doi:10.5194/acp-11-4679 (2011).

Schichtel, Bret A. , **Marc L. Pitchford**, and Warren H. White (2011). Comments on "Impact of California's Air Pollution Laws on Black Carbon and their Implications for Direct Radiative Forcing" by R. Bahadur et al. Atmospheric Environment. Volume 45, Issue 24, August 2011, Pages 4116-4118. doi:10.1016/j.atmosenv.2011.04.042

Seidel, D. J., B. Sun, M. Pettey, and A. Reale (2011), Global radiosonde balloon drift statistics, J. Geophys. Res., 116, D07102, doi:10.1029/2010JD014891.

Stein, A. F., Y. Wang, J.D. de la Rosa, A.M.S. de la Campa, N. Castell, **R.R. Draxler** (2011) Modeling PM10 Originating from Dust Intrusions in the Southern Iberian Peninsula Using HYSPLIT. Weather and Forecasting. Vol 26 (2), 236-242. doi 10.1175/waf-d-10-05044.1.

Tang, Wei, Daniel S. Cohan, Gary A. Morris, **Daewon W. Byun**, and **Winston T. Luke**. (2011) Influence of vertical mixing uncertainties on ozone simulation in CMAQ. Atmospheric Environment. Volume 45, Issue 17, June 2011, Pages 2898-2909. doi:10.1016/j.atmosenv.2011.01.057

Dr. Xinrong Ren, a visiting scientist with ARL, published a paper titled: "A relaxed eddy accumulation system for measuring vertical fluxes of nitrous acid" in Atmospheric Measurement Techniques. The full citation is: Ren, X., J. E. Sanders, A. Rajendran, R. J. Weber, A. H. Goldstein, S. E. Pusede, E. C. Browne, K.-E. Min, and R. C. Cohen,(2011) A relaxed eddy accumulation system for measuring vertical fluxes of nitrous acid, Atmos. Meas. Tech. Discuss., 4, 4105-4130. doi:10.5194/amtd-4-4105-2011. www.atmos-meas-tech-discuss.net/4/4105/2011/ The paper is based on work that Xinrong conducted while at the University of Miami.

Melissa Free contributed the section on stratospheric temperature in the report "State of the Climate in 2010", which was officially released on June 28th. The report states that the global mean stratospheric temperature showed a cooling trend between 1980 and the mid-1990s, but has been approximately constant over the past 15 years. 2010 was slightly warmer than the mean over the last decade but cooler than the 1980s. The full report, along with the

supplementary materials, is available online at: http://www.ncdc.noaa.gov/bams-state-of-the-climate/2010.php. Melissa's specific contribution is cited as: Free, M., 2011: [Global Climate 2.b.3] Lower Stratospheric Temperatures [in State of the Climate in 2010], Bull. Amer. Meteor. Soc., 92 (6), S36-S37. melissa.free@noaa.gov

Marc Pitchford is the principal author on Chapter 4 of the "Policy Assessment for the Review of the Particulate Matter National Ambient Air Quality Standards" which was published by EPA (see http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_2007_pa.html). This Policy Assessment document presents EPA staff conclusions regarding the adequacy of the current suite of particulate matter (PM) standards as well as potential standards for consideration to replace or supplement the current standards. Chapter 4 contains the review of the secondary standards for protection of visibility-related public welfare effects. In it, EPA concludes the current secondary PM standards do not adequately protect against visibility effects and that a new standard with particle-calculated light extinction as the indicator should be considered. Marc.pitchford@noaa.gov

Accepted:

"Climatological Characteristics of Arctic and Antarctic Surface-Based Inversions" by Y. Zhang, D.J. Seidel, J.-C. Golaz, C. Deser, and R.A. Tomas, accepted for publication in Journal of Climate. This paper is the second contribution in ARL's effort to develop a climatological understanding of the global planetary boundary layer. It focuses on surface based inversions, which developfrequently in the polar regions, particularly in autumn and winter. The study presents quantitative estimates of the spatial and temporal variability in surface-based inversion frequency of occurrence, intensity and depth, and compares observations from radiosondes with both reanalysis data and simulations from two state-of-the-art climate models. Such comparisons are needed because several important climate feedback mechanisms are controlled by planetary boundary layer processes, including mechanisms that involve cloud formation, surface energy and moisture fluxes, sea ice changes, and planetary albedo, yet climate model simulations of the planetary boundary layer have not been carefully evaluated against observations.

"A Synthesis of Rates and Controls on Elemental Mercury Evasion in the Great Lakes Basin" by Joseph S. Denkenberger, Charles T. Driscoll, Brian Branfireun, Chris S. Eckley, Mark Cohen and Pranesh Selvendiran was accepted for publication in Environmental Pollution.

"Uncertainties in PM2.5 Gravimetric and Speciation Measurements and What Can We Learn from Them" by William C. Malm, Bret A. Schichtel, and Marc L. Pitchford was accepted for publication in the Journal of the Air & Waste Management Association.

James Wang, a visiting scientist with ARL, reported that a paper he authored with colleagues titled: "Emissions credits: Opportunity to promote integrated nitrogen management in the wastewater sector," was accepted for publication in Environmental Science & Technology. The authors found that certain wastewater treatment practices that reduce harmful discharges of

reactive nitrogen into the aquatic environment could at the same time result in reductions of N_2O emissions potentially worth millions of dollars each year on a U.S. greenhouse gas trading market. The paper is based mostly on work that James conducted in his previous position as a scientist at Environmental Defense Fund.

Submitted and under journal review:

"Chemical Data Assimilation – an Overview" by Adrian Sandu and Tianfeng Chai was submitted on-line to the journal Atmosphere.

"The effect of soil surface litter residue on energy and carbon fluxes in a deciduous forest" by T.B. Wilson, T.P. Meyers, J. Kochendorfer, M. C. Anderson, and M. Heuer was submitted to Agriculture and Forest Meteorology.

Awards, Honors, Recognition

Marcia Wood (ARL HQ) received a 35-year length of service certificate in April.

FRD was awarded the "All-for-One" Combined Federal Campaign award for Idaho agencies in the "Small Agency" (20-49 employees) size category.

Maggie Robinson (ATDD) received an employee award from Oak Ridge Associated Universities (ORAU) for her work on ATDD's inventory system.

Outreach

Dian Seidel (ARL HQ) volunteered with College Tracks at Bethesda Chevy Chase High School helping high school students apply to college and for financial aid.

Jason Rich (FRD Meteorologist) represented ARL/FRD at the Idaho National Laboratory Health and Safety Fair on June 16, 2011. This event was collaborated with the Pocatello National Weather Service.

Lynne Satterfield (ATDD) continues to volunteer 1-1.5 hours a week at the Recording for the Blind and Dyslexic, in Oak Ridge, TN.

Michael Potter (ATDD) continues to volunteer with Boy Scout Troop 42, performing secretary and librarian duties in May and June.

Maggie Robinson (ATDD) continues to volunteer with the Shelter Animals Rescue Group (SARG). She recently volunteered at the SARG booth during the Oak Ridge Secret City Festival and she continues fostering animals needing permanent homes.