JCET Cooperative Agreement NNX15AT34A

Year 4 Quarterly Report # 2

PERIOD COVERED: JANUARY 1 – MARCH 31, 2019

Dear GSFC Colleagues,

The current JCET cooperative agreement has completed the second quarter of its fourth year. This report describes the research of the JCET faculty, funding proposals that have been submitted during this quarter, as well as education and outreach efforts of the Center, changes in personnel and upcoming events.

We are delighted to report also on the ever-strengthening partnerships between JCET, Goddard and the UMBC academic departments that relate to JCET's mission.

We invite you to join us for the 3rd annual Earth Day Symposium at UMBC on Friday, April 26, 2019. This is event is organized by the graduate students affiliated with JCET (http://eds.umbc.edu).

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.

HIGHLIGHTS: *A SUMMARY OF NEWSWORTHY JCET ACTIVITY.*

AWARDS

Jae N. Lee (613/UMBC-JCET) was awarded the 2019 Piers J. Sellers Award for Interdisciplinary Science at the 12th Annual Sciences & Exploration Directorate New Year's Poster Party, February 26, 2019. Dr. Lee's poster at the event, "Is There a Time Lag between Total Solar Irradiance and Sunspot Area?" explores two fundamental quantities in Heliophysics and Earth Science: the solar magnetic field emergence and total solar energy input to Earth. To examine this relationship, she presented SDO solar disc images, ground observations of sunspot area, and measured total solar irradiance data from SORCE, TCTE, and newly launched TSIS.

EXTERNAL PRESENTATIONS/MEDIA

EARSeL Spectroscopy Workshop

Petya Campbell (618/UMBC-JCET) participated in the European EARSeL Spectroscopy Workshop in Brno, CZ, February 4-8, 2019.

SCOAPE Meeting

Nader Abuhassan (614/UMBC-JCET) traveled to Cocodrie, LA, to visit the Louisiana Universities Marine Consortium (LUMCON) on February 26-27, 2019. The group met to finalize plans for a cruise campaign in the Gulf of Mexico from May 10-18, 2019. The cruise is part of the Satellite Continental and Oceanic Atmospheric Pollution Experiment (SCOAPE), an interagency agreement between NASA and BOEM to observe pollutants and validate satellite measurements over oil and gas operations in the Gulf of Mexico.

SBG Architecture Team Meeting

Kevin Turpie (616.2/UMBC-JCET) participated in the Surface Biology and Geology (SBG) Architecture Team Meeting at JPL in Pasadena, CA on February 27-28, 2019. The purpose of the meeting is to develop initial ideas for candidate mission architectures for the SBG pre-formulation study.

GSICS Annual Meeting

Kevin Turpie (616.2/UMBC-JCET) presented an overview of the air-LUSI mission and its objective to improve characterization of the Moon as a calibration reference for Earth observing satellite instruments at the Global Space-based Inter-Calibration System (GSICS) Annual Meeting at ESA ESRIN in Frascati, Italy on March 6, 2019.

DOSBGM Meeting

Kevin Turpie (616.3/UMBC-JCET) served as the Cal/Val Working Group Chair at a meeting of the R&A Working Group Chairs and Co-Chairs for the NASA Designated Observable Surface Biology and Geology Mission, in Washington DC on March 13-14, 2019.

AeroCenter Poster Bash

Jasper Lewis (612/UMBC-JCET co-organized the Annual AeroCenter Poster Bash on March 19, 2019. Scientists and students from GSFC and surrounding universities came together to present their most current work.

EEO: Tribal College Presentation

Valerie Casasanto (610/UMBC-JCET) presented to members of the Fond du Lac Tribal and Community College, March 13, 2019 at GSFC. The college is located in Cloquet, MN. Valerie presented the ICESat-2 mission and the new tree-height measurement GLOBE citizen science app.

Earth Observatory

Christopher Shuman (615/UMBC) provided commentary for an Earth Observatory story regarding the potential calving of the Brunt Ice Shelf in Antarctica. https://go.nasa.gov/2BRTipo

NEW TASKS:

Task 179
Sponsor: C.E. Del Castillo/Code 616
JCET Personnel: K. Turpie

1. Subject Matter Expert - Participate in all requirement and architecture option discussions to provide prioritized input regarding the needs of the coastal and inland aquatic remote sensing community, identify potential data products to support science and applications, and inform the mission study regarding the effect of different requirement and architecture options on related science and application objectives and data quality. Lead the Cal/Val working group and member participating in the Objectives and Performance working group. Communicate questions with other community experts, including organizing small study groups as necessary, to draw on the broader knowledge of the community. Review and contribute to the SBG pre-formulation study report, drawing on community input and literature.

2. Community of Practice Lead - Head a community of practice (CoP) for the coastal and inland aquatic remote sensing community. Disseminate appropriate and relevant information regarding NASA SBG mission development and draw input from the community for consideration by NASA. This role will include organizing the CoP, facilitating regular meetings and discussion forums, and initializing community driven reports, as necessary.

3. International Liaison - Engage in discussions and collaborations, as appropriate, with other international groups with common interests. This includes participating with groups such as the Committee on Earth Observation Satellites (CEOS) and the Group on Earth Observations (GEO) and their initiatives (e.g., Blue Earth, Aquatic Watch, GEOGLOWS, and GEO Wetlands).

PROPOSALS: *LISTING OF PROPOSALS AWARDED AND SUBMITTED*

AWARDED

None this quarter.

SUBMITTED

Agency	UMBC Role	Name	Solicitation/Sponsor	Title
NASA	PI	Zhibo Zhang (for QianQian Song)	(FINESST)-2019 New Proposals, NASA	Investigate the Radiative and Microphysical Effects of Above-cloud Dust Aerosols in North-East Atlantic
NASA	PI	Pengwang Zhai (for Neranga Prasadi Kaluappuwa Hannadige)	(FINESST)-2019 New Proposals, NASA	Prototyping MuSLI canopy chlorophyll content for assessment of vegetation function and productivity
NASA	PI	Vanderlei Martins (for Anin Puthukkudy	(FINESST)-2019 New Proposals, NASA	Measurement of Microphysical, Optical Properties, and Chemical Composition of Volcanic ash in Support of Remote Sensing and Modeling for Earth and Planetary Applications

NASA	PI	Vanderlei Martins (for Noah Sienkiewicz)	(FINESST)-2019 New Proposals, NASA	Development of Aerosol Retrieval Algorithms Utilizing Multi-Angular Polarimetric Data from the HARP instruments
US Dept Energy	PI	Zhibo Zhang	Atmospheric System Research (ASR)/DOE	Characterizing the Variation and Covariation of Cloud Microphysical Properties and Implications for Simulation of Subgrid-scale Warm-Rain Processes in Earth System Models
NOAA	Co-I	Stephen Guimond	FY2019 Office of Weather and Air Quality Research Programs/ NOAA	Real-time Observations of the Three-Dimensional Hurricane Boundary Layer Winds and Ocean Surface Vector Winds with an Imaging Airborne Profiler
NASA	PI	Ali Tokay	Small Business Innovation Research (SBIR)/ NASA	High Volume Disdrometer
NASA	Co-I	Vanderlei Martins	Small Business Innovation Research (SBIR)/NASA	A versatile payload system for multi-sensor integration on 6U satellites
NASA	PI	Belay Demoz	MUREP Institutional Research Opportunity (MIRO) Group 7/NASA	UMBC Center for Atmospheric Research and Education Solutions (UMBC-CARES)
NSF	Co-I	Belay Demoz	NSF 98-1524	Collaborative Research: Inter-Hemispheric Transports of Ozone and Smoke across the Equatorial Atlantic Ocean
NASA	PI	Jason St. Claire	Rapid Response and Novel Research in Earth Science/NASA	satellite validation aircraft flights in Romania

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

JANUARY

Traveler	Destination	Travel Begin	Travel End	Trip Purpose
Kironji, Wambugu	MD to Phoenix, AZ	1/4/19	1/11/19	Attend/present - 99th AMS Mtg
Balasus, Nicholas	MD to Phoenix, AZ	1/5/19	1/10/19	Attend/present - 99th AMS Mtg

Ball, Katherine Lipscomb	MD to Phoenix, AZ	1/5/19	1/10/19	Attend/present - 99th AMS Mtg
Carroll, Brian	MD to Phoenix, AZ	1/5/19	1/10/19	Attend/present - 99th AMS Mtg
Delgado, Ruben	MD to Phoenix, AZ	1/5/19	1/10/19	Attend/present - 99th AMS Mtg
Demoz, Belay	MD to Phoenix, AZ	1/5/19	1/10/19	Attend/student mentor - 99th AMS Mtg
Hoffman, Kylie	MD to Phoenix, AZ	1/5/19	1/10/19	Attend -99th AMS Mtg
Tokay, Ali	MD to Phoenix, AZ	1/5/19	1/10/19	Attend/present - 99th AMS Mtg
Caicedo, Vanessa	MD to Phoenix, AZ	1/6/19	1/11/19	Attend/present - 99th AMS Mtg
Lee, Jae	MD to Phoenix, AZ	1/6/19	1/10/19	Attend/present - 99th AMS Mtg
Lewis, Jasper	MD to Phoenix, AZ	1/6/19	1/11/19	Attend/present - 99th AMS Mtg
Posey, Julianna	MD to Phoenix, AZ	1/6/19	1/10/19	Attend/present - 99th AMS Mtg
Robinson, Joseph	MD to Phoenix, AZ	1/6/19	1/11/19	Attend/present - 99th AMS Mtg
Sperling, Meredith	MD to Phoenix, AZ	1/6/19	1/10/19	Attend/present - 99th AMS Mtg
St. Clair, Jasper	MD to Phoenix, AZ	1/6/19	1/11/19	Attend/present - 99th AMS Mtg
Yuan, Tianle	MD to Phoenix, AZ	1/6/19	1/12/19	Attend/present - 99th AMS Mtg
Zhang, Zhibo	MD to Phoenix, AZ	1/6/19	1/10/19	Attend/present - 99th AMS Mtg
Varnai, Tamas	MD to Phoenix, AZ	1/9/19	1/11/19	Attend/present - 99th AMS Mtg
Shie, Chung-lin	Local to Bethesda, MD	1/15/19	1/17/19	Attend/present - 2019 ESIP Winter Mtg
Zhang, Zhibo	MD to Brookhaven, NY	1/28/19	1/30/19	Attend DOE ACE-ENA Workshop

FEBRUARY

Traveler	**Destination**	**Travel Begin**	**Travel End**	**Trip Purpose**
Campbell, Petya	VA to Brno, Czech Rep	2/3/19	2/10/19	Attend/present at EarSEL2019, ARTMO workshop.
Abuhassan, Nader	MD to Puerto Rico	2/19/19	2/23/19	Setup of Pandora System.
Carroll, Brian	MD to Charleston, NC	2/19/19	4/3/19	Participate in AEROSE research cruise.
Abuhassan, Nader	MD to New Orleans, LA	2/25/19	2/27/19	Site visits for future Pandora system installation.
Turpie, Kevin	MD to Pasadena, CA	2/26/19	3/1/19	Participate in SBG Architecture Team concept mtg.

MARCH

Traveler	Destination	Travel Begin	Travel End	Trip Purpose
Turpie, Kevin	MD to Frascati, Italy	3/2/19	3/10/19	Presentation at Global Space-based Inter-Calibration System (GSICS) Working Group Mtg.
Casasanto, Valerie	MD to Paris, FR	3/23/19	3/29/19	Attend/present International Astronautical Congress Planning Mtg.
Tangborn, Andrew	MD to Tucson, AZ	3/21/19	3/23/19	Doctoral Com. Mtg.-Univ of AZ

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

Recent Departmental Affiliations: No new affiliations this quarter.

Courses taught by JCET Faculty & Staff in Spring 2019:

PHYS 622: Atmospheric Physics II (3 credits), B. Demoz
PHYS 440/640: Computational Physics (3 credits), A. Tangborn
PHYS 650: Data Assimilation (1 credit), A. Tangborn (50%)
GES 481: Digital Image Processing for Environmental Applications (3 credits), L. Remer
SOC 101Y: Basic Concepts in Sociology (1 credit), K. Evans

JCET Seminar:

During Fall semesters, the JCET Seminar comprises research presentations by graduate students affiliated with JCET as well as guest speakers from UMBC, Goddard and the local Earth Science community. In the Spring semester, a one-credit course on a JCET-related subject is offered. This semester, Spring 2019, the course is "Data Assimilation," and is being offered by Andrew Tangborn (UMBC-JCET) and Animikh Biswas (UMBC-Mathematics & Statistics). JCET-affiliated graduate students are required to participate, and the course is open to graduate students from JCET-related departments.

Link to Seminar Website

JCET Student Activities:

Planning for 3rd Annual Earth Day Symposium

JCET-affiliated graduate students are responsible for the annual Earth Day Symposium, sponsored jointly by JCET and the UMBC Physics Department. This year's symposium will be held at UMBC on Friday, April 26, 2019, from 9 AM – 4 PM. The symposium features speakers from Goddard, UMBC and the local Earth Science community. The symposium is open to the public. Registration information is located at http://eds.umbc.edu .

REPORTED PUBLICATIONS : *LISTING OF REPORTS AND ARTICLES*

Ciufolini, I., Paolozzi, A., **Pavlis, E. C.**, Matzner, R., Koenig, R., Ries, J., Sindoni, G., Paris, C., Gurzadyan, V. (2019). Tests of General Relativity with the LARES Satellites. In D. Puetzfeld and C. Lämmerzahl (Ed.), *Relativistic Geodesy* (pp. 467--479). Cham: Springer Nature. doi.org/10.1007/978-3-030-11500-5_15

Dubovik, O., Li, Z., Mishchenko, M. I., 37 co-authors including, a. a., **Remer, L. A.** (2019). Polarimetric remote sensing of atmospheric aerosols: Instruments, methodologies, results, and perspectives. *Journal of Quantitative Spectroscopy & Radiative Transfer, 224*, 474-511.

Giles, D. M., Sinyuk, A., Sorokin, M. G., Schafer, J. S., Smirnov, A., Slutsker, I., Eck, T. F., Holben, B. N., **Lewis, J. R.**, Campbell, J. R., Welton, E. J., Korkin, S. V., Lyapustin, A. I. (2019). Advancements in the Aerosol Robotic Network Version 3 database - automated near-real-time quality control algorithm with improved cloud screening for Sunphotometer aerosol optical depth (AOD) measurements. *Atmospheric Measurement Techniques, 12*, 169 - 209.

Pearlman, M., Arnold, D., Davis, M., Barlier, F., Biancale, R., Vasiliev, V., Ciufolini, I., Paolozzi, A., **Pavlis, E. C.**, Sosnica, K., others (2019). Laser geodetic satellites: a high-accuracy scientific tool. *Journal of Geodesy*, 1--14. doi.org/10.1007/s00190-019-01228-y

Salinas, C. J., **Lee, J. N.** (2019). Solar Cycle Response of CO2 over the Austral Winter Mesosphere and Lower Thermosphere Region. *J. Geophy. Res. Space Physics, 123*, 7581–7597. doi.org/10.1029

Shi, Y. R., Levy, R. C., Eck, T. F., Fisher, B., Mattoo, S., **Remer, L. A.**, Slutsker, I., Zhang, J. (2019). Characterizing the 2015 Indonesia fire event using modified MODIS aerosol retrievals. *Atmos. Chem. Phys., 19*, 259-274.

PERSONNEL:

LISTING OF PROMOTIONS:

None this quarter

HIRES:

Jeewoo Park, Research Associate, 3.6.2019

DEPARTURES:

Meng Gao, Research Associate, 1.5.2019

FACULTY IN NEED OF FUNDING:

Keith Evans – working at 60%
Susan Hoban – working at 77%
Bill Olson - working at 85%
Chung-Lin Shie – working at 75%
Christopher Shuman – working at 55%
Andrew Tangborn – working at 60%