



## **NOAA Air Resources Laboratory**

### **Quarterly Activity Report**

**FY2017 Quarter 4 (July, August, September 2017)**

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## ***DISPERSION AND BOUNDARY LAYER***

### **1. Project Stagebrush**

The NOAA Technical Memorandum OAR-ARL-275 (doi:10.7289/V5VX0DHV) summarizing the experimental design, measurements, and results for Phase 2 of Project Sagebrush was published late in the quarter.

The draft manuscript “Plume Dispersion in Low Wind Speed Conditions During Project Sagebrush Phase 2 with Emphasis on Measurement Uncertainties” is ready for journal submission pending a final internal review. The title has been changed from that reported in last quarter’s report. The emphasis of the paper is on the large uncertainties in tracer measurements in the very stable boundary layer and the significance of that with respect to plume modeling.

Heping Liu (Washington State University) and Dan Li (Boston University) are developing a National Science Foundation proposal for a turbulence study focused on the role of coherent structures in scalar transport in the convective boundary layer. The site proposed for the field study is on the INL. The proposal also includes Large Eddy Simulations in conjunction with the field observations. If funded, field work would be conducted in 2019.

Bruce Hicks is lead author on a pair of manuscripts that were completing ARL review late in the quarter and will be submitted to a journal as companion papers in the first quarter of 2018. These utilize data from measurements on the INL to examine (1) contributions to turbulence events at the surface from mechanisms aloft and (2) the limitations of Monin-Obukhov similarity theory, particularly in the stable boundary layer. (dennis.finn@noaa.gov, roger.carter@noaa.gov, [jason.rich@noaa.gov](mailto:jason.rich@noaa.gov))

### **2. HYSPLIT Runs for Annual Report**

The HYSPLIT runs for calendar year 2016 were largely completed in the previous quarter. In the fourth quarter, INL Site contractors used the runs to compute radiological population exposures for publication in the 2016 Site Environmental Report. The final report including the results of the HYSPLIT simulations was published late in September. ([richard.eckman@noaa.gov](mailto:richard.eckman@noaa.gov))

### **3. Wind Forecast Improvement Project (WFIP2)**

Activities related to WFIP2 were limited during the fourth quarter due to the departure of Matt Brewer in May. Other staff made some final updates to the FRD entries in the project’s database. Discussions were held with ESRL staff on hiring a replacement for the ERT Inc. contract position vacated by Brewer, but there was insufficient time left in the project to justify hiring a replacement working full time on WFIP2. When the ERT contract was renewed in August, the vacant position was redirected to focus on the

division's dispersion and boundary layer work. However, the replacement employee may still spend a limited amount of time on WFIP2. ([richard.eckman@noaa.gov](mailto:richard.eckman@noaa.gov))

#### **4. Birch Creek Valley Wind Flow Study**

The U.S. Forest Service Fire Science Laboratory is developing a proposal for a field study in the summer of 2018 centered on the Menan Buttes area near Idaho Falls. This is part of an ongoing effort to improve wind-flow models used in wildfire simulations. FRD has for some time been interested in adapting these models for dispersion applications.

The manuscript "Potential HRRR Forecast Skill in Predicting Surface Winds during a Thunderstorm Outflow Event in Complex Terrain: Implications for Wildland Firefighting" is presently in review at the International Journal of Wildland Fire. It is based upon work during the Birch Creek field campaign in 2013. ([dennis.finn@noaa.gov](mailto:dennis.finn@noaa.gov))

#### **5. ERA5 Reanalysis from ECMWF to ARL HYSPLIT Readable Format**

Alice Crawford created an era52arl program to convert the new ERA5 reanalysis from ECMWF to ARL HYSPLIT readable

format. The ERA5 dataset will eventually span the time period from 1979 onward and provides hourly meteorological data at approximately 31 km resolution globally. Currently data from 2010 onward is available. This dataset will replace the ERA-Interim reanalysis.

<https://www.ecmwf.int/en/newsletter/147/news/era5-reanalysis-production>. The era52arl program is based on the api2arl program and utilizes the ecCodes library (<https://software.ecmwf.int/wiki/display/ECC>). A python program, get\_era5.py, which automates the retrieval of the ERA5 grib files for conversion to ARL format was also created. The program utilizes the ecmwfapi <https://software.ecmwf.int/wiki/display/WEBAPI/Access+ECMWF+Public+Datasets> and simplifies the task of choosing which data fields need to be downloaded for use by HYSPLIT.

#### **6. Consequence Assessment for the Nevada National Security Site**

James Wood, Rick Lantrip, and Walt Schalk participated in an emergency response training event as the Consequence Assessment Team (CAT) for the NNSA Nevada Field Office. The training was conducted on the Nevada National Security Site (NNSS). The event consisted of a training drill, and a field exercise that occurred on the NNSS. In this event, the activities to be conducted were discussed and local weather data and weather forecasts were provided and dispersion products were generated based on the worst case event information provided for the scenario. In addition, the CAT worked with field measurement teams to help identify/locate the plume. These events were conducted with the DOE/NNSA/NFO Emergency

Response Organization. ([rick.lantrip@noaa.gov](mailto:rick.lantrip@noaa.gov), [james.s.wood@noaa.gov](mailto:james.s.wood@noaa.gov), [walter.w.schalk@noaa.gov](mailto:walter.w.schalk@noaa.gov))

## 7. NOAA/ATDD – Coyote sUAS

Assistance was given to Joe Cione, NOAA/AOML/HRD to clean up and provide initial quality control of data from six Coyote flights into Hurricane Maria on September 22, 23, and 24, 2017. Three of the flights were eyewall penetrations, two were gliding flights, and one was designed to measure inflow around the eyewall of the hurricane.

Several instrument challenges presented themselves during the flights. A failure of the pressure, temperature, and humidity data occurred on one eyewall flight, as well as during the inflow flight. Several flights had varying frequencies of recorded data, from 10 Hz to 2 Hz to 1 Hz, depending on the phase of flight. The table below shows the distribution of data quality throughout the series of flights:

Date (YYYY/MM/DD)	Flight	Flight Type	Frequency	PTU Data Good	Flight Time (HH:MM:SS)
2017/09/22	01	Eyewall	10Hz-2Hz	100%	00:40:53
2017/09/23	02	Inflow	1Hz-2Hz	0%	00:29:59
2017/09/23	03	Eyewall A	10Hz-2Hz	100%	00:31:36
2017/09/23	04	Eyewall B	10Hz-2Hz	33%	00:32:24
2017/09/24	05	Glide 1	7-10Hz	7%	00:06:07
2017/09/24	06	Glide 2	10 Hz	76%	00:06:59

During some of the flights, 10 Hz data was available from the aircraft systems that included autopilot-derived winds from the pitot-static and GPS/INS systems. It is hoped that turbulence information as a function of altitude can be gleaned from this data.

([ed.dumas@noaa.gov](mailto:ed.dumas@noaa.gov), [R. Dobosy](#), [B. Baker](#))

## 8. NOAA/ATDD – MD4-1000 & DJI S-1000 sUAS

ATDD flew both the DJI S-1000 and the Microdrone MD4-1000 small UAS in the Land-Atmosphere Feedback Experiment (LAFE) at the Department of Energy’s (DOE) Southern Great Plains (SGP) Atmospheric Radiation Measurement (ARM) facility in the vicinity of Lamont, OK. The experiment consisted of coordinated meteorological measurements among multiple NOAA laboratories and universities during intensive operations periods (IOPs) weather conditions were relatively benign in the LAFE research domain during the IOPs.

A total of 35 flights were made with the S-1000 on August 11, 14, 15, and 17. A total of 17 flights were made with the MD4-1000 on August 14 and 15. Mark Rogers from NOAA/AOC was pilot-in-command of the MD4-1000 during the simultaneous flights.

A NOAA Technical Memorandum was written to document the flights made by the DJI S-1000 and MD4-1000 in LAFE 2017. It is currently in the process of being published.

ATDD also flew the DJI S-1000 at a farm near Ten Mile, TN, during the Great American Eclipse on August 21, 2017, to document changes in temperature and relative humidity of the lower boundary layer during the total eclipse. A series of vertical profiles were performed over a small meteorological research tower at regular intervals prior to and after the total eclipse. The weather conditions were nearly ideal for such a study. Some cumulus clouds formed near the sun approximately 1.5-1 hour prior to totality, but those clouds dissipated within 45 minutes of totality, leaving clear skies and excellent visibility during the period of eclipse totality.

Date (YYYY/MM/DD)	Flight	Takeoff time (LDT)	Landing time (LDT)	Takeoff time (GPS)	Landing time (GPS)	Flight Time (HH:MM:SS)
2017/08/21	01	11:53:35	12:04:33	15:53:53	16:04:51	00:10:58
2017/08/21	02	13:02:08	13:14:13	17:02:26	17:14:31	00:12:05
2017/08/21	03	13:31:02	13:43:07	17:31:20	17:43:25	00:12:05
2017/08/21	04	14:05:38	14:15:54	18:05:56	18:16:12	00:10:16
2017/08/21	05	14:26:49	14:42:20	18:27:07	18:42:38	00:15:31
2017/08/21	06	15:00:54	15:14:34	19:01:12	19:14:52	00:13:40

2017/08/21	07	15:30:53	15:43:30	19:31:11	19:43:48	00:12:37
2017/08/21	08	15:58:54	16:11:24	19:59:12	20:11:42	00:12:30

A total of eight flights were made with the DJI S-1000 sUAS. Note that times in this table are local daylight time (LDT), which lags Universal Coordinated Time (UTC) by 4 hours (LDT=UTC-4 h). Additionally, GPS time is ahead of UTC time by 18 s during this experiment (GPS=UTC+18 s).

The eclipse study site was 3250 meters northeast of the line of closest eclipse totality. The total time of totality in this location was 2:38. The table below shows the event, UTC time, the Sun's altitude, and Sun's azimuth for each phase of the eclipse.

Event	Time (UTC)	Altitude	Azimuth
Start of partial eclipse (C1) :	17:03:29.6	64.7°	157.6°
Start of total eclipse (C2) :	18:32:05.6	63.6°	208.7°
Maximum eclipse (MAX) :	18:33:25.0	63.5°	209.4°
End of total eclipse (C3) :	18:34:44.2	63.4°	210.0°
End of partial eclipse (C4) :	19:58:11.9	51.1°	240.9°

A NOAA Technical Memorandum was written to document the flights made by the DJI S-1000 in the Great American Eclipse of 2017. It is currently in the process of being published. ed.dumas@noaa.gov, T. Lee, M. Buban, B. Baker

## 9. NOAA/ATDD – Penguin BE sUAS

The Penguin BE fixed-wing sUAS has been at BlackSwift Technologies in Boulder, CO, for the duration of this quarter. An autopilot system has been installed, as well as each of the payload instruments. The aircraft was successfully test flown by BlackSwift personnel and their contractors on October 10, 2017 at Brush airport in Brush, CO. A training session for ATDD, AOC, and UTSI personnel to learn how to operate the aircraft and its payload systems is scheduled for early November 2017. Mark Rogers from

NOAA/AOML will attend, as well as Steve Brooks from UTSI. ([ed.dumas@noaa.gov](mailto:ed.dumas@noaa.gov), [temple.lee@noaa.gov](mailto:temple.lee@noaa.gov), [michael.buban@noaa.gov](mailto:michael.buban@noaa.gov), [bruce.baker@noaa.gov](mailto:bruce.baker@noaa.gov) )

## **10. Atmospheric Research Related to Total Solar Eclipse**

The total solar eclipse on 21 August passed right over FRD's observation network, with totality occurring just after 1130 MDT. This was a unique opportunity to collect detailed observations on the response of the atmosphere to the eclipse. The most important observations were the vertical profiles on the 61 m Grid 3 tower and the measurements of the surface energy balance at FRD's permanent flux station. These two locations were in the path of totality but a little south of the center. FRD therefore also installed a temporary flux station closer to the path's center.

Skies were clear at the time of the eclipse. The radiative temperature of the earth's surface dropped about 12°C during the event, whereas the air temperature at 2 m above the ground fell about 4°C during the same period. The effects of the eclipse on air temperature were largely limited to the first 20-30 m above the ground. Turbulence levels dropped about 80% due to the collapse of thermally generated eddies during the eclipse. Additional analysis is ongoing. ([richard.eckman@noaa.gov](mailto:richard.eckman@noaa.gov), Dennis Finn, Devin Clinger, Adam Haggarty, Roger Carter; Changxing Lan and Heping Liu, Washington State University).

## **11. NOAA/Mesonet**

Between July 28 and Sept. 22, new internet capable VHF radios were installed at six stations in the NOAA/INL mesonet. New Campbell Scientific CR6 data loggers were installed at the same time. These are actively collecting operational data from these six stations as well as providing an extended real-world test of the components planned for the upgrade of all the mesonet stations. There were some problems with communication drop outs initially, but those greatly improved after a radio frequency cavity filter was installed at a repeater location. This configuration will continue to operate through the winter and upgrades will continue next summer. ([Roger.Carter@noaa.gov](mailto:Roger.Carter@noaa.gov), [Devin.Clinger@noaa.gov](mailto:Devin.Clinger@noaa.gov), [Adam.Haggerty@noaa.gov](mailto:Adam.Haggerty@noaa.gov))

Ravens have used the BAS and ROV mesonet towers as nesting locations that provide them with an opportunity to eat the eggs of protected sage grouse in the spring. FRD technicians installed wire mesh to deter nesting near the top of the towers, but the ravens responded by moving their nests to lower locations on the tower where booms extend out from the towers. During the fall semiannual visits to the towers, the technicians will be adding additional wire mesh at these lower locations. ([devin.clinger@noaa.gov](mailto:devin.clinger@noaa.gov), Adam Haggerty)

## **12. SORD Mesonet**



SORD continues to look at ways to improve the SORD/NNSS mesonet. As we move well into our second year with this new system, we have identified several areas of improvement. Ice riming of our 3D sonic anemometers and the need for heated precipitation gauges are at the top of the list of improvements. Other improvements to be considered include new weighing precipitation gauges. Static dissipaters were purchased and are being installed especially at problem prone sites to help prevent scrambling of the wind sonic programming.

James Wood and Rick Lantrip have begun the next instrumentation calibration/verification cycle (late September).

Rick Lantrip is nearly finished in updating the weather station site surveys with new pictures and information. In addition, Rick is nearly finished with removing the large battery from the main Logger Box on the towers to a separate box on the ground. This will make the towers weigh less which will be helpful when tilting them down.

Walt Schalk has provided several processed data sets from the NNSS weather towers for use by NNSS environmental and experimental groups.

Lightning Detection System: Two of the sensors located on the NNSS had issues this quarter. The one sensor at the Desert Rock Weather Station had an issue with communications (media converter power supply) and the DSL modem pair was replaced. The sensor in the NE NNSS was having power issues. James Wood and Walt Schalk replaced the power cable to the sensor. Both sensors have been functioning properly following repairs.

3D Sonic Anemometers: Three sensors had issues this quarter. Rick Lantrip was able to reset two of the anemometers without having to lower the towers. The third anemometer was replaced and was sent to the manufacturer (RM Young) for repair, refurbishment, and calibration. We have received the repaired sensor back from the manufacturer and have put it back in to inventory. We are also installing static dissipaters at the trouble prone sites to potentially help reduce the program scrambling issues. The plan will be to install dissipaters at all of the sites. ([walter.w.schalk@noaa.gov](mailto:walter.w.schalk@noaa.gov), [james.s.wood@noaa.gov](mailto:james.s.wood@noaa.gov), [rick.lantrip@noaa.gov](mailto:rick.lantrip@noaa.gov))

### **13. Support to DOE/NNSA NNSS Projects and Experiments**

Walt Schalk participated in several planning meetings including one at Sandia National Laboratory in Albuquerque, NM in preparation for Phase II of non-proliferation experiments (Source Physics Experiments – Phase I, Dry Alluvium Geology – Phase II). Discussions with Los Alamos scientists have been conducted to determine collaborative and support areas especially in the area of using balloon elevated instrument platforms. These activities will continue to evolve over the fiscal year.

Walt Schalk continues to develop a portable micro-net of weather stations to support experiments on the NNSS such as the SPE. A proof of concept with one station was deployed in support of SPE-6. A test system had been operating at the Desert Rock Weather Observatory at the NNSS for a couple of weeks.

The proof of concept station during the SPE-6 experiment was a success and greatly appreciated by the National Laboratory scientists. The main challenge is communications.

## **ATMOSPHERIC CHEMISTRY AND DEPOSITION**

### **14. Atmospheric Mercury and Toxics Modeling**

Several advancements were made in atmospheric mercury and toxics modeling during this quarter. (1) **Great Lakes Restoration Initiative (GLRI):** A modeling analysis estimating the 2011 transport and deposition of mercury from regional, national, and global sources to the Great Lakes was extended to include a comparison of Lagrangian and Eulerian modeling methodologies. Extensive model evaluation against measurements of mercury air concentration and wet deposition is continuing. Preliminary analysis indicates encouraging consistency between 2011 model results and measurements, a significant development given that the previous model analysis and evaluation occurred for 2005. A final technical report is being prepared to document the methodology and findings. Results of the Lagrangian vs. Eulerian comparison were presented at the 13th International Conference on Mercury as a Global Pollutant (ICMGP), July 16-21, in Providence, RI. (2) **Post-processing:** The special versions of HYSPLIT for mercury (HYSPLIT-Hg) and for semi-volatile pollutants (HYSPLIT-SV) have several associated post-processing programs. "Fincalc" and associated helper programs combine the HYSPLIT simulation results with emissions inventories to produce overall results for the analysis. New versions of several key post-processing programs have been developed that can accommodate outputs from both Hg and SV HYSPLIT simulations. The new versions are more generalized, more user-friendly, and have more error-catching features. (3) **PEER Project:** The project *Exploring the Fate of Mercury in Artisanal Gold Mining of the Lake Victoria Gold Field* has been selected for 3-year funding by the Partnerships for Enhanced Engagement in Research (PEER) program. Professor Clavery Tugaraza of the Sokoine University of Agriculture in Tanzania is the Principal Investigator and Dr. Mark Cohen of the NOAA Air Resources Laboratory (ARL) is the U.S. Government partner in the project. The project was one of only 27 awarded funding out of 100 full proposals and 454 pre-proposals in PEER Cycle 6. Mercury emitted from its use in artisanal and small-scale gold mining (ASGM) can have serious occupational, local and regional consequences. Globally, ASGM processes are estimated to be the largest anthropogenic source of mercury emissions to the air. PEER ([Partnerships for Enhanced Engagement in Research](#)) is a competitive grants program that invites scientists in developing countries to apply for funds to support research and capacity-building activities on select topics. The applicant researcher must partner with a U.S. government-funded researcher. PEER is administered by the National Academies and USAID. ([mark.cohen@noaa.gov](mailto:mark.cohen@noaa.gov))

### **15. Air Quality Local and State Forecasters Assembled to Give Feedback on NAQFC**

ARL plays the role as the research and implementation leader in providing air quality forecasting service to the nation since 2005 through the National Air Quality Forecasting Capability (NAQFC) service. More than a decade, local and state agency air quality managers and forecasters assemble in D.C. to give feedback concerning the accuracy of the forecast in terms of surface ozone and particulate matter concentrations. NAQFC alert sensitive groups to adopt mitigation and adaptation measures to minimize exposure to adverse air pollution conditions. **Pius Lee** provided an overview presentation on the nationwide and regional performance of NAQFC for this past summer. In addition, he presented the upcoming changes and areas for improvement for the NAQFC. In this past summer the considerable shift in energy generation from coal-fired to gas-fired power plants and the prominence of PM pollution due to wildland fires posed challenges to NAQFC. NAQFC continued to meet the success criterion mandated at the outset of the service that NAQFC should capture a minimum of 90% of the fraction correct. However with the nation's air quality ambient air standard trended to be further tightened the ARL NAQFC scientists are forward looking to explore advanced emission and atmospheric chemistry models to pre-position NAQFC for the emerging challenges. [Pius.Lee@noaa.gov](mailto:Pius.Lee@noaa.gov)

ARL scientists stand forefront in establishing scientific knowhow to help devising a new paradigm for safeguarding large metropolitan residents from air pollution. Hereafter are publications and presentations given in this frontier of air science and public health:

## **CLIMATE OBSERVATIONS AND ANALYSES**

### **16. Climate Reference Network (CRN)**

Two Divisions of ARL, the Atmospheric Turbulence and Diffusion Division (ATDD) in Oak Ridge, TN, and the Field Research Division (FRD) in Idaho Falls, ID, were located in the path of totality for the Great American Solar Eclipse on August 21, 2017. ATDD scientists and engineers led a number of multiple research and outreach activities. On the 21st, an ATDD team flew a small Unmanned Aircraft System (sUAS) to capture vertical profiles of air temperature, relative humidity, and solar energy before, during, and after the eclipse. The U.S. Climate Reference Network (USCRN), managed by ATDD, had a total of 13 USCRN stations that were either in or touching the eclipse's narrow totality path across the US. Partnering with colleagues at NOAA's National Centers for Environmental Information, ATDD collected USCRN station data two hours before and after the start of the eclipse and calculate temperature (e.g., air, skin temperature, and 5cm soil), relative humidity, and solar radiation changes over that hour of the eclipse's pass and were posted on an interactive site at <http://www.atdd.noaa.gov/crn-eclipse/>; in addition, data from all 114 USCRN stations across the conterminous US was captured during the duration of the eclipse as even sites not in the path of totality experienced some decreases in solar radiation; see [ftp://ftp.atdd.noaa.gov/pub/crn/solar\\_eclipse\\_data/](ftp://ftp.atdd.noaa.gov/pub/crn/solar_eclipse_data/). In addition, another ATDD team launched a weather balloon and deployed sensors to measure solar energy, wind speed and direction, air temperature, and other variables at Roane State Community College in Harriman, TN, during a field trip for students from Linden Elementary School in Oak Ridge. A similar suite of measurements was also collected by ATDD

at a local farm near Philadelphia, TN. Data from the sUAS study will be presented at the 2018 American Meteorological Society (AMS) Annual Meeting in Austin, TX, in January 2018.

The landfall of two major hurricanes, Harvey in Texas in August, and Irma in Florida in September made landfall very close to two USCRN stations, in Port Aransas, TX, and Everglades City, FL, due to the robust engineering employed by ATDD for USCRN station installations, despite the loss of electrical power in both landfall areas, these two USCRN stations (along with other USCRN stations along the paths of both Harvey and Irma) continued to operate normally and provide critical and continuing climate information. While the observing station at the Port Aransas airport went down soon after Harvey's landfall, the fact that the Port Aransas USCRN station continued to operate allowed us to record the full extent of over 15 inches of rain that was received in that area as a result of Hurricane Harvey; and the situation in southwestern Florida, with the Everglades City USCRN station was similar.

ARL/ATDD installed two new USCRN stations in Alaska from late July to mid-August. The stations were in Cordova on the southeast coast of Alaska and Toolik Lake in the northeast portion of the state. The Cordova station is on property owned by the Eyak Native Corporation. The Toolik Lake station is on property owned by the U.S. Bureau of Land Management and will be collocated with a National Science Foundation-funded National Ecological Observatory Network (NEON) site. These installations brought the number of operational USCRN stations in Alaska up to 21 installed since 2009. A total of 29 stations are planned for installation in Alaska by the end of FY 2022. The USCRN provides the nation with long-term, high quality observations of air temperature, precipitation, and soil moisture and temperature collected in relatively stable and pristine environments. ARL is in charge of the overall management, engineering design, and deployment and maintenance of the stations and regular calibration of the sensors. The data are served to the public by NOAA's National Centers for Environmental Information via the web site at <http://www.ncdc.noaa.gov/crn>.

A meeting was held on September 29 to evaluate the final three grid site locations in Alaska for the eventual installation of USCRN stations in Alaska. This is a milestone for the program, as all 29 selected grid points across the state of Alaska have been surveyed and evaluated for eventual installation of the last eight stations through 2022; with the possibility of one additional station in 2023 as budgets allow. The evaluation team consisted of scientists and engineers from ATDD, the National Centers for Environmental Information (NCEI) in Asheville, NC, and the NWS Alaska Region Headquarters in Anchorage, AK. The meeting was chaired by ARL's Howard Diamond who serves as the USCRN Program Manager. This activity formally brought the USCRN site survey program in Alaska to a formal end, and now the program has all the candidate stations it needs in order to complete the USCRN configuration of stations there. [howard.diamond@noaa.gov](mailto:howard.diamond@noaa.gov)

along with a record of events which affect data quality. New ISIS events are identified from ATDD's field crews and archived data. [lynne.satterfield@noaa.gov](mailto:lynne.satterfield@noaa.gov) During this reporting period, tUSCRN personnel made 23 annual maintenance visits (AMVs), one unscheduled maintenance visit (UMV) and installed two sites in Alaska. [Mark.e.hall@noaa.gov](mailto:Mark.e.hall@noaa.gov)

In July, August, and September, NCEI retrieved 41 data files from USCRN sites through the server <ftp.atdd.noaa.gov>. Data are passed to NCEI by this path when retrieved episodically by ATDD from

individual site visits to fill data gaps. Instruments' characteristics for each site are maintained in the database ISIS (Integrated Station Information System) on NCEI's server,

## 17. Atmospheric Chemistry - Blue Carbon

Blue Carbon, which is carbon captured by marine organisms, has recently been highlighted as an option for climate change mitigation initiatives. Through collaborations with scientists from the NOAA National Centers for Coastal Ocean Science (NCCOS), a team from ATDD is in the early stages of planning a field study to understand the influence of atmospheric deposition of carbon and nutrients on blue carbon stocks in coastal ecosystems. The experiment would feature measurements of carbon dioxide, nitrogen, and methane fluxes by ATDD co-located with water quality and sediment sampling by NCCOS. Integration of atmospheric and water quality measurement is challenging, and work continues to develop experimental protocols. [latoya.myles@noaa.gov](mailto:latoya.myles@noaa.gov)

## ARL 4th Quarter Publications

Balasubramanian, S., A. Nelson, S. Koloutsou-Vakakis, J. Lin, M.J. Rood, **L. Myles**, and C. Bernacchi. (2017) Evaluation of DeNitrification DeComposition Model for Estimating Ammonia Fluxes from Chemical Fertilizer Application. *Agricultural and Forest Meteorology*, 237, 123-134, <https://doi.org/10.1016/j.agrformet.2017.02.006>.

Biederman, J. A., R. L. Scott, T. W. Bell, D. R. Bowling, S. Dore, J. Garatuza-Payan, T. Kolb, P. Krishnan, D. J. Krofcheck, M. E. Litvak, G. E. Maurer, **T. P. Meyers**, W. C. Oechel, S. A. Papuga, G. E. Ponce-Campos, J. C. Rodriguez, W. K. Smith, R. Vargas, C. J. Watts, E. A. Yopez, and M. L. Goulden (2017). CO<sub>2</sub> exchange and evapotranspiration across dryland ecosystems of southwestern North America. in *Global Change Biology*, 23 (10), 4204-4221. <https://doi.org/10.1111/gcb.13686>

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## Tech Memos and Other Reports

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## **Conferences, Presentations, & Invited Talks**

Glenn Rolph provided support to the Web Operations Center (WOC) during the week of August 14 to prepare a new operational web server for the HYSPLIT application run on WOC servers for the NWS forecast offices. The current system was to be disconnected on August 23 due to security issues related to old versions of the system software. The new server was successfully implemented on August 17. Work will now begin to prepare the staging and backup servers.

At the request of the National Weather Service, Glenn Rolph modified the HYSPLIT web-based system at the Web Operations Center (WOC) to be able to send an email to specific NOAA employees and other government clients to notify them when a real event is simulated and when the weather forecast office creates a link to the products on the WOC server. This is required so that management is aware of ongoing events that require HYSPLIT modeling support.

Glenn Rolph and Fantine Ngan attended the International MACCS User Group meeting during September 14-15, 2017 in Bethesda, Maryland. They gave a presentation "North America Reanalysis Data for Dispersion Applications and Recent HYSPLIT Updates" and had discussions with the development group of MACCS (an accident consequence analysis model) on how HYSPLIT can provide support as an input for MACCS modeling.

Atmospheric Turbulence and Diffusion Division (ATDD) joined with the University of Tennessee, Knoxville (UTK) on September 12, 2017 to host a science workshop at the Cherokee Farm Innovation Campus and Research Park in Knoxville. The goal of the workshop was to identify areas of scientific collaborations that would improve understanding of air pollution, atmospheric transport processes, and weather on regional and national levels. Participants explored educational opportunities for undergraduate and graduate students at UTK to participate in atmospheric research investigations alongside NOAA scientists and engineers. This effort was a first step under the recent Memorandum of Agreement that was signed between ATDD and UTK.

LaToya Myles met with incoming NOAA EPP and Hollings scholars at the Student Orientation in Silver Spring on July 10. Ko Barrett, DAA for Programs and Administration, gave the OAR overview, and LaToya Myles and Keith Dixon (GFDL) gave presentations on their career journeys and research opportunities.

Nabila Lichiheb, NRC postdoctoral research associate, gave a presentation entitled "Evaluation of ammonia air-surface exchange at the field scale: integration of soil and stomatal emission potential parameterization in a modelling approach" at the 254th ACS National Meeting last week in Washington, DC.

### **Outreach & Engagement**

LaToya Myles was selected for the 2017 NOAA Center Champions Workshop Group award, which recognized her sustained support of student mentorship and capacity building at the NOAA Educational Partnership Program Center for Environmental Sciences.

LaToya Myles is a member of the PI team that hosted the Geosciences Opportunities for Leadership in Diversity (GOLD) Institute on July 24-25 in Colorado Springs. The GOLD Institute is a NSF-funded research activity designed to help leaders in geosciences become champions for diversity. The Institute is designed to demonstrate the vital role that diversity plays in increasing innovation and creativity and increasing the quality of science.