NASA Air Quality Applied Sciences Team
Quarterly Newsletter

July 2014

"Earth science serving air quality management needs"

Highlights:
AQAST8 Date & Location Set

The next AQAST meeting (AQAST8) will be held December 2-4, 2014 (Tuesday-Thursday) at Georgia Tech University in Atlanta. The meeting is open to all, and air quality managers are particularly invited. Go to the meeting website to access additional information and to register. Indicate when you register if you would like to give a presentation. We look forward to seeing you in Atlanta in December!

AQAST supports FRAPPÉ campaign in Colorado

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Several AQAST members will be integral parts of an ambitious effort to study and understand the complex factors that contribute to air quality problems in Colorado's Front Range region. The project begins July 16th and will last through August 16th. More information can be found on the FRAPPE homepage.

AQAST7 recap & highlights

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The AQAST7 meeting at Harvard University in June 2014 promoted an exciting exchange of information on advanced science for AQ managers. All presentations can be accessed here.

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AQAST Members Support NASA Air Quality Research in National Media Coverage

AQAST members Russell Dickerson (top), Anne Thompson (middle) and Bryan Duncan (bottom) were featured in television interviews where they discussed air quality trends revealed by NASA satellite instruments showing significant improvements in NO_2 concentrations across the county. Links to the full video clips of the interviews can be found here.

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AQAST would like to thank all of the participants who attended AQAST7 and made the meeting a successful forum to discuss research activities and disseminate best practices among multiple stakeholder groups. The meeting was held at Harvard University in Cambridge, MA. AQAST director Daniel Jacob served as the local host.

AQAST7 Highlights

AQAST7 was held June 17-19 at Harvard University in Cambridge, Massachusetts. The meeting featured presentations by AQAST members and other scientists covering a range of applications of Earth Science data and models to air quality issues. Several presentations on the first day of the meeting focused on preliminary work done by members of the Oil & Gas Tiger Team, which will support the FRAPPE and DISCOVER-AQ campaign in the Colorado Front Range this summer.

The second day featured presentations from air quality managers in the Northeastern states. Representatives from NESCAUM, NYSERDA, and regulatory agencies in New Hampshire, Rhode Island, Vermont and Massachusetts gave talks about techniques and best practices being demonstrated in their region. The morning session closed with a panel discussion led by AQAST member Russell Dickerson centered around how applications of Earth Sciences research can support air quality managers. The day ended with sessions covering AQAST modeling and satellite data applications.

On Day 3 the AQAST team met to discuss progress, including updates and planning for Year 3 Tiger Teams. Other sessions covered AQAST's outreach activities and preliminary planning for Year 4 Tiger Teams. The next AQAST meeting (AQAST8) will be held on December 2-4, 2014 at Georgia Tech University in Atlanta. Preliminary information on AQAST8 is available here.

All AQAST7 presentations can be found here and video recordings of the meeting can be found here.

<<Recently published

Cohan, D. S. and R. Chen, Modeled and observed fine particulate matter reductions from state attainment demonstrations. *Journal of Air & Waste Management Association*, accepted, 2014. [Article]

Duncan, B.N., et al., Satellite data for U.S. air quality applications: Examples of applications, summary of data end-user resources, answers to FAQs, and common mistakes to avoid,, submitted to *Atmospheric Environment*, February 2014. [Article]

Fishman, J., K. M. Belina, C. H. Encarnacion, The St. Louis Ozone Gardens: Visualizing the Impact of a Changing Atmosphere, *Bulletin of American Meteorological Society*, 5-10, August 2014. [Article]

Hao H., C. P. Loughner, J. W. Stehr, H. L. Arkinson, L. C. Brent, M. B. Follette-Cook, M. A. Tzortziou, K. E. Pickering, A. M. Thompson, D. K. Martins, G. S. Diskin, B. E. Anderson, J. H. Crawford, A. J. Weinheimer, P. Lee, J. C. Hains, R. R. Dickerson, An elevated reservoir of air pollutants over the Mid-Atlantic States during the 2011 DISCOVER-AQ campaign: Airborne measurements and numerical simulations, *Atmospheric Environment*, 85, 18-30, 2014. [Article]

Paulot F., Jacob, D.J., Pinder R.W., Bash J.O., Travis, K., Henze D.K., Ammonia emissions in the United States, Europe, and China derived by high-resolution inversion of ammonium wet deposition data: Interpretation with a new agricultural emissions inventory (MASAGE_NH3), *Journal of Geophysical Research*, 119, 4343-4364, 2014. [Article]

Paulot F, D.J. Jacob, Hidden cost of U.S. agricultural exports: particulate matter from ammonia emissions, *Environmental Science & Technology*, 48, 903-908, 2014. [Article]

Pfister, G. G., S. Walters, J.-F. Lamarque, J. Fast, M. C. Barth, J. Wong, J. Done, G. Holland, and C. L. Bruyère, Projections of future summertime ozone over the U.S., *Journal of Geophysical Research: Atmosphere*, 119, 5559–5582, doi:10.1002/2013JD020932, 2014.[Article]

Plachinski, S.D., T. Holloway, P. J. Meier, G. F. Nemet, A. Rrushaj, J. T. Oberman, P. L. Duran, C. L. Voigt, Quantifying the emissions and air quality co-benefits of lower-carbon electricity production, *Atmospheric Environment*, 94, September 2014, Pages 180-191, ISSN 1352-2310. [Article]

Wecht, K.J., D.J. Jacob, C. Frankenberg, Z. Jiang, and D.R. Blake, Mapping of North America methane emissions with high spatial resolution by inversion of SCIAMACHY satellite data, submitted to *Journal of Geophysical Research*, 2014. [Article]

Zhang, L., D. J. Jacob, X. Yue, N. V. Downey, D. A. Wood, and D. Blewitt, Sources contributing to background surface ozone in the US intermountain West, *Atmospheric Chemistry & Physics*, 14, 5295-5309, 2014. [Article]

Zhu, L., D. J. Jacob, L. J. Mickley, E. A. Marais, D. S. Cohan, Y. Yoshida, B. N. Duncan, G. González Abad K. V. Chan,Anthropogenic emissions of highl reactive volatile organic compounds in eastern Texas inferred from oversampling of satellite (OMI) measurements of HCHO columns, submitted to *Environmental Research Letters*, 2014. [Article]

Visit aqast.org for a full list of AQAST publications.

AQAST in the National Spotlight

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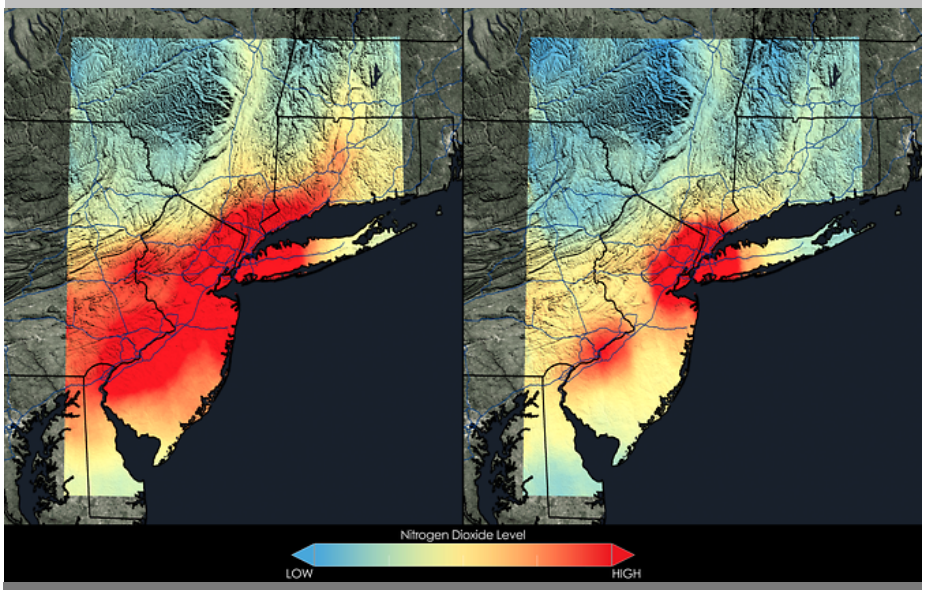
NASA's Aura satellite, which launched in 2004, is celebrating 10 years of providing continuous global atmospheric composition data. Aura observations include NO_2, SO_2, formaldehyde, ozone, and aerosols. AQAST is playing a major role in using these data for a wide range of air quality applications. The Aura media event on June 27, 2014 featured an "Improving US Air Quality" story presented by AQAST members Bryan Duncan, Russell Dickerson, and Anne Thompson using NO_2 trends observed by Aura, which can be found here.

NASA's analysis takes a close look at the Ohio River Valley, Northeast Corridor, and some populous US cities. Images generated from satellite data compare average NO_2 concentrations during spring and summer months from 2005-2007 against 2009-2011. Blue and green areas in the images shown below denote lower concentrations and orange and red denote higher concentrations. The Images were created by NASA's Scientific Visualization Studio using data and input provided by atmospheric scientists Yasuko Yoshida, Lok Lamsal, and Bryan Duncan, all of NASA's Goddard Space Flight Center in Greenbelt, Maryland.

The story was picked up by numerous media outlets. "We talked with many journalists, including live shots on the morning news, radio interviews, phone interviews, and taped interviews," Duncan said. "We hit some big media names, such as The Weather Channel, WGN, Fox & Friends, and CNN. I even did an interview with Brian Todd of The Situation Room on CNN."

Read and watch the CNN story here, Russ Dickerson's appearance on CBS here, and Anne Thompson's appearance here.



This image shows two maps of NO_2 concentrations in the New Jersey/New York City area. The map on the left shows pollution concentrations in 2005, while the map on the right shows concentrations in 2011 that are roughly 32% lower (Image courtesy of NASA).

More AQtivities:

AQAST Members Deliver Presentations at LADCO/CenSARA Meeting

AQAST members Daven Henze, Tracey Holloway, and David Streets gave presentations at the 2014 Midwest and Central States Air Quality Meeting held in St. Louis from April 22-24. Presentations can be found here.

Henze's talk focused on modeling and observational constraints for ammonia and nitrogen deposition. Holloway discussed methods for quantifying contributions to ozone and particulate episodes in the eastern U.S., and Streets' talk focused on the relationship between NO_2 concentrations and NO_x emissions measured with satellite instruments.

AQAST Ozone Garden Network is Maturing and Expanding!

The network now includes three sites in St. Louis, two sites in Boulder, and additional sites in Philadelphia, Maryland, and Boston. These ozone gardens are set up in natural history museums and similar locales to educate the general public on ozone pollution and its effects on ecosystems. The Boulder gardens are the first of their kind in the western US and will play an important role in raising awareness to poor air quality in the Colorado Front Range.

The AQAST ozone garden network was recently featured in a cover article of the Bulletin of the American Meteorological Society, which can be found here.

This photo shows the ozone garden at NCAR's Mesa Lab in Boulder, CO. Two other ozone gardens have been established in the city.

AQAST Supports Ground Breaking FRAPPÉ Campaign

The Front Range Air Pollution and Photochemistry Experiment (FRAPPÉ) features multiple aircraft campaigns running from July 16th to August 16th with the goal of improving understanding of the factors contributing to poor air quality in Colorado's Northern Front Range Metropolitan Area.

AQAST's Oil & Gas Tiger Team, led by Anne Thompson, will support the project by quantifying oil/gas emissions that mix with other pollution sources in the Front Range region. AQAST member Gabrielle Pfister is a primary investigator for the FRAPPÉ program at the National Center for Atmospheric Research (NCAR), which received funding from the National Science Foundation.

FRAPPÉ is designed to measure pollution that accumulates in the Front Range region that often prevents the area from complying with National Ambient Air Quality Standards (NAAQS) established by the US EPA. "Something this comprehensive has not happened in the Front Range before," Pfister said.

The FRAPPÉ campaign will involve a series of flights by the NSF/NCAR C-130 aircraft outfitted with sophisticated chemical instruments, ground-based instrumentation as well as tethered balloons and ozone sondes. The combination of air and ground-based measurements is designed to identify the key factors that affect surface ozone formation in the Front Range, and to provide policy makers with a strong scientific foundation to make informed decision on how to reduce pollution in the Front Range.

FRAPPÉ will be closely linked to NASA's DISCOVER-AQ campaign, both of which will operate in the Front Range from July 16 to August 16. The DISCOVER-AQ project is aimed at improving satellite capabilities to interpret surface air quality conditions by combining satellite data retrievals with aircraft measurements and extensive sampling at selected ground sites.

Aligning the two missions presents a unique opportunity to study and characterize local air quality at a level of detail previously unachievable. "They are two different campaigns, but the way we work it is as one campaign," Pfister said. "We work it as fully complementary."

More information on the FRAPPÉ campaign can be found here, and Pfister was featured in an article by the *Daily Camera* here.

Team Forms to Tackle Eastern U.S. Air Pollution Episodes

The "Eastern U.S. Episodes" (EUSE) Tiger Team, led by AQAST Deputy Leader Tracey Holloway and AQAST Member Arlene Fiore, has been successful at forming a team and work-plan to evaluate peak air pollution events across the Eastern U.S.

To date, the team includes representatives from seven state agencies (Maryland, Missouri, New Hampshire, New York, Texas, Vermont, and Wisconsin), three regional air quality management organizations (LADCO, NESCAUM, and the Ozone Transport Commission), and the U.S. EPA.

To kick off the project, air quality managers were asked for ozone and particulate matter episodes where long-range air pollution may have played a role. These episodes were considered to be high-priority events where satellite data, global models, and other AQAST resources could play a valuable role in diagnosis and evaluation. States submitted 60 episodes occurring from 2007-2013 that will undergo in-depth analysis by AQAST team members.

Starting in July, AQAST researchers are beginning to tackle these events, with a short-term goal of preparing consulting-style reports that link AQAST science with air quality management needs for each episode. Air quality managers are providing guidance and feedback to make sure that work is useful and targeted to management needs through monthly teleconference calls.

The team has also set up a password protected website to share results. Any U.S. air quality management agency is invited to participate in the monthly conference calls. Interested partners should email Tracey Holloway (taholloway@wisc.edu) or Arlene Fiore (af2544@columbia.edu).

Next AQAST Biannual Meeting (AQAST8)

AQAST8 will be held December 2-4, 2014, at Georgia Tech University in Atlanta. Our host will be AQAST member Ted Russell. Click here to register!