JCET Cooperative Agreement NNX15AT34A

Year 2 Quarterly Report # 1

PERIOD COVERED: SEPTEMBER 1 – DECEMBER 31, 2016

Dear GSFC Colleagues,

The new JCET cooperative agreement is now approaching the second quarter of its second year. This report describes the research of the JCET faculty, funding proposals that have been submitted this first quarter of year two, as well as, education and outreach efforts of the Center, changes in personnel and upcoming events.

With great pleasure, we submit this quarterly report highlighting our ongoing partnership with NASA Goddard Space Flight Center.

Sincerely,

Belay B. Demoz, JCET Director, and the JCET team.

Joint Center for Earth Systems Technology, 5523 Research Park DR, #320, Baltimore, MD 21250

HIGHLIGHTS : *A SUMMARY OF NEWSWORTHY JCET ACTIVITY.*

AWARDS

Congratulations to the following 610AT Award Recipients:

- Best Senior Author Publication –**Tianle Yuan** (613/UMBC-JCET)
- Outstanding Performance Outreach – **Stephen Nicholls** (612/UMBC-JCET)

NOTEWORTHY

On September 13, **Valerie Casasanto** (610/UMBC-JCET) and the Icesat-2 outreach team installed the new ICESat-2 Altimeter Exhibit in the Building 28 Atrium at Goddard. This exhibit allows participants to have their height measured by a model of the ICESat-2 satellite that moves along a track, mimicking how the ICESat-2 satellite will measure the topography of our planet. There is also a video screen that shows a real-time graph of the participants' heights' being measured, as well as ICESat-2 videos and visualizations. This exhibit will be a stopping point for Goddard tours relating to ICESat-2.

Ana Prados (614/UMBC-JCET) attended NASA's 'Workshop to Develop a Portfolio of Low Latency Datasets for Time-Sensitive Applications' and the LANCE User Working Group meeting, held at NASA Langley on September 27-29. The title of her presentation was "NASA Applied Remote Sensing Training (ASRET): Building Capacity to access and use NASA NRT products".

At the SED (Science and Exploration Directors) seminar on October 7, participants of KORUS-AQ and KORUS-OC (Korea-US Experiment, AQ= Air Quality, OC=Ocean, May-June 2016) presented preliminary data highlights showing widespread elevated pollution levels over Korea and adjacent waters from ship, aircraft and ground-based measurements. The presentation featured Anne Thompson (610), John Sullivan (614/USRA), **Glenn Wolfe** (614/UMBC-JCET), and Ryan Stauffer (614/USRA-ESSIC) and was entitled: "Surf, Turf and Above the Earth: Probing International Air Quality in KORUS-AQ."

Christopher Shuman (615/UMBC-JCET) was quoted in this Science story about Thwaites: http://www.sciencemag.org/news/2016/10/us-and-uk-plan-thwaites-invasion-antarctica

Tianle Yuan (613/UMBC-JCET) presented an Earth System Science Interdisciplinary Center (ESSIC) seminar entitled "Positive Low Cloud and Dust Feedbacks Help to Generate Tropical North Atlantic Multidecadal Variability", October 17.

Jae N. Lee (613/UMBC-JCET) presented a talk entitled "2016 Warming as observed by AIRS: Bottom up or Top down", Lee, J. N. (613/UMBC), J. Susskind (610), L. Iredell (610/SAIC-ESSIC), and Y. K. Lim (610.1/USRA) at Laboratory of Atmospheric and Space Physics (LASP), University of Colorado, Boulder, CO, on November 2.

Valerie Casasanto (610-UMBC-JCET) and the ICESat-2 outreach team released the new ICESat-2 website: http://icesat-2.gsfc.nasa.gov/

"Spectral Longwave Cloud Radiative Forcing as Observed by AIRS," J. Blaisdell (610/SAIC), J. Susskind (610), **J. Lee** (presenter, 613/UMBC), and L. Iredell (610/SAIC), was a poster at AGU (Poster A11I-0132), at the 2016 AGU Fall Meeting, San Francisco, CA, December 12-16.

NEW TASKS:

Task 150
JCET Faculty Member: Andrew Tangborn
Sponsor – Weijia Kuang

This task involves the continued development and application of the NASA geomagnetic data assimilation system. This will include testing of the ensemble Kalman filter system, implementation of a model bias correction scheme, and other algorithms that will help to improve short to medium range forecasting of the geomagnetic field. This system will also be used to gain further insight into the fluid flow inside the Earth's outer core, and how it impacts the geomagnetic field. We plan to expand our collaboration with other research groups involved in geomagnetic modeling, particularly on timescales of several thousand years.

Tasks 151 & 152 (same task description – separate tasks for individuals).
JCET Faculty Member: Pengwang Zhai
JCET Post-doc: Meng Gao

The Project Science team for the Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission and members of the competed PACE Science Team in the Ocean Ecology Laboratory are actively exploring novel methods for using the increased spectral resolution to be provided by PACE to advance their ocean color atmospheric correction process and improve their in-water bio-optical algorithms. One substantial part of this involves radiative transfer modeling. Dr. Pengwang Zhai developed and maintains radiative transfer software that perfectly suits the needs (vector-based, withpolarization) for the PACE-related activities. Specifically, Dr. Zhai and his Post-doc Dr.Meng Gao will utilize Zhai's radiative transfer code to produce aerosol look-up tables for atmospheric correction. They will enhance existing radiative transfer code to include inelastic scattering processes, such as phytoplankton fluorescence. The aerosol tables will be incorporated into the prototype PACE data processing system. The at-water radiative transfer output will be used to generate synthetic datasets for algorithm development and testing. All work to be done iteratively and collaboratively, with the additional goal of publishing all results and findings.

Task 153
JCET Faculty Member: Christopher Shuman
Sponsor – Compton Tucker

The working title for the activity is "Assessing Andean Ice Mass Changes with High-resolution Imagery and MERRA Reanalysis Data." The goal of the task is develop a high resolution imagery time series to assess glacier area changes of selected high elevation ice masses and to compare detected changes with climate variables extracted from reanalysis products.

PROPOSALS: *LISTING OF PROPOSALS AWARDED AND SUBMITTED*

AWARDED

Agency	UMBC Role	Name	Solicitation/Sponsor	Title
NASA	PI	Hoban	ROSES C.3 Solar System Workings	Comprehensive Modeling of the Nucleus Rotational State and the Coma Morphology and Lightcurve Variability of Comet 1P/Halley
NASA	PI	Hoban	MUREP MOO	NASA Early Opportunities Program for Underrepresented Minorities in Earth and Space Sciences
NASA	PI	Huemmrich	NNH16ZDA001N-TE TERRESTRIAL ECOLOGY	Causes and consequences of arctic greening: the importance of plant functional types and surface hydrology
NOAA	PI	Remer	NOAA NEEA0000-16-01257	SNPP VIRS Aerosol Product Calibration and Validation Activities
NOAA	PI	Strow	RFQ EE-133E-16RQ-0951	Full Spectral Resolution Fast Radiative Transfer Modules Updates For CrIS
NASA	Co-I	Tokay	A.23 PRECIPITATION MEASUREMENT MISSIONS (PMM)SCIENCE TEAM	Rain and Snow Particle Size Distribution Models and their Application

SUBMITTED

Agency	UMBC Role	Name	Solicitation/Sponsor	Title
NSF	PI	Kruchten	Advancing Informal STEM Learning (AISL)	Mission HiTech
NASA	PI	Lolli	Cloud and Aerosol Monsoonal Processes - Philippines Experiment	Aerosol 3D-Radiative Effects and their implication in raindrop evaporation by Lidar Measurements in the Central Philippines
NASA	PI	Lolli	ROSES A.23 - Weather and Atmospheric Dynamics	Performance model simulator of a Direct Detection UV Doppler Wind Lidar from space: sensitivity study and ground validation under cloudy and high aerosol loading conditions as in tropical regions
NASA	PI	Martins	Airborne Instrument Technology Transition	Air-HARP: Airborne Integration of the Hyper-Angular Rainbow Polarimeter Imaging System
NASA	PI	Martins	Cloud and Aerosol Monsoonal Processes - Philippines Experiment	Microphysical measurements of aerosol and cloud particles with multi-angular polarized imaging during CAMP2EX
NASA	PI	Remer	A.28INTERDISCIPLINARY RESEARCH IN EARTH SCIENCE	Aeolian fertilization of marine ecosystems, a key component of the global carbon system
NOAA	PI	Strow	FY2016 to FY2017 NOAA (BAA)NOAA-NFA-NFAPO-2016-2004791	Calibration and Validation of the CrIS Operational Sensors
NASA	PI	Turpie	ESTO Airborne Instrument Technology Transition (AITT)	Development of a Highly Accurate Lunar Spectral Irradiance Measurement Capability - The Airborne LUnar Spectral Irradiance Instrument (air-LUSI)
NASA	PI	Yuan	ROSES A.23 - Weather and Atmospheric Dynamics	Investigate Aerosol-Convection-Lightning Interactions using NASA data and a Cloud Resolving Model with Explicit Lightning Physics

NR	PI	Zhai	Funding Opportunity Announcement FY2017 Office of Naval Research (ONR) Young Investigator Program (YIP)	Development of an exact polarized radiative transfer model for coupled atmosphere and ocean systems with both elastic and inelastic scattering mechanisms
DOE	PI	Zhang	Atmospheric System Research Program	ASR: Improve Understanding and GCM representation of BB aerosols
NSF	Co-I	Casasanto	Advancing Informal STEM Learning (AISL)	Earth Mars Connections Collaboration (EMC2): Preparing The Next Generation of Indigenous Astronomers
NSF	Co-I	Demoz	PD 98-1522 AGS - GEO/ATM Physical & Dynamic Meteorology	Collaborative Research: Perlan & Unraveling the relationship between the Southern Hemispheric Stratospheric Jet's Modification by Gravity Waves and its Impacts on Weather & Climate
NASA	Co-I	Herman	Interdisciplinary Science for Eclipse 2017 NNH16ZDA001N-ISE	Using the 2017 Eclipse viewed by DSCOVR/EPIC & NISTAR from space and spectral radiance and broadlband irradiance instruments from below to perform a 3-D radiative transfer closure experiment
NASA	Co-I	Nicholls	ROSES A.23 - Weather and Atmospheric Dynamics	Feedbacks Between Wind-Driven Surface Fluxes and Cloud Population Evolution During MJO: A Combined Satellite and Modeling Study
NASA	Co-I	Shuman	Planetary Science and Technology Through Analog Research [3] [4]	
NASA	Co-I	Varnai	Cloud and Aerosol Monsoonal Processes - Philippines Experiment	

MEETINGS AND FIELD WORK ATTENDED: *LISTING OF MEETINGS, TRAVEL*

OCTOBER

Tokay, Ali	MD to Houston, TX	NASA PMM meeting
Delgado, Ruben	MD to Newport, RI	International Partnering Forum Wind Energy conference
Bian, Huisheng	MD to Beijing, China	Attend workshops of "15th AeroCom and 4th AeroSat" (Sept 19-24) and "International Lecture Courses on Atmospheric Aerosol" (Sept 25-27).
Campbell, Petya	MD to Amsterdam, Netherlands	Participation in the SAIL 35 symposium and associated workshops
St. Pe, Alexandra	DC to Newport, RI	International Partnering Forum Wind Energy conference
Olson, William	MD to Houston, TX	Precipitation Measurement Missions 2016 Science Team meeting and attend the Joint Precipitation Science Team meetings
Casasanto, Valerie	MD to Guadalajara, Mexico	Attend 67th International Astronautical Congress and attend Education and Outreach committee meetings, and Co-chair a session
Varnai, Tamas	MD to Budapest, Hungary	Presentation at a scientific meeting organized by the Hungarian Academy of Sciences and the Hungarian Meteorological Service

Lolli, Simone	MD (Italy) to Bangkok, KL, Singapore	Invited talk to 7-SEAS meeting in KL. visiting our partner in project in Thailand and Singapore to visit our partners and then Jakarta
Shie, Chung-Lin	MD to Houston, TX	Attend the PMM 2016 Science Team Meeting, 24-28 October 2016, Houston, TX present a co-authored poster and participating discussions with attendees on the science and data matters.
Delgado, Ruben	MD to NY, NY	NOAA CREST Science Implementation meeting at CCNY
Vermeesch, Kevin	Local travel-weather balloon retrieval	Weather balloon retrieval
Turpie, Kevin	MD to Pasadena, CA	NASA HyspIRI Science Workshop at CalTech
Turpie, Kevin	Seattle, WA to Victoria, B.C.	Ocean Optics XXIII meeting and host the HyspIRI Town Hall.
Pavlis, Erricos	MD to Berlin, Germany	20th ILRS Laser Ranging Workshop and Analysis Stand. Committee Meeting
Campbell, Petya	DC to Madison, WI	Project working meetings and UAV field tests
Lee, Jae	MD to Denver, CO	TSIS Quarterly review and visit to LASP, Univ. of CO
St. Clair, Jason	MD to Palmdale, CA	Engineering test flights for the CAFE instrument aboard the NASA ER-2 aircraft.

NOVEMBER

St. Pe, Alexandra	DC to Lewes, DE	Service instruments as part of the VERTEX campaign.
Delgado, Ruben	MD to Seattle, WA	NOAA CREST Student recruitment at the Society of Hispanic Professional Engineers conference
Strow, Lawrence	Claysville, PA to Greenbelt, MD	Attend meeting at NOAA for improving CrIS sensor data assimilation
St. Pe, Alexandra	DC to Lewes, DE	To travel to Lewes, DE and service instruments during VERTEX campaign.
Song, Hua	Baltimore to Rockville, MD	Regional and Global Climate Modeling PI meeting (November 29-December 1, 2016)

DECEMBER

Evans, Keith	MD to San Francisco, CA	AGU
Herman, Jay		
Lewis, Jasper		
Lee, Jae		
Shie, Chung-Lin		
Miller, Daniel J.		
DeLima, Adriana Rocha		
Werner, Frank		
Varnai, Tamas		
Campbell, Petya		
Lolli, Simone		AGU

Casasanto, Valerie	MD to San Francisco, CA	
Blevins, Brock		
St Pe, Alexandra		
Huemmrich, Karl		
Zhang, Zhibo		
Pavlis, Erricos		
St. Clair, Jason	MD to Palmdale, CA	Support for the ATom aircraft campaign: instrument installation
Kruchten, Catherine	MD to NYC/CT	NASA's BEST Professional Development with GISS (weekend 1)
Borda, Roberto McBride, Brent	MD to Logan, UT	HARP project campaign
Delgado, Ruben	MD to Amherst, MA	Massachusetts Research Partnership in Offshore Wind Energy meeting

EDUCATION AND OUTREACH: *LISTING OF OUTREACH, GRADUATE SEMINAR, COURSES TAUGHT AND ADVISEMENT, AND STUDENT ACCOMPLISHMENTS.*

Recent Affiliations:

Amita Mehta, Lorraine Remer, Christopher Shuman, and Kevin Turpie were re-affiliated with the Department of Geography and Environmental Systems.

Courses taught by JCET Faculty & Staff in Fall 2016:

PHYS 335, Physics & Chemistry of the Atmosphere, Delgado/DeSousa-Machado (3 credits)
GES 302, Selective Topics in Geography, Huemmrich (3 credits)
GES 415, Climate Change, Mehta (3 credits)
CMSC 626, Computer Security, Hoban (3 credits)

JCET Seminar:

The 2016-17 cohort of eight JCET graduate students completed the Fall JCET Seminar Series. In the fall semesters, the seminar series comprises presentations by the students on the status of their research. This exercise has become an important component in the professional development of these young scientists. The seminar series is open to the public and is led and organized by Dr. Susan Hoban, Associate Director of JCET.

Link to Seminar schedule

JCET Student Activities:

JCET graduate student Daniel Miller presented a poster at the Fall meeting of the AGU. Miller's advisor is Dr. Zhibo Zhang, UMBC Physics/JCET.

Miller, D.J., **Zhang, Z.**, Platnick, S., Ackerman, A. (2016). Comparative evaluation of polarimetric and bi-spectral cloud microphysics retrievals: Retrieval closure experiments and comparisons based on idealized and LES case studies. Conference poster presentation at AGU Fall Meeting, December 12-16, 2016. San Francisco, CA.

Additional Activities

September 29, **Valerie Casasanto** (610/UMBC-JCET) presented a paper at the International Astronautical Federation in Guadalajara, Mexico, entitled "Lasers, Penguins, and Polar Bears: Novel Outreach and Education Approaches for NASA's ICESat-2 Mission."

October 6, **Valerie Casasanto** (610/UMBC-JCET) contributed to the International Observe the Moon Night Event by volunteering at two different hands-on activity stations.

On November 4, Goddard hosted the first ever girls sleep over: 'STEM Girls Night In" at GSFC. Fifty high school girls from Prince George's County participated in hands-on activities. **Valerie Casasanto** (610/UMBC-JCET) with help from volunteers ran the ICESat-2 altimeter exhibit for the girls and talked about the mission.

Thirty six digital arts students and teachers from Catonsville High School visited NASA Goddard Space Flight Facility on Friday, November 18, hosted by **Valerie Casasanto** (610, UMBC-JCET), as part of UMBC's Seeing Science program http://seeingscience.umbc.edu/. Students toured Goddard's integration and testing facilities. **Christopher Shuman** (615/UMBC-JCET), talked about Antarctica and ice science on the Hyperwall. The students also saw an animated short film about ICESat-2. They watched scientific visualizations from the planetarium show Dynamic Earth in an inflatable dome. And finally, students experienced ICESat-2's altimeter interactive exhibit to get their heights' measured.

Jasper Lewis (612/UMBC-JCET) assisted with activity tables for the Sunday Experiment held at the Goddard Visitor Center on November 20. He event focused on weather as the theme

On December 2, 35 STEM educators attended the 2nd in a series of seven blended Educational Professional Development workshops at GISS. Educators received training from **Catherine Kruchten** (UMBC-JCET) on implementing the NASA BEST curriculum into their classrooms. On December 3 educators reconvened at the Intrepid Sea Air and Space Museum where they continued to learn how to implement the BEST curriculum and also participated in a guided tour of the museum where they examined engineering principles related to the design of the Space Shuttle Enterprise, Soyuz and Mercury Spacecraft.

PUBLICATIONS : *LISTING OF REPORTS AND ARTICLES*

BIAN, HUISHENG

Alvarado, M. J., Lonsdale, C. R., Macintyre, H. L., Bian, H., Chin, M., Ridley, D. A., Heald, C. L., Thornhill, K. L., Anderson, B. E., Cubison, M. J., Jimenez, J. L., Kondo, Y., Sahu, L. K., Dibb, J. E., Wang, C. (2016). Evaluating Model Parameterizations of Submicron Aerosol Scattering and Absorption with In Situ Data from ARCTAS 2008. *Atmos. Chem. Phys.*, doi:10.5194/acp-2015-935.

HUEMMRICH, KARL F.

Gamon, J. A., Huemmrich, K. F., Stone, R., Tweedie, C. Spatial and temporal variation in primary productivity (NDVI) of coastal Alaskan tundra: Decreased vegetation growth following earlier snowmelt. *Remote Sensing of Environment, 129*, 144–153.

KUZMICZ-CIESLAK, MAGDALENA M.

Pavlis, E. C., Luceri, V., Kuzmicz-Cieslak, M. H., Konig, D., Bianco, G. (2016). Evaluation of the ILRS network performance using the final ITRF2014. *EGU General Assembly Conference Abstracts* (vol. 18, pp. 9337).

LEWIS, JASPER R.

Lewis, J. R., Campbell, J. R., Welton, E. J., Stewart, S. A., Haftings, P. C. (2016). Overview of MPLNET Version 3 Cloud Detection. *Journal of Atmospheric and Oceanic Technology*. dx.doi.org/10.1175/JTECH-D-15-0190.1

OLSON, WILLIAM S.

Grecu, m., Olson, W. S., Munchak, S. J., Ringerud, S., Liao, L., Haddad, Z. S., Kelley, B. L., McLaughlin, S. F. (2016). The GPM Combined Algorithm. *Journal of Atmospheric and Oceanic Technology/American Meteorological Society, 33*, 2225-2245.

PAVLIS , ERRICOS C.

Ciufolini, I., Paolozzi, A., Pavlis, E. C., Koenig, R., Ries, J., Gurzadyan, V., Matzner, R., Penrose, R., Sindoni, G., Paris, C., others (2016). A test of general relativity using the LARES and LAGEOS satellites and a GRACE Earth gravity model. *The European Physical Journal C, 76*(3), 1–7.

Pavlis, E. C., Luceri, V., Kuzmicz-Cieslak, M. H., Konig, D., Bianco, G. (2016). Evaluation of the ILRS network performance using the final ITRF2014. *EGU General Assembly Conference Abstracts* (vol. 18, pp. 9337).

Kehm, A., Bloßfeld, M., Pavlis, E. C. (2016). Future global SLR network evolution and its impact on the terrestrial reference frame. *EGU General Assembly Conference Abstracts* (vol. 18, pp. 5848).

Matzner, R., Nguyen, P., Brooks, J., Ciufolini, I., Paolozzi, A., Pavlis, E. C., Koenig, R., Ries, J., Gurzadyan, V., Penrose, R., others (2016). LARES satellite thermal forces and a test of general relativity. *Metrology for Aerospace (MetroAeroSpace), 2016 IEEE* (pp. 516–521).

Paolozzi, A., Paris, C., Pavlis, E. C., Sindoni, G., Vendittozzi, C., Ciufolini, I. (2016). Monitoring global climate change using SLR data from LARES and other geodetic satellites. *SPIE Smart Structures and Materials+ Nondestructive Evaluation and Health Monitoring* (pp. 98034N–98034N).

Pearlman, M. R., E. C. Pavlis, C. Ma, C. Noll, D. Thaller, R. Gross, B. Richter, J. Mueller, R. Neilan, R. Barzaghi, S. Bergstrand, J. Saunier, and M. Tamisiea (2016) “Update on the activities of the GGOS Bureau of Networks and Observations”, *Geophysical Research Abstracts,* Vol. 18, EGU2016-10095-2, EGU General Assembly 2016, Vienna, Austria, 17-22 April, 2016.

Sindoni, G., E. C., Pavlis, C., Paris, A., Paolozzi, I. Ciufolini, (2016). Effects of Climate Change on Earth’s Parameters, *Proceedings of the 1st International Conference on Complex Information Systems*– Vol. 1: COMPLEXIS, ISBN 978-989-758-181-6, pages 131-138. DOI: 10.5220/0005905101310138.

SHUMAN, CHRISTOPHER A.

Shuman, C. A., Scambos, T., Berthier, E. (2016). Ice loss processes in the Seal Nunataks ice shelf region from satellite altimetry and imagery. *Annals of Glaciology*, 1-11. https://www.cambridge.org/core/article/ice-loss-processes-in-the-seal-nunataks-ice-shelf-region-from-satellite-altimetry-and-imagery/36F2854C443FB865404F09C578B0F08A

ST. CLAIR, JASON M.

Liu, X., Zhang, Y., Huey, L. G., Yokelson, R. J., Wang, Y., Jimenez, J. L., Campuzano-Jost, P., Beyersdorf, A. J., Blake, D. R., Choi, Y., St. Clair, J. M., Crounse, J. D., Day, D. A., Diskin, G. S., Fried, A., Hall, S. R., Hanisco, T. F., King, L. E., Meinardi, S., Mikoviny, T., Palm, B. B., Peischl, J., Perring, A. E., Pollack, I. B., Ryerson, T. B., Sachse, G., Schwarz, J. P., Simpson, I. J., Tanner, D. J., Thornhill, K. L., Ullmann, K., Weber, R. J., Wennberg, P. O., Wisthaler, A., Wolfe, G. M., Ziemba, L. D. (2016). Agricultural fires in the southeastern U.S. during SEAC4RS: Emissions of trace gases and particles and evolution of ozone, reactive nitrogen, and organic aerosol. *Journal of Geophysical Research: Atmospheres, 121*(12), 7383–7414. http://dx.doi.org/10.1002/2016JD025040

Barth, M. C., Bela, M. M., Fried, A., Wennberg, P. O., Crounse, J. D., St. Clair, J. M., Blake, N. J., Blake, D. R., Homeyer, C. R., Brune, W. H., Zhang, L., Mao, J., Ren, X., Ryerson, T. B., Pollack, I. B., Peischl, J., Cohen, R. C., Nault, B. A., Huey, L. G., Liu, X., Cantrell, C. A. (2016). Convective transport and scavenging of peroxides by thunderstorms observed over the central U.S. during DC3. *Journal of Geophysical Research: Atmospheres, 121*(8), 4272–4295. http://dx.doi.org/10.1002/2015JD024570

Fisher, J. A., Jacob, D. J., Travis, K. R., Kim, P. S., Marais, E. A., Chan Miller, C., Yu, K., Zhu, L., Yantosca, R. M., Sulprizio, M. P., Mao, J., Wennberg, P. O., Crounse, J. D., Teng, A. P., Nguyen, T. B., St. Clair, J. M., Cohen, R. C., Romer, P., Nault, B. A., Wooldridge, P. J., Jimenez, J. L., Campuzano-Jost, P., Day, D. A., Shepson, P. B., Xiong, F., Blake, D. R., Goldstein, A. H., Misztal, P. K., Hanisco, T. F., Wolfe, G. M., Ryerson, T. B., Wisthaler, A., Mikoviny, T. (2016). Organic nitrate chemistry and its implications for nitrogen budgets in an isoprene- and monoterpene-rich atmosphere: constraints from aircraft (SEAC4RS) and ground-based (SOAS) observations in the Southeast US. *Atmospheric Chemistry and Physics, 16*, 5969-5991. http://www.atmos-chem-phys-discuss.net/acp-2016-52/

Bela, M. M., Barth, M. C., Toon, O. B., Fried, A., Homeyer, C. R., Morrison, H., Cummings, K. A., Li, Y., Pickering, K. E., Allen, D. J., Yang, Q., Wennberg, P. O., Crounse, J. D., St. Clair, J. M., Teng, A. P., O'Sullivan, D., Huey, L. G., Chen, D., Liu, X., Blake, D. R., Blake, N. J., Apel, E. C., Hornbrook, R. S., Flocke, F., Campos, T., Diskin, G. (2016). Wet scavenging of soluble gases in DC3 deep convective storms using WRF-Chem simulations and aircraft observations. *Journal of Geophysical Research: Atmospheres, 121*(8), 4233–4257. http://dx.doi.org/10.1002/2015JD024623

Travis, K. R., Jacob, D. J., Fisher, J. A., Kim, P. S., Marais, E. A., Zhu, L., Yu, K., Miller, C. C., Yantosca, R. M., Sulprizio, M. P., Thompson, A. M., Wennberg, P. O., Crounse, J. D., St. Clair, J. M., Cohen, R. C., Laugher, J. L., Dibb, J. E., Hall, S. R., Ullmann, K., Wolfe, G. M., Pollack, I. B., Peischl, J., Neuman, J. A., Zhou, X. (2016). Why do models overestimate surface ozone in the Southeast United States? *Atmospheric Chemistry and Physics, 16*, 13561-13577. www.atmos-chem-phys.net/16/13561/2016/

St. Clair, J. M., Rivera-Rios, J. C., Crounse, J. D., Praske, E., Kim, M. J., Wolfe, G. M., Keutsch, F. N., Wennberg, P. O., Hanisco, T. F. (2016). Investigation of a potential HCHO measurement artifact from ISOPOOH. *Atmospheric Measurement Techniques, 9*, 4561-4568. http://www.atmos-meas-tech.net/9/4561/2016/

VARNAI, TAMAS

Wen, G., Marshak, A., Varnai, T., Levy, R. (2016). Testing the two-layer model for correcting near cloud reflectance enhancement using LES/SHDOM simulated radiances. *Journal of Geophysical Research, 121*, 9661–9674.

WANG, YUJIE

Maeda, E., Moura, Y., Wagner, F., Hilker, T., Lyapustin, A. I., Wang, Y., Chave, J., Mõttus, M., Aragão, L. E. O. C., Shimabukuro, Y. (2016). Consistency of vegetation index seasonality across the Amazon rainforest. *International Journal of Applied Earth Observation and Geoinformation, 52*, 42-53.

WOLFE, GLENN M.

Anderson, D. C., Nicely, J. M., Salawitch, R. J., Canty, T. P., Dickerson, R. R., Hanisco, T. F., Wolfe, G. M., Apel, E. C., Atlas, E., Bannan, T., Bauguitte, S., Blake, N. J., Bresch, J. F., Campos, T. L., Carpenter, L. J., Cohen, M. D., Evans, M., Fernandez, R. P., Kahn, B. H., Kinnison, D. E., Hall, S. R., Harris, N. R., Hornbrook, R. S., Lamarque, J. F., Le Breton, M., Lee, J. D., Percival, C., Pfister, L., Pierce, R. B., Riemer, D. D., Saiz-Lopez, A., Stunder, B. J., Thompson, A. M., Ullmann, K., Vaughan, A., Weinheimer, A. J. (2016). A pervasive role for biomass burning in tropical high ozone/low water structures. *Nature Communications, 7*, 10267. http://www.ncbi.nlm.nih.gov/pubmed/26758808

Liu, X., Zhang, Y., Huey, L. G., Yokelson, R. J., Wang, Y., Jimenez, J. L., Campuzano-Jost, P., Beyersdorf, A. J., Blake, D. R., Choi, Y., St. Clair, J. M., Crounse, J. D., Day, D. A., Diskin, G. S., Fried, A., Hall, S. R., Hanisco, T. F., King, L. E., Meinardi, S., Mikoviny, T., Palm, B. B., Peischl, J., Perring, A. E., Pollack, I. B., Ryerson, T. B., Sachse, G., Schwarz, J. P., Simpson, I. J., Tanner, D. J., Thornhill, K. L., Ullmann, K., Weber, R. J., Wennberg, P. O., Wisthaler, A., Wolfe, G. M., Ziemba, L. D. (2016). Agricultural fires in the southeastern U.S. during SEAC4RS: Emissions of trace gases and particles and evolution of ozone, reactive nitrogen, and organic aerosol. *Journal of Geophysical Research: Atmospheres, 121*(12), 7383–7414. http://dx.doi.org/10.1002/2016JD025040

Nicely, J. M., Anderson, D. C., Canty, T. P., Salawitch, R. J., Wolfe, G. M., Apel, E. C., Arnold, S. R., Atlas, E. L., Blake, N. J., Bresch, J. F., Campos, T. L., Dickerson, R. R., Duncan, B., Emmons, L. K., Evans, M. J., Fernandez, R. P., Flemming, J., Hall, S. R., Hanisco, T. F., Honomichl, S. B., Hornbrook, R. S., Huijnen, V., Kaser, L., Kinnison, D. E., Lamarque, J.-F., Mao, J., Monks, S. A., Montzka, D. D., Pan, L. L., Riemer, D. D., Saiz-Lopez, A., Steenrod, S. D., Stell, M. H., Tilmes, S., Turquety, S., Ullmann, K., Weinheimer, A. J. (2016). An observationally constrained evaluation of the oxidative capacity in the tropical western Pacific troposphere. *Journal of Geophysical Research: Atmospheres*. http://dx.doi.org/10.1002/2016JD025067

Wolfe, G. M., Kaiser, J., Hanisco, T. F., Keutsch, F. N., de Gouw, J. A., Gilman, J. B., Graus, M., Hatch, C. D., Holloway, J., Horowitz, L. W., Lee, B. H., Lerner, B. M., Lopez-Hilifiker, F., Mao, J., Marvin, M. R., Peischl, J., Pollack, I. B., Roberts, J. M., Ryerson, T. B., Thornton, J. A., Veres, P. R., Warneke, C. (2016). Formaldehyde production from isoprene oxidation across NOx regimes. *Atmospheric Chemistry and Physics, 16*, 2597-2610.

Fisher, J. A., Jacob, D. J., Travis, K. R., Kim, P. S., Marais, E. A., Chan Miller, C., Yu, K., Zhu, L., Yantosca, R. M., Sulprizio, M. P., Mao, J., Wennberg, P. O., Crounse, J. D., Teng, A. P., Nguyen, T. B., St. Clair, J. M., Cohen, R. C., Romer, P., Nault, B. A., Wooldridge, P. J., Jimenez, J. L., Campuzano-Jost, P., Day, D. A., Shepson, P. B., Xiong, F., Blake, D. R., Goldstein, A. H., Misztal, P. K., Hanisco, T. F., Wolfe, G. M., Ryerson, T. B., Wisthaler, A., Mikoviny, T. (2016). Organic nitrate chemistry and its implications for nitrogen budgets in an isoprene- and monoterpene-rich atmosphere: constraints from aircraft (SEAC4RS) and ground-based (SOAS) observations in the Southeast US. *Atmospheric Chemistry and Physics, 16*, 5969-5991. http://www.atmos-chem-phys-discuss.net/acp-2016-52/

Busilacchio, M., Di Carlo, P., Aruffo, E., Biancofiore, F., Dari Salisburgo, C., Giammaria, F., Bauguitte, S., Lee, J., Moller, S., Hopkins, J., Punjabi, S., Andrews, S., Lewis, A. C., Parrington, M., Palmer, P. I., Hyer, E., Wolfe, G. M. (2016). Production of peroxy nitrates in boreal biomass burning plumes over Canada during the BORTAS campaign. *Atmospheric Chemistry and Physics, 16*(5), 3485-3497.

Pan, L. L., Atlas, E. L., Salawitch, R. J., Honomichl, S. B., Bresch, J. F., Randel, W. J., Apel, E. C., Hornbrook, R. S., Weinheimer, A. J., Anderson, D. C., Andrews, S. J., Baidar, S., Beaton, S. P., Campos, T. L., Carpenter, L. J., Chen, D., Dix, B., Donets, V., Hall, S. R., Hanisco, T. F., Homeyer, C. R., Huey, L. G., Jensen, J. B., Kaser, L., Kinnison, D. E., Koenig, T. K., Lamarque, J.-F., Liu, C., Luo, J., Luo, Z. J., Montzka, D. D., Nicely, J. M., Pierce, R. B., Riemer, D. D., Robinson, T., Romashkin, P., Saiz-Lopez, A., Schauffler, S., Shieh, O., Stell, M. H., Ullmann, K., Vaughan, G., Volkamer, R., Wolfe, G. M. (2016). The Convective Transport of Active Species in the Tropics (CONTRAST) Experiment. *Bulletin of the American Meteorological Society*. http://journals.ametsoc.org/doi/abs/10.1175/BAMS-D-14-00272.1

Travis, K. R., Jacob, D. J., Fisher, J. A., Kim, P. S., Marais, E. A., Zhu, L., Yu, K., Miller, C. C., Yantosca, R. M., Sulprizio, M. P., Thompson, A. M., Wennberg, P. O., Crounse, J. D., St. Clair, J. M., Cohen, R. C., Laugher, J. L., Dibb, J. E., Hall, S. R., Ullmann, K., Wolfe, G. M., Pollack, I. B., Peischl, J., Neuman, J. A., Zhou, X. (2016). Why do models overestimate surface ozone in the Southeast United States? *Atmospheric Chemistry and Physics, 16*, 13561-13577. www.atmos-chem-phys.net/16/13561/2016/

St. Clair, J. M., Rivera-Rios, J. C., Crounse, J. D., Praske, E., Kim, M. J., Wolfe, G. M., Keutsch, F. N., Wennberg, P. O., Hanisco, T. F. (2016). Investigation of a potential HCHO measurement artifact from ISOPOOH. *Atmospheric Measurement Techniques, 9*, 4561-4568. http://www.atmos-meas-tech.net/9/4561/2016/

Chen, D., Huey, L. G., Tanner, D. J., Salawitch, R. J., Anderson, D. C., Wales, P. A., Pan, L. L., Atlas, E. L., Hornbrook, R. S., Apel, E. C., Blake, N. J., Campos, T. L., Donets, V., Flocke, F. M., Hall, S. R., Hanisco, T. F., Hills, A. J., Honomichl, S. B., Jensen, J. B., Kaser, L., Montzka, D. D., Nicely, J. M., Reeves, J. M., Riemer, D. D., Schauffler, S. M., Ullmann, K., Weinheimer, A. J., Wolfe, G. M. (2016). Airborne measurements of BrO and the sum of HOBr and Br2 over the Tropical West Pacific from 1 to 15km during the CONvective TRansport of Active Species in the Tropics (CONTRAST) experiment. *Journal of Geophysical Research: Atmospheres*, n/a-n/a. http://dx.doi.org/10.1002/2016JD025561

Marais, E. A., Jacob, D. J., Jimenez, J. L., Campuzano-Jost, P., Day, D. A., Hu, W., Krechmer, J., Zhu, L., Kim, P. S., Miller, C. C., Fisher, J. A., Travis, K., Yu, K., Hanisco, T. F., Wolfe, G. M., Arkinson, H. L., Pye, H. O. T., Froyd, K. D., Liao, J., McNeill, V. F. (2016). Aqueous-phase mechanism for secondary organic aerosol formation from isoprene: application to the Southeast United States and co-benefit of SO2 emission controls. *Atmospheric Chemistry and Physics, 16*, 1603-1618.

Schobesberger, S., Lopez-Hilfiker, F. D., Taipale, D., Millet, D. B., D'Ambro, E. L., Rantala, P., Mammarella, I., Zhou, P., Wolfe, G. M., Lee, B. H., Boy, M., Thornton, J. A. (2016). High upward fluxes of formic acid from a boreal forest canopy. *Geophysical Research Letters, 43*(17), 9342-9351. http://dx.doi.org/10.1002/2016GL069599

Warneke, C., Trainer, M., de Gouw, J. A., Parrish, D. D., Fahey, D. W., Ravishankara, A. R., Middlebrook, A. M., Brock, C. A., Roberts, J. M., Brown, S. S., Neuman, J. A., Lerner, B. M., Lack, D., Law, D., Huebler, G., Pollack, I., Sjostedt, S., Ryerson, T. B., Gilman, J. B., Liao, J., Holloway, J., Peischl, J., Nowak, J. B., Aikin, K., Min, K. E., Washenfelder, R. A., Graus, M. G., Richardson, M., Markovic, M. Z., Wagner, N. L., Welti, A., Veres, P. R., Edwards, P., Schwarz, J. P., Gordon, T., Dube, W. P., McKeen, S., Brioude, J., Ahmadov, R., Bougiatioti, A., Lin, J., Nenes, A., Wolfe, G. M., Hanisco, T. F., Lee, B. H., Lopez-Hilfiker, F. D., Thornton, J. A., Keutsch, F. N., Kaiser, J., Mao, J., Hatch, C. (2016). Instrumentation and Measurement Strategy for the NOAA SENEX Aircraft Campaign as Part of the Southeast Atmosphere Study 2013. *Atmos. Meas. Tech., 2016*, accepted. http://www.atmos-meas-tech-discuss.net/amt-2015-388/

Zhu, L., Jacob, D. J., Kim, P. S., Fisher, J. A., Yu, K., Travis, K. R., Mickley, L. J., Yantosca, R. M., Sulprizio, M. P., De Smedt, I., Gonzalez Abad, G., Chance, K., Li, C., Ferrare, R., Fried, A., Hair, J. W., Hanisco, T. F., Richter, D., Scarino, A. J., Walega, J., Weibring, P., Wolfe, G. M. (2016). Observing atmospheric formaldehyde (HCHO) from space: validation and intercomparison of six

retrievals from four satellites (OMI, GOME2A, GOME2B, OMPS) with SEAC^{4}RS aircraft observations over the Southeast US. *Atmospheric Chemistry and Physics Discussions*, 1-24.

Wolfe, G. M., Marvin, M. M., Roberts, S. J., Travis, K. R., Liao, J. (2016). The Framework for 0-D Atmospheric Modeling (F0AM) v3.1. *Geosci. Model Dev. Discuss., 2016*, 1-21. http://www.geosci-model-dev-discuss.net/gmd-2016-175/

UPCOMING EVENTS: *A "HEADS-UP" SECTION FOR UPCOMING EVENTS.*

HARP satellite to launch in Spring

Perhaps as early as March, the Hyper-Angular Rainbow Polarimeter (HARP) satellite is set to launch from Wallops Island to the International Space Station (ISS). HARP was designed and built by Dr. Vanderlei Martins and his team in partnership with Goddard. HARP will be released into space from the ISS to study the polarized light from aerosols to better understand their interactions with clouds. See local coverage in Technically Baltimore:
http://technical.ly/baltimore/2016/12/20/umbc-small-satellite-harp/

JCET Seminar: Spring 2017: Forecasting the Impact of Climate Change
Guest speakers and the JCET graduate students will discuss the potential impacts of climate change on the state of Maryland. The seminar will be held on Tuesdays, from 11 Am – Noon, at UMBC in the Physics Building, room 401. The seminar is open to the public.

PERSONNEL CHANGES:

LISTING OF PROMOTIONS:

Dr. Erricos Pavlis was promoted to the rank of Senior Research Scientist.

HIRES:

No new hires this period.

DEPARTURES:

Daniel Koenig, resigned 11/15/16, returned home to Germany;
Forrest Hall, retired effective 12/31/16

FACULTY IN NEED OF FUNDING:

The following faculty/staff are working at a reduced FTE.

Susan Hoban – working at 60%

Bill Olson - working at 85%

Christopher Shuman – working at 15%

Leonid Yurganov - working at 50%