



NASA Air Quality Applied Sciences Team Quarterly Newsletter



Dec. 2015, Vol. 14

Earth science serving air quality management needs.

2 | Latest presentations by AQAST members



From Wisconsin to Raleigh to Rome, AQAST researchers are spreading the word about the role of satellite data in serving air quality management needs.

3 | The latest in AQAST research



AQAST researchers publish peer-reviewed scientific papers focused on the use of Earth science for air quality applications, and address the pressing needs of air quality management.

4 | AQivities: More news and highlights



Milestone projects, conferences, public outreach, pushing new satellite concepts, and building a lasting legacy: all part of AQAST's work to serve the air quality management community with the latest Earth science data and tools.



Welcome.

In this newsletter, you will find details of recent and ongoing activities from NASA's Air Quality Applied Sciences Team (AQAST). Started in 2011, AQAST has remained dedicated to employing the best science to meet the needs of air quality managers. As the year winds down, AQAST members keep up their activity -- speaking at local, national, and international events; collaborating across disciplines to produce high-quality research results; and developing resources to foster new ideas about satellites, air quality, and more. The team looks forward to a new year with new possibilities, kicking off with the 10th AQAST meeting (AQAST10) in January at the EPA's Research Triangle Park. Thank you for reading, and for your continued support. (Photo: Research Triangle Park, EPA)



Arlene Fiore and Tom Moore from WRAP at the 2015 Energy Summit. (Photo: Olivia Sanderfoot)

Tracey Holloway chaired the 2015 Energy Summit at the University of Wisconsin-Madison, which featured a number of ACAST members and collaborators. The theme of the summit, held on Oct. 13, was "Air & Energy: The Path Ahead for U.S. States."

Experts spanned industry, academia, and regulatory agencies, discussing major topics facing states -- including the new ozone standard, the Clean Power Plan, and the growing importance of satellite data.

The Energy Summit Keynote, on the Clean Power Plan, was given by EPA Region 5 Director Susan Hedman, and was followed by expert presentations on the Clean Power Plan from environmental and industry perspectives.

ACAST followers may be particularly interested in talks by ACAST members Arlene Fiore and Bryan Duncan, and collaborators Rob Kaleel from LADCO, Paul Miller from NESCAUM, Pat Reddy from Colorado, and Terry Keating from EPA. In planning the Energy Summit, Holloway based all session topics on discussions with the air quality management community from our ACAST team meetings over the past few years.

Video recordings of all talks and question-and-answer periods are available online, provided through funding from ACAST. [<http://bit.ly/1NMWpL8>]



Tracey Holloway welcomes guests to the 2015 Energy Summit. (Photo: Olivia Sanderfoot)

Recent ACAST presentations

Nov. 2015 | Russ Dickerson | Insight into Air Quality from Recent Measurement Campaigns and Model Runs | Ozone Transport Commission [<http://bit.ly/1Z1H3um>]

Oct. 2015 | Multiple ACAST researchers | 2015 Energy Summit | Wisconsin Energy Institute | Madison, WI [<http://bit.ly/1NMWpL8>]

Oct. 2015 | Tracey Holloway | Keynote: Satellite Data for Air Quality in Wisconsin | Wisconsin Department of Natural Resources Meeting | Sheboygan, WI [<http://bit.ly/1M5o5K4>]

Oct. 2015 | Meiyun Lin and Arlene Fiore | The Role of Climate, the Stratosphere, and Emissions on U.S. Surface Ozone Trends and Extremes | IGAC/SPARC Chemistry Climate Model Initiative Workshop | Rome, Italy [<http://1.usa.gov/21Sf42L>]

Sept. 2015 | Meiyun Lin and Arlene Fiore | Detecting Changes in U.S. Background Ozone Means and Extremes Amidst Climate Variability | Meteorology and Climate-Modeling for Air Quality (MAC-MAQ) Conference | CARB/UC-Davis [<http://1.usa.gov/1IHCiIs>]

June 2015 | Arlene Fiore | Air Quality and Climate Connections | 2015 Air & Waste Management Annual Conference | Raleigh, NC [<http://bit.ly/1lShi14>]

May 2015 | Tracey Holloway | NASA ACAST Support for Western U.S. Air Quality Management | Western States Air Meeting | EPA | Boulder, CO [<http://bit.ly/10kqfaj>]

May 2015 | Tracey Holloway | NASA Supporting Healthy Air: The NASA Air Quality Applied Sciences Team | American Thoracic Society Meeting | NASA Applied Sciences | Denver, CO [<http://bit.ly/1NesQVz>]

Visit Acast.org for a full list of talks. [<http://bit.ly/1IHDjde>]

Recently published >>

Chai, Tianfeng, Li Pan, **Pius Lee**, Daniel Tong, Hyun-Cheol Kim & Weiwei Chen, Using optimal interpolation to assimilate surface measurements and satellite AOD for ozone and PM2.5: A case study for July 2011. *JAWMA*, 65, 10, 2015. [<http://bit.ly/1Nep0Mj>]

Fiore, Arlene M., Vaishali Naik, Eric M. Leibensperger (2015), Air Quality and Climate Connections, *J. Air & Waste Manage. Assoc.*, 65, 6, 645-685. [<http://bit.ly/1md5Ai4>]

Harkey, M., **T. Holloway**, J. Oberman, and E. Scotty (2015), An evaluation of CMAQ NO₂ using observed chemistry-meteorology correlations, *J. Geophys. Res. Atmos.*, 120, doi:10.1002/2015JD023316. [<http://bit.ly/1XZzZRY>]

Jin, X., and **T. Holloway** (2015), Spatial and temporal variability of ozone sensitivity over China observed from the Ozone Monitoring Instrument. *J. Geophys. Res. Atmos.*, 120, 7229–7246. doi: 10.1002/2015JD023250. [<http://bit.ly/1mrWrIE>]

Kim, P.S., **D.J. Jacob**, J.A. Fisher, K. Travis, K. Yu, L. Zhu, R.M. Yantosca, M.P. Sulprizio, J.L. Jimenez, P. Campuzano-Jost, K.D. Froyd, J. Liao, J.W. Hair, M.A. Fenn, C.F. Butler, N.L. Wagner, T.D. Gordon, A. Welti, P.O. Wennberg, J.D. Crounse, J.M. St. Clair, A.P. Teng, D.B. Millet, J.P. Schwarz, M.Z. Markovic, and A.E. Perring, Sources, seasonality, and trends of Southeast U.S. aerosol: an integrated analysis of surface, aircraft, and satellite observations with the GEOS-Chem model, *Atmos. Chem. Phys.*, 15, 10, 411-10,433, 2015. [<http://bit.ly/10kpjCO>]

Lacey, F., and **D. K. Henze**, Global climate impacts of country-level primary carbonaceous aerosol from solid-fuel cookstove emissions, *Environ. Res. Lett.*, 10, 114003, doi:10.1088/1748-9326/10/11/114003, 2015. [<http://bit.ly/20Nh0c2>]

Langford, A.O., C.J. Senff, R.J. Alvarez II, J. Brioude, O.R. Cooper, J.S. Holloway, **M.Y. Lin**, R.D. Marchbanks, **R.B. Pierce**, S.P. Sandberg, A.M. Weickmann, E.J. Williams. An overview of the 2013 Las Vegas Ozone Study (LVOS): Impact of stratospheric intrusions and long-range transport on surface air quality. *Atmos. Environ.*, doi:10.1016/j.atmosenv.2014.08.040, 2014. [<http://1.usa.gov/1XZAsDI>]

Lee, H.-M., F. Paulot, **D. K. Henze**, K. Travis, **D. J. Jacob**, L. H. Pardo, B. Schichtel, Sources of nitrogen deposition in Federal Class-I areas in the U.S., *Atmos. Chem. Phys. Discuss.*, 15, 23089-23130, doi:10.5194/acpd-15-23089-2015, 2015. [<http://bit.ly/1Q3WBMV>]

Lin, Meiyun, Arlene M. Fiore, Larry W. Horowitz, Andrew O. Langford, Samuel J. Oltmans, David Tarasick, and Harald E. Rieder (2015), Climate variability modulates western U.S. ozone air quality in spring via deep stratospheric intrusions, *Nature Communications*, 6, 7105, 1-11, doi:10.1038/ncomms8105 [<http://bit.ly/1QhvayM>]

Lu, Z., **D. G. Streets**, **B. de Foy**, L. N. Lamsal, **B. N. Duncan**, and J. Xing, Emissions of nitrogen oxides from U.S. urban areas: estimation from Ozone Monitoring Instrument retrievals for 2005–2014, *Atmos. Chem. Phys.*, 15, 10367–10383, 2015 [<http://bit.ly/10kpJJF>]

Marais, E. A., **D. J. Jacob**, J. L. Jimenez, P. Campuzano-Jost, D. A. Day, W. Hu, J. Krechmer, L. Zhu, P. S. Kim, C. C. Miller, J. A. Fisher, K. Travis, K. Yu, T. F. Hanisco, G. M. Wolfe, H. L. Arkinson, H. O. T. Pye, K. D. Froyd, J. Liao, V. F. McNeill, Aqueous-phase mechanism for secondary organic aerosol formation from isoprene: application to the Southeast United States and co-benefit of SO₂ emission controls, *Atmos. Chem. Phys. Discuss.*, 15, 32005-32047, 2015. [<http://bit.ly/1NkPY2z>]

Shen, L., **L. J. Mickley** and A. P. K. Tai, Influence of synoptic patterns on surface ozone variability over the eastern United States from 1980 to 2012, *Atmos. Chem. Phys.*, 15, 10925-10938, 2015. [<http://bit.ly/1SQzKSB>]

Turner, A.J., **D.J. Jacob**, K.J. Wecht, J.D. Maasakkers, E. Lundgren, A.E. Andrews, S.C. Biraud, H. Boesch, K.W. Bowman, N.M. Deutscher, M.K. Dubey, D.W.T. Griffith, F. Hase, A. Kuze, J. Notholt, H. Ohyama, R. Parker, V.H. Payne, R. Sussmann, C. Sweeney, V.A. Velazco, T. Warneke, P.O. Wennberg, and D. Wunch Estimating global and North American methane emissions with high spatial resolution using GOSAT satellite data, *Atmos. Chem. Phys.*, 15, 7049-7069, 2015. [<http://bit.ly/1M5mVyh>]

Valin, L.C., **A.M. Fiore**, K. Chance, G. Gonzalez Abad (2015), The role of OH production in interpreting the variability of CH₂O columns in the Southeast U.S., *J. Geophys. Res.*, in press. [<http://bit.ly/21Seodu>]

Yue, X., **L.J. Mickley**, J.A. Logan, R.C. Hudman, M. Val Martin, and R.M. Yantosca, Impact of 2050 climate change on North American wildfires: Consequences for ozone air quality, *Atmos. Chem. Phys.*, 15, 10033-10055, 2015. [<http://bit.ly/1TDny7L>]

Visit ACAST.org for a full list of titles. [<http://bit.ly/1OTXENI>]

More AQtivities >>

- ACAST deputy leader Tracey Holloway will be serving as an inaugural member of the American Association for the Advancement of Science (AAAS) Leshner Leadership Fellows Program [<http://bit.ly/1maCD65>] where she will be promoting satellite data to support public decision-making. Check out Holloway's invited blog post, "Viewpoints: <http://bit.ly/1U8w53i> What's Next for Air Quality in the United States?" [<http://bit.ly/1U8w53i>]

- ACAST members Meiyun Lin and Arlene Fiore received media attention for their Nature Communications article on how La Niña conditions increase background surface ozone in the western U.S. through increased frequency of stratospheric intrusions. See write-ups in AAAS' EurekAlert [<http://bit.ly/1K4QYKH>] and EE News [<http://bit.ly/1IXIyR8>].

- ACAST member Bryan Duncan has developed a NASA website, "Air Quality from Space," with NO₂ satellite data and imagery curated for easy access by air quality managers. See NO₂ satellite maps over individual U.S. cities in just a few clicks! [<http://go.nasa.gov/1U8xx63>]

- Bryan Duncan's tutorial on using air quality data from space, co-authored with nine other ACAST PIs, has been THE most downloaded Energy & Earth Science article published since January 2014! Access it at "Satellite data of atmospheric pollution for U.S. air quality applications: Examples of applications, summary of data end-user resources, answers to FAQs, and common mistakes to avoid." [<http://bit.ly/1IHxUDb>]

- ACAST PIs Russ Dickerson, Bryan Duncan, and Anne Thompson hosted a press conference at the American Geophysical Union (AGU) meeting on Dec. 14, 2015 on NO_x emission trends as seen from OMI satellite observations covering 2005-2014. The press conference got some great media attention from CNN [<http://www.cnn.com/2015/12/16/world/nasa-air-quality-maps/>] and the BBC [<http://www.bbc.com/news/science-environment-35099519>]. Check out Bryan Duncan's article in the Journal of Geophysical Research documenting these trends.

- Anne Thompson was awarded the Roger Revelle Medal at AGU, in honor of her groundbreaking research of ozone and other trace gases in the troposphere and stratosphere. Congrats, Anne, on the well-deserved award! [<http://bit.ly/1UFmnG1>]



ACAST pushes its vision for future observation of U.S. air quality and climate from space

In November 2015, ACAST responded to a Request For Information (RFI) from the Earth Science Applications from Space (ESAS) Decadal Survey of the National Research Council.

The Decadal Survey, to be released in 2017, provides strategic recommendations to NASA and other U.S. agencies on priority satellite missions for the 2020s. [<http://sites.nationalacademies.org/DEPS/ESAS2017/index.htm>]

The White Paper lead-authored by Daniel Jacob and submitted by ACAST in response to the RFI makes the case for continuing geostationary observations of air quality over North America initiated through TEMPO and augmenting them with observations of greenhouse gases (methane, CO₂). [<http://bit.ly/1RcdQXv>]



Building the ACAST Legacy

NASA Announces New “H-ACAST” Solicitation

As part of its Research Opportunities in Space and Earth Sciences (ROSES) program, NASA has announced that it will be accepting solicitations for a new opportunity -- the Health and Air Quality Applied Sciences Team (H-ACAST). This will continue the legacy of the current ACAST, the appointment of which ends in 2016. [<http://go.nasa.gov/1Jh5N8H>]

Health and Air Quality applications involve the use of Earth observations for air quality management and public health, particularly regarding infectious disease and environmental health issues. They address issues of toxic and pathogenic exposure and health-related hazards and their effects for risk characterization and mitigation. They promote the use of Earth observing data and models regarding implementation of air quality standards, policy, and regulations for economic and human welfare. Health and Air Quality applications also address the effects of climate change on public health and air quality to support managers and policy makers in their planning and preparations.

The objective of this solicitation is to select a Health and Air Quality Applied Sciences Team (H-ACAST). The Health and Air Quality area supports the formation of this team to execute projects on specific applied topics and demonstrations required to advance the health and air quality management communities' sustained use and application of Earth science observations and models in decision making.

This solicitation is a partial follow-on to the NASA Air Quality Applied Sciences Team (ACAST) competed in ROSES 2009. The vast majority of ACAST grants expire in summer 2016 and will not be re-competed. H-ACAST will build on the lessons and successes of ACAST. While many elements of H-ACAST will be similar to ACAST, specific topics will differ. H-ACAST will address topics at the intersection of the health and air quality communities, but will also address issues unique to each community.

NOIs are requested by January 14, 2016, and proposals are due March 11, 2016. Questions concerning this program and submitting solicitations may be directed to John Haynes at jhaynes@nasa.gov. For more information, visit the NASA ROSES website. [<http://go.nasa.gov/1Jh1nyQ>]



In case you missed it, ACAST Communications Specialist Olivia Sanderfoot put together a video this summer about ACAST's mission and the lasting legacy that its researchers continue to build through collaboration, scientific research, and dedication to serving air quality management needs.

The video, "ACAST: Building a legacy," features interviews with Daniel Jacob (ACAST Leader), Brad Pierce (ACAST Team Member), Arlene Fiore (ACAST Team Member), Rob Kaleel (Executive Director of the Lake Michigan Air Directors Consortium), and Angie Dickens (Air Policy Analyst, Wisconsin Department of Natural Resources). Check it out! [<https://www.youtube.com/watch?v=WicdzZPrIsE>]

Photos from previous page: (top) NASA's 2012 "blue marble image" created using Suomi NPP satellite data, and (bottom) a Roger Revelle Medal (Erik Jepsen, UC San Diego Publications).

Photos from current page: (top) A smoggy Atlanta skyline [<http://appliedsciences.nasa.gov/programs/health-air-quality-program>] and (bottom) a still-frame from the video "ACAST: Building a legacy." [<https://www.youtube.com/watch?v=WicdzZPrIsE>]



Gear up for the next ACAST meeting!

A group photo taken at the ninth annual ACAST meeting (ACAST9) earlier this year in St. Louis, MO.

The 10th ACAST meeting (ACAST10) will be hosted by Pat Dolwick (EPA/OAQPS) Jan. 5-7, 2016, at EPA Research Triangle Park. ACAST meetings bring together atmospheric scientists and air quality managers to discuss how Earth science products can be used effectively for air quality applications. ACAST10 will feature overviews of ACAST projects, discussions of air quality management issues, and talks on air quality science and applications. [<http://bit.ly/1HWV0We>]



An aerial view of EPA Research Triangle Park, the location of the upcoming ACAST10 meeting. (Photo: RTS, EPA)



EPA Research Triangle Park, the location of the upcoming ACAST10 meeting. (Photo: CASW.org)

Stay in touch throughout the year!
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