JCET: QUARTERLY REPORT # 2

PERIOD COVERED: JANUARY 1 - MARCH 31, 2016

Dear GSFC Colleagues,

The new JCET cooperative agreement is now in its second quarter. This report describes the research of the JCET faculty, funding proposals that have been submitted this quarter, 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.

Belay B. Demoz and the JCET team.

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

JCET: QUARTERLY REPORT: *PERIOD COVERED: JANUARY 1 - MARCH 31, 2016*

HIGHLIGHTS : *A SUMMARY OF NEWSWORTHY JCET ACTIVITY.*

Mustafa Aksoy (555/UMBC JCET) was awarded the NASA "Robert H. Goddard Exceptional Achievement for Engineering" as a member of SMAP Radiometer Level 1 Algorithm Development Team for excellence in development and delivery of the SMAP Radiometer Level 1 Algorithm.

Zhibo Zhang (613/UMBC JCET & Physics) and Jun Wang, University of Nebraska organized the session "Impacts of Aerosol-Cloud Interactions on Radiation I" at the American Meteorology Society Annual Meeting 2016 at New Orleans in Jan. 2016.

Jae N. Lee (613/UMBC JCET), Thomas Hearty (Wyle Information System), Richard Cullather (610/UMD), Sophie Nowicki (615), and Joel Susskind (610), presented a talk entitled "Comparison of Surface Temperature at Greenland Summit in AIRS, MERRA, and in-situ measurements" at the GeoSummit meeting, held at GSFC, January 19.

Jae N. Lee (613/UMBC JCET), Dorothy Hall (615), Joel Susskind (610), Lena Iredell (610/SAIC), Thomas Hearty (Wyle Information System), Dong L. Wu (613), and Sophie Nowicki (615), presented a poster entitled "Variations of Surface Temperature Over Greenland As Observed In AIRS, MODIS, and In-Situ Measurements", at the Program for Arctic Regional Climate Assessment (PARCA) meeting, GSFC, January 20.

Young-Kwon Lim (610.1/USRA), Siegfried Schubert (610.1), Sophie Nowicki (615), **Jae N. Lee** (613/UMBC JCET), Andrea Molod (610.1/ESSIC), Richard Cullather (610.1/UMD), Bin Zhao (610.1/SAIC), and Isabella Velicogna gave an oral talk titled "Atmospheric Summer Teleconnections and Greenland Ice Sheet Surface Mass Variation: Insights from MERRA2" at the Program for Arctic Regional Climate Assessment (PARCA) meeting held at NASA/GSFC, January 20.

A recent paper by **Glenn Wolfe** (614/UMBC JCET) and coworkers ("Quantifying sources and sinks of reactive gases in the lower atmosphere using airborne flux observations" (doi:10.1002/2015GL065839)) was highlighted in a Research Spotlight on AGU's EOS Earth and Space Science News website. The paper presents a novel analysis of airborne observations taken on the DC-8 during NASA's 2013 SEAC4RS mission. https://eos.org/research-spotlights/trace-gas-exchange-offers-key-insight-into-atmospheric-processes

A paper by Dan Anderson, Tom Hanisco, **Glenn Wolfe** (614/UMBC JCET), and Anne Thompson (A pervasive role for biomass burning in tropical high ozone/low water structures. Nat. Commun. 7:10267 doi:10.1038/ncomms10267 (2016)) was highlighted in EOS: Sullivan, C. (2016), Human-made fires pollute air with ozone half a world away, *Eos*, *97*,doi:10.1029/2016EO044743 https://eos.org/articles/human-made-fires-pollute-air-with-ozone-half-a-world-away

Kevin Turpie (616/UMBC JCET) hosted a community-wide HyspIRI Town Hall and chaired a four-part session titled, "Present and Future Coastal and Inland Aquatic Remote Sensing for Science and Societal Benefits" at the 2016 Ocean Sciences meeting in New Orleans, February 23 & 24.

Ana Prados (614/UMBC JCET) organized a remote sensing training best practices meeting with the US Forest Service Remote Sensing Applications Center (RSAC) and Conservation International. The purpose of the meeting was to discuss training experiences among the three programs and identify key common best practices that can be shared with the wider capacity building and remote sensing

communities. The meeting was held in Salt Lake City on March 14-15th. NASA's Applied Remote Sensing Training Program (led by Prados) will be leading the development and eventual publication of a Remote Sensing Training Best Practices Manual intended for NASA scientists and other professionals.

Jay Herman (614/UMBC JCET) reported that DSCOVR observed Jupiter in all 10 wavelengths and images of the 4 Galilean Moons. The observation is possible only once per year.

Margo Young, Business Analyst for JCET, received the UMBC Employee of the Quarter Award.

PROPOSALS: *LISTING OF PROPOSALS AWARDED AND SUBMITTED*

Awarded
Larrabee Strow - US DOC/NOAA
Title: Full Spectral Resolution Fast Radiative Transfer Modules For CrIS

Submitted
Huisheng Bian to NOAA (Subcontract under USRA)
Title: Towards the improvement of chemical lateral boundary conditions for the National Air Quality Forecasting Capability

Ruben Delgado to NOAA (Subcontract from CUNY CREST)
Title: NOAA Educational Partnership Cooperative Science Center Solicitation for the Center: Earth System Sciences and Remote Sensing Technologies

Belay Demoz on behalf of **Brian Carroll** for NESSF (NASA/Fellowship)
Title: Investigation of Low-Level Jet wind Evolution using molecular and aerosol 3D Doppler lidar systems.

Belay Demoz to NOAA (Subcontract from Howard)
Title: NOAA Cooperative Science Center in Atmospheric Sciences and Meteorology at Howard University

Belay Demoz to NOAA/NWS (subcontract from CICS:ESSIC/UMD)
Title: Investigate and validate the effectiveness of the Vaisala CL31 ceilometer algorithm at selected sites across the U.S. for the Automated Surface Observing System (ASOS) program product improvement

Belay Demoz to NOAA/JPSS/PGRR (subcontract from CICS:ESSIC/UMD)
Title: In Support of NOAA's commitment to the Global Climate Observing System (GCOS) Reference Upper Air Network (GRAUN)

Larrabee Strow to NOAA/DOC:
Title: Full Spectal Resolution Fast Radiative Transfer Modules For CrIS

Larrabee Strow to JPL/Renewal
Title: AIRS Climate and Calibration Algorithms

Kevin Turpie to NASA Roses BIO A.6 (subcontract from NC State)Title: From Arboreal to Benthic Communities: the ABCs of Land to Ocean Biodiversity Observations A

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

Ruben Delgado, Zhibo Zhang and three students: 2016 Annual Meeting of the American Meteorological Society, New Orleans, LA.

Tamás Várnai, Zhibo Zhang: CALIPSO/CloudSat Science Team meeting
Block Blevins, Ana Prados, Joint meeting w/NASA ARSET & USDA Forest Service
Andrew Tangborn, Sergio deSouza-Machado, Lawrence Stroh: AIRS Science Team meeting
Andrew Tangborn: International Astronautical Federation Spring meeting
Reed Espinosa, Brent McBride: NCAR Atmospheric Radiation Science Workshop
Kevin Turpie: 2016 Ocean Sciences, New Orleans, LA.
Ana Prados: Capacity building meeting w/NASA Langley

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

Recent Affiliations:
Glenn Wolfe and Jason St. Clair have become affiliate faculty in the Chemistry Department.
Ruben Delgado became affiliated with the Physics Department and Susan Hoban was re-affiliated with Physics.

Courses being taught by JCET Faculty & Staff in Spring 2016:
PHYS 622: Aerosols, clouds and radiation, Dr. Belay Demoz
GES 400x: Earth's Cryosphere, Dr. Christopher Shuman
FYS 108: Mathematics in Literature, Ms. Catherine Kruchten

JCET Seminar:
The 2015-16 cohort of nine JCET graduate students are participating in the Spring JCET Seminar Series. The students have been tasked with developing a proposal to NASA to study dust transport across the Atlantic. Each week one student prepares and delivers a presentation on one aspect of the proposal. This exercise has become an important component in the professional development of these young scientists. The seminar series is open to the public.

Link to Seminar schedule Link to Seminar website

Recent student accomplishments:
Roy Prouty successfully defended his Master's thesis on 2/1/2016.
Daniel Orozco successfully defended his PhD dissertation on 3/30/2016.

PUBLICATIONS : *LISTING OF REPORTS AND ARTICLES*

SUBMITTED

Debnath , M., G. V. Iungo , R. Ashton, W. A. Brewer, A. Choukulkar, A. J. Clifton, **R. Delgado**, J. K. Lundquist, W. J. Shaw, J. M. Wilczack, D. Wolfe, "Vertical profiles of the 3D wind velocity retrieved from multiple wind LiDARs performing triple range-height-indicator scans", 2016, *submitted to Atmospheric Measurements and Techniques.*

Grecu, M., **W. S. Olson**, S. J. Munchak, S. Ringerud, L. Liao, Z. S. Haddad, B. L. Kelley, and S. F. McLaughlin, 2016: The GPM Combined Algorithm. (submitted to the *J. Atmos. and Oceanic Tech.*)

Mohammed, P.N.; **Aksoy, M.**; Piepmeier, J.R.; Johnson, J.T.; Bringer, A., "SMAP L-band Microwave Radiometer: RFI Mitigation Pre-Launch Analysis and First Year On-Orbit Observations," submitted to the IEEE Transactions on Geoscience and Remote Sensing.

Shuman, C., E. Berthier, and T. Scambos, 2016, Changes in Seal Nunataks Ice Shelf Region from Imagery and Altimetry, submitted to *Annals of Glaciology*.

Wen, G., A. Marshak, **T. Várnai**, R. Levy, 2016: Testing the two-layer model for correcting near cloud reflectance enhancement using LES/SHDOM simulated radiances. J. Geophys. Res., submitted on March 1, 2016.

ACCEPTED

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., and Weinheimer, A. J.: A pervasive role for biomass burning in tropical high ozone/low water structures, *Nature Communications*, 7, 10267, doi: 10.1038/ncomms10267, 2016.

Bovchaliuk, B., P. Goloub, T. Podvin, **I. Veselovskii**, D. Tanre, A. Chaikovsky,O. Dubovik, A. Mortier, A. Lopatin, M. Korenskiy, and S. Victori: "Comparison of aerosol properties retrieved using GARRLiC, LIRIC, and Raman algorithms applied to multi-wavelength LIDAR and sun/sky-photometer data", Atm. Meas. Tech. Disc., doi:10.5194/amt-2016-40, 2016.

Di, Q., Kloog, I., Koutrakis, P., Lyapustin, A., **Wang, Y**., and Schwartz, J. "Assessing PM2.5 Exposures with High Spatio-Temporal Resolution across the Continental United States", (2016), *Environ. Sci. Technol.*, DOI: 10.1021/acs.est.5b06121.

Dreessen,, J. J. T. Sullivan, **R. Delgado**. (2016). "Observations and Impacts of Transported Canadian Wildfire Smoke on Ozone and Aerosol Air Quality in the Maryland Region on 9-12 June", *Journal of the Air & Waste Management Association*, 10.1080/10962247.2016.1161674, 2016.

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., and Mikoviny, T.: 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 Discussions*, 2016, 1-38, doi: 10.5194/acp-2016-52, 2016.

Granados-Muñoz, M. J., J. A. Bravo-Aranda, D. Baumgardner, J. L. Guerrero-Rascado, D. Pérez-Ramírez, F. Navas-Guzmán, **I. Veselovskii**, H. Lyamani, A. Valenzuela, F. J. Olmo, G. Titos, J. Andrey, A. Chaikovsky, O. Dubovik, M. Gil-Ojeda, and L. Alados-Arboledas: Study of aerosol microphysical properties profiles retrieved from ground-based remote sensing and aircraft in-situ measurements during a Saharan dust event, *Atmos. Meas. Tech.*, 9, 1113-1133, 2016.

Haarig, M., R. Engelmann, A. Ansmann**, I. Veselovskii**, D. N. Whiteman, and D. Althausen: 1064 nm Raman lidar for extinction and lidar ratio profiling: Cirrus case study , *Atm. Meas. Tech. Disc*., doi:10.5194/amt-2016-100, 2016

Johnson, B. T., **W. S. Olson**, and G. Skofronick-Jackson, 2016: The microwave properties of simulated melting precipitation particles: Sensitivity to initial melting. *Atmos. Meas. Tech.*, **9**, 9-21, *doi:10.5194/amt-9-9-2016*

Kuo, K.-S., **W. S. Olson**, B. T. Johnson, M. Grecu, L. Tian, T. L. Clune, B. H. van Aartsen, A. J. Heymsfield, L. Liao, and R. Meneghini, 2016: The microwave radiative properties of falling snow derived from nonspherical ice particle models. Part I: An extensive database of simulated pristine crystals and aggregate particles, and their scattering properties. *J. Appl. Meteor. and Climatol.*, **55**, 691-708.

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., and McNeill, V. F.: Aqueous-phase mechanism for secondary organic aerosol formation from isoprene: application to the Southeast United States and co-benefit of SO_2 emission controls, *Atmospheric Chemistry and Physics*, 16, 1603-1618, doi: 10.5194/acp-16-1603-2016, 2016.

Munchak, S. J., R. Meneghini, M. Grecu, and **W. S. Olson**, 2016: A coupled emissivity and surface backscatter cross-section model for radar-radiometer retrieval of precipitation over water surfaces. *J. Atmos. Oceanic Technol.*, **33**, 215-229.

Olson, W. S., L. Tian, M. Grecu, K.-S. Kuo, B. T. Johnson, A. J. Heymsfield, A. Bansemer, G. M. Heymsfield, J. R. Wang, and R. Meneghini, 2016: The microwave radiative properties of falling snow derived from nonspherical ice particle models. Part II: Initial testing using radar, radiometer and in situ observations. *J. Appl. Meteor. Climatol.*, **55**, 709 – 722.

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Scambos, T. and **C. Shuman**. 2016. Comment on "Mass gains of the Antacrtic iced exceed losses," by H. J. Zwally et al.. *Journal of Glaciology* (in press).

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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., and Hatch, C.: Instrumentation and measurement strategy for the NOAA SENEX aircraft campaign as part of the southeast atmosphere study 2013, *Atmospheric Measurement Techniques Discussions*, 2016, 1-39, doi: 10.5194/amt-2015-388, 2016.

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Yurganov L.N., Leifer I., Lund Myhre C., Seasonal and interannual variability of atmospheric methane over Arctic Ocean from satellite data, *Current problems in remote sensing of the Earth from space (http://jr.rse.cosmos.ru/?lang=eng)*, 2016, Vol. 13, No 2.

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

SEEING SCIENCE

Christopher Shuman is a participating in the UMBC Seeing Science project, a campus-wide, interdisciplinary activity, that will take place over the course of a full year. Its goal is to bring together the UMBC's science, humanities, and art communities to explore communicating science through visual imagery. Researchers and students will explore topics such as the central and evolving role that images play in defining, shaping, promoting, and furthering science, and how images made in and about the

sciences impact public opinion and policy, science education, visual and popular culture, and trigger awareness of and discussion about pressing issues.

Spring 2016 JCET Seminar
The JCET graduate research assistants are developing a proposal to NASA to study dust transport across the Atlantic. Each week, the students will give a presentation on one aspect of the proposal concept. The seminar is held each Tuesday, 11 am – Noon, at UMBC in Physics 401. The public is welcome to attend.

PERSONNEL CHANGES:

LISTING OF PROMOTIONS:

None this Quarter.

HIRES:

Mustafa Aksoy	1/11/2016	POST DOCTORAL RESEARH ASSOCIATE
Brock Blevins	1/11/2016	RESEARCH ANALYST
Janet Mercer	2/29/2016	EXECUTIVE ADMINISTRATIVE ASSISTANT I
Stephen Nicholls	3/1/2016	POST DOCTORAL RESEARH ASSOCIATE
Hua Song	1/25/2016	POST DOCTORAL RESEARH ASSOCIATE

DEPARTURES:

Scott Rabenhorst	3/31/2016	POST DOCTORAL RESEARH ASSOCIATE

FACULTY IN NEED OF FUNDING:

The following faculty/staff are working at a reduced FTE – some by choice but most because of the need for funding.

- Forrest Hall - working at 50%, current task funding depleted by 8/30/16 - no bridge support remaining. Task 122 is a Not Too Exceed.
- Susan Hoban – working at 50% support.
- Daniel Konig - working at 70% - bridge support ends 6/8/16, will need to drop to 60% if no additional grant support from Pavlis.
- Catherine Kruchten – working at 50% support.
- Magda Kuzmicz-Cieslak - working at 70%, bridge support ends 6/8/16, will need to drop to 60% if no additional grant support from Pavlis
- Chris Shuman - currently at 27%, once teaching and Seeing Science ends 5/29/16 , will be down to 5% support
- Leonid Yurganov - working at 50% support
- Pavlis working at 90%, bridge support ends August 2016. Should have enough funds in Year 3 of current grant to cover difference, assuming travel expense is not excessive.