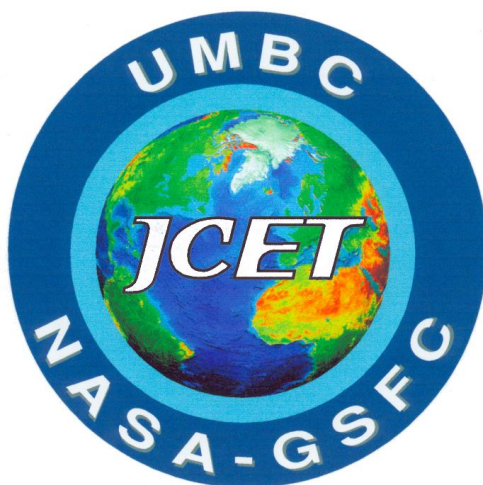


# JCET COOPERATIVE AGREEMENT NNX15AT34A

## YEAR 3 QUARTERLY REPORT # 3

***PERIOD COVERED: APRIL 1 – JUNE 30, 2018***



Dear GSFC Colleagues,

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

During this quarter, the JCET Executive Board held its annual meeting, this time at Goddard. We are happy to report that the Executive Board signaled an overall positive outlook for JCET's accomplishments.

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.

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**

#### *Best Student Poster Award, AOGS 2018*

JCET/Physics graduate student Lipi Mukherjee, advised by Pengwang Zhai (Physics/JCET Affiliated Faculty), received the Best Student Poster Award for Atmospheric Science Section in the 2018 annual meeting of Asia Oceania Geosciences Society (AOGS). In addition to receiving an award certificate, Ms. Mukherjee will also receive a complimentary registration to attend the AOGS Annual Meeting the following year.

### **NOTEWORTHY**

#### *JCET Executive Board Meeting*

The JCET Executive Board held its annual meeting at Goddard on May 14, 2018. In attendance from Goddard were James Irons (Deputy Director of the Earth Sciences Division), Torry Johnson (COR – JCET), Steve Platnik (Deputy Director for Atmospheres, Earth Sciences Division), Christa Peters-Lidard (Deputy Director for Hydrosphere, Biosphere, and Geophysics), Lazarus Oreopolous (Chief of the Climate and Radiation Lab), Carlos Del Castillo (Chief, Ocean Ecology Lab), and James Gleason (Chief, Atmospheric Chemistry and Dynamics Lab). UMBC participants included Karl Steiner (Vice President for Research), Alan Yeakley (Chair, Geography and Environmental Systems), Zhibo Zhang (Physics & JCET Affiliated Faculty), and Bedřich Sousedík (Mathematics & Statistics); and from JCET: Belay Demoz (JCET Director), Susan Hoban (JCET Associate Director for Academics), Mary Dawson (JCET Assistant Director), Margo Young (JCET Senior Business Manager) and Ali Tokay (JCET Faculty Representative).

#### *Final Phase of AToM Mission Underway*

Glenn Wolfe (614/JCET) and Reem Hannun (614/JCET) are working on the 4th and final phase of the NASA EVS-3 Atmospheric Tomography (ATom) mission. The ATom mission has a total of 23 in-situ chemistry and particle instruments on the NASA DC-8, with 12 flights that spans the Pacific and Atlantic. The DC-8 continuously profiles from altitudes above 30,000 feet down to 500 feet. Over 300 species are being measured by ATom.

#### *External interactions (HQ, universities, other Gov't organizations, conferences, etc.)*

Jae N. Lee (613/JCET) presented "Solar rotational modulations of spectral irradiance and correlations with the variability of solar proxies" at the European Geosciences Union General Assembly on April 11, 2018.

Yujie Wang (613/JCET) visited the Australian Bureau of Meteorology (BoM) in Melbourne, Australia with Alexei Lyapustin (613), April 3-10, 2018. They were invited to adapt algorithm MAIAC, developed at NASA, for processing geostationary HIMAWARI-8 AHI data. Of particular interest are the aerosol and land surface reflectance information produced by MAIAC for land vegetation and air quality research and applications.

Valerie Casasanto (610/JCET) provided ICESat-2 expertise at the NASA exhibit at the 2018 US Science and Engineering Festival in Washington D.C. April 6-8, 2018.

Valerie Casasanto (610/JCET) provided ICESat-2 expertise at the NASA Earth Day event “Celebrate Earth Day with NASA” at Union Station in Washington, DC April 19 & 20, 2018.

Kevin Turpie (616/JCET) participated in the Alliance for Coastal Technologies (ACT) Hyperspectral Workshop in Honolulu, HI May 15-16, 2018. ACT is a NOAA-funded partnership of research institutions, resource managers, and private sector companies dedicated to fostering the development and adoption of effective and reliable sensors and platforms for use in coastal, freshwater and ocean environments. The workshop objective was to invite key researchers in the field to discuss and develop recommendations for technological demonstrations of current hyperspectral techniques and assets.

The Applied Remote Sensing Training Program (ARSET) completed its webinar series on Monitoring Tropical Storms in June 2018. Led by Amita Mehta (612/JCET), participants learned to identify remote sensing data and tools relevant to tropical storms; how to monitor conditions before, during, and after a storm using remote sensing; and how remote sensing can be applied to decision-making activities. The training included applications using GEOS-5, TRMM, GPM, MODIS-NRT Flood Mapping, SRTM, SEDAC, ERDS, GFMS, GDACS, and the SLOSH NWS model. Around 480 people participated in the online training. The ARSET program is managed by Ana Prados (614/JCET) and supported by Brock Blevins (614/JCET).

Christopher Shuman (615/JCET) gave a presentation entitled “Thermal imagery tracks the calving and early movements of iceberg A-68 from the Larsen C Ice Shelf” at the IGS Workshop on Timescales, Processes, and Glacier Dynamics in Buffalo, NY, June 3-8, 2018. He also chaired the judging for the student oral/poster presentations.

## **NEW TASKS:**

### **Task 168**

**Sponsor: Janie Nall (160)**

**JCET Personnel: UMBC Subcontract to Morgan State University**

This task supports the Maryland HBCU STEM Network to develop four STEM Summer Camps for under-represented youth enrolled in Middle Schools in targeted communities linked to the four HBCUs in the Network. NASA and NOAA resources associated with Earth Systems Science will be the STEM content for the framework in the summer camps. The outputs will include: 1) professional development mentor training for pre-service teachers; 2) summer camps for upper elementary, middle and high school students (pre-service teachers will implement STEM Challenge lessons developed at the four targeted HBCUs); and 3) follow-up evaluation of the summer camp activities by faculty leads at each of the four targeted Network institutions.

**Task 169****Sponsor: Hongbin Yu (613)****JCET Personnel: Zhibo Zhang**

This task supports a JCET faculty member to participate in a recently funded TASNPP proposal (PI: Hongbin Yu) on the dust variability and radiative effects. This faculty member will advise a PhD student to use a radiative transfer model to calculate the dust radiative effect on solar and terrestrial radiation by using satellite-based, dust 3-D distribution and observationally constrained dust optical properties.

**Task 170****Sponsor: Hongbin Yu (613)****JCET Personnel: Qianqian Song**

This task supports a PhD student to participate in a recently funded TASNPP proposal (PI: Hongbin Yu) on the dust variability and radiative effects. Under supervision of his/her PhD advisor, the PhD student will use a radiative transfer model to calculate the dust radiative effect on solar and terrestrial radiation by using satellite-based, dust 3-D distribution and observationally constrained dust optical properties.

**Task 171****Sponsor: Robert Swap (614)****JCET Personnel: Arowa Suliman**

This task supports a Ph.D. student to provide technical assistance with the research and development of Pandora Spectrometer System and its operationalization related to the larger Pandora Project and the Pandonia Global Network (PGN). The student will conduct network operator duties of ground based environmental observation networks as well as assisting the Pandora Project engineering team with the continued engineering development of the Pandora instrument for standardized network operations, instrument calibration and characterization.

**Task 172****Sponsor: Bryan Franz (616)****JCET Personnel: Vanderlei Martins and Team**

This task supports NASA GSFC in the following areas: (1) development of algorithms for Level-0 to Level-1A/B/C processing of data from the HARP2 instrument that is expected to fly on the PACE mission, and delivery of prototype software; (2) development and delivery of Level-0 to Level-1A/B/C prototype software and data from AirHARP/HARP, to be used as pre-launch proxy for HARP2 by the PACE Science Data Segment (SDS); (3) guidance on implementation and testing of AirHARP/HARP/HARP2 processing capabilities within the SDS; (4) expertise in algorithm development and validation for polarimetry science for the PACE mission.

### Task 173

**Sponsor: Robert Levy (613)**

**JCET Personnel: Lorraine Remer**

This task supports a JCET faculty member to develop, validate and provide science-quality aerosol retrievals from geostationary sensors, while also ensuring product consistency with existing retrievals from low earth orbiting sensors. The researcher will provide analysis of multiple data sets to look for trends and patterns of fires and smoke in India and other regions, as well as other research involving aerosols, clouds, other atmospheric, land and ocean parameters, remote sensing, radiative transfer, developing algorithms for remote sensing, in situ and satellite sensor development, field work, and data collection. The primary effort of this task is to help the PIs synthesize and manage their projects, providing high level scientific input, strategic planning and help towards decision-making. The task will involve synthesis of literature review, data analysis, mentoring less-experienced team members, and a variety of leadership responsibilities and writing/publishing papers.

### Task 174

**Sponsor: John Sullivan (614)**

**JCET Personnel: Lance Nino**

This task supports a JCET student for the Ozone Water Land Environmental Transition Study (OWLETS). The effort will be to operate laboratory equipment at the GSFC trailer that is currently at UMBC. The student will prepare balloon-borne instrumentation as well as ground-based passive and active remote sensing instrumentation. The student will also perform QC/QA check on surface level in-situ measurements.

## **PROPOSALS: LISTING OF PROPOSALS AWARDED AND SUBMITTED**

### **AWARDED**

<b>Solicitation/ Funding Agency</b>	<b>UMBC Role</b>	<b>Name</b>	<b>Sponsor</b>	<b>Title</b>
NASA	PI	Lorraine Remer	NASA	Understanding airborne fertilization of oceanic ecosystems from analysis of MODIS, VIIRS, and CALIOP observations
NASA	Co-I	Ruben Delgado	SSAI	Mixing Layer Height Algorithm for Environmental Protection Agency Photochemical Assessment Monitoring Sites
NASA	PI	Larrabee Strow	NASA /GSFC	The AIRS Radiative Transfer Algorithm
MDE	PI	Ruben Delgado	MDE	The UMBC Monitoring of Atmospheric Pollution: The Ozone Water Land Environmental Transition Study Part 2 (OWLETS-2): Enhanced Monitoring of Atmospheric

Pollution of the Chesapeake Bay Using Vertical Profiles of Ozone, Wind, Temperature and Aerosols

**SUBMITTED**

Solicitation/ Funding Agency	UMBC Role	Name	Sponsor	Title
NASA	Co-I	Stephen Nicholls	GSFC	Earth Venture:CLARINET
NASA	PI	Vanderlei Martins renewal submission of NESSF for Brent McBride	NASA	Retrievals of Aerosol and Cloud Droplet Microphysical Properties with the Hyper- Angular Rainbow Polarimeter (HARP)
NASA	PI	Vanderlei Martins	NASA	The 3D Cloud Scanner CubeSat for Cloud and Aerosol Measurements
Unsolicited	PI	Mohamed Younis	APL	Intra-Spacecraft Wireless communication network
NASA	Co-I	Tams Varnai	GSFC	Use of CALIOP data for understanding cloud- related variations in aerosol properties and aerosol radiative effects
NASA	Co-I	Shin-Chan Han	GSFC	Earth Surface and Interior
NASA	Co-i	Amita Mehta	JPL	A Sustainable Forest Management and Information System (SFMIS) Tool
NASA	Co-I	Ali Tokay	UMD - ESSIC	Relating in-cloud and sub-cloud processes for light rain events using cloud-resolving models and GPM ground validation campaign measurements
NASA	PI	Amita Mehta	NASA	Remote Sensing-based Integrated Floodplain Detection and Information System (IFDIS) for Emergency Risk Reduction and Response
NASA	PI	Ali Tokay	NASA	Comparison of precipitation phase algorithms: Ground Validation activity for PMM
NASA	Co-I	Chung-Lin Shie	GSFC	Precipitation Measurement Missions
NASA	Co-I	Stephen Nicholls	GSFC	Precipitation Measurement Missions
NASA	Co-I	Andrew Tangborn	GSFC	Physical Oceanography

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

April

Traveler	Destination	Travel Begin	Travel End	Trip Purpose
Wang, Yujie	MD to Melbourne, Australia	4/1/18	4/11/18	Visit Australia Bureau of Meteorology to help them implement MAIAC algorithm for Himawari-8/9 data. (Mostly funded by ABM)
Delgado, Ruben	MD to Princeton, NJ	4/3/18	4/5/18	Present at International Offshore Wind Partnership Forum.
Casasanto, Valerie	Local - MD to DC	4/6/18	4/8/18	Booth at U.S. Science & Engineering Festival.
Lee, Jae	MD to Vienna, Austria	4/7/18	4/14/18	Attend/present at EGU 2018.
Hannun, Reem	MD to Palmdale, CA	4/8/18	4/14/18	NASA ATom-4 test flights.
Pavlis, Erricos	MD to Vienna, Austria	4/9/18	4/13/18	Attend EGU 2018, GGOS BNO & BPS mtgs & ILRS ASC meeting.
Borda, Roberto	MD to Argentina	4/13/18	4/24/18	Invited guest on Review Panel of SABIA-MAR Multispectral Camera Design. (Fully Funded)
Guimond, Stephen	MD to Jacksonville, FL	4/15/18	4/20/18	Attend/present 33rd Annual AMS Hurricane Conference.
Evans, Keith	Local - Annapolis, MD	4/18/18	4/20/18	Attend NASA's Earth Science Data Systems Working Group meeting.
Shie, Chung-Lin	Local Annapolis, MD	4/18/18	4/20/18	Attend NASA's Earth Science Data Systems Working Group meeting.
Casasanto, Valerie	Local - MD to DC	4/19/18	4/20/18	Booth at NASA Earth Day Events-Union Station.
Demoz, Belay	MD to Potsdam, GER	4/20/18	4/27/18	Organize/Chair/Present at the 10th GRUAN ICM Meetings.
Strow, Lawrence	PA to Pasadena, CA	4/24/18	4/28/18	Attend NASA AIRS Science Team Meeting.
Hannun, Reem	MD to Punta Arenas, Chile	4/26/18	5/13/18	Operate instruments for NASA's ATom-4 field campaign.
Robinson, Joseph	DC to Denver, CO	4/27/18	5/1/18	Exchange PANDORA instrumentation at NOAA Boulder to continue observations for Pandonia Global Network.
Martins, J. Vanderlei	Local - Greenbelt to Silver Spring, MD	4/30/18	5/2/18	Participation in the ACE Science Team Meeting.

## May

<b>Traveler</b>	<b>Destination</b>	<b>Travel Begin</b>	<b>Travel End</b>	<b>Trip Purpose</b>
Casasanto, Valerie	MD to Santa Maria, CA	5/1/18	5/6/18	Attend a site visit of Vandenberg Air Force launch site for the ICESat-2 mission.
Wolfe, Glenn	MD to Christchurch, NZ; Punta Arenas, Chile; Recife, BR...	5/2/18	5/12/18	ATom IV field deployment.
Prados, Ana	VA to Red Cliff, WI	5/8/18	5/11/18	Attend Stakeholder Meeting organized by NASA Applied Sciences Program.
Abuhassan, Nader	MD to Johannesburg, South Africa	5/13/18	5/25/18	Setup of a Pandora Spectrometer System and training of local scientists and instrument operators.
Yuan, Tianle	Bari, Italy	5/28/18	5/31/18	Invited talk at DUST2018 Meeting.

## June

<b>Traveler</b>	<b>Destination</b>	<b>Travel Begin</b>	<b>Travel End</b>	<b>Trip Purpose</b>
Zhang, Zhibo	MD to Hawaii	6/1/18	6/7/18	Attend AOGS annual meeting.
Herman, Jay	MD to Denver, CO	6/5/18	6/8/18	TEMPO Science Team Meeting.
Remer, Lorraine	MD to Hawaii	6/3/18	6/10/18	Attend/Present at AOGS meeting.
Yuan, Tianle	MD to Hawaii	6/3/18	6/13/18	Attend/Present at AOGS meeting
Campbell, Petya	VA to Zagreb, Croatia	6/9/18	6/15/18	Coordination of SCERIN-6 Workshop.
Guimond, Steve	MD to Oklahoma City, OK	6/11/18	6/15/18	Attend/Present at 23rd Symposium on Boundary Layers and Turbulence/21st Conference on Air-Sea Interaction.
Lewis, Jasper	MD to Bonn, Germany	6/11/18	6/16/18	Attend the European Space Agency EarthCARE Validation Workshop.
DeSouza-Machado, Sergio	MD to Cambridge, MA	6/12/18	6/15/18	Attend/Present at 15th International HITRAN Conference.
Hepplewhite, Christopher	La Grange, IL to Logan, UT	6/17/18	6/22/18	Attend/Present at CALCON Conference.



St. Clair, Jason	MD to Palmdale, CA	6/19/18	6/29/18	Prep instruments for SARP flights. De-install instruments from NASA DC-8 aircraft after ATom4 and SARP projects.
Wolfe, Glenn	MD to Palmdale, CA	6/19/18	6/29/18	Student Airborne Research Program (SARP)
Prados, Ana	Springfield, VA to Delft, Netherlands	6/23/18	7/14/18	Present at Global Flood Partnership Annual Meeting.
Tokay, Ali	MD to Utrecht, Netherlands	6/29/18	7/6/18	Present at ERAD 2018 Conference

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

**Recent Departmental Affiliations:** JCET faculty member Steven Guimond is now affiliated with the UMBC Physics Department.

**Courses taught by JCET Faculty & Staff in Spring 2018:**

GES 481/681: Remote Sensing, **P. Campbell** (3 credits)

PHYS 335: Physics and Chemistry of the Atmosphere, **R. Delgado/S. de Souza-Machado** (3 credits)

PHYS 622: Cloud Physics, **B. Demoz** (3 credits)

SOCY 101Y: Basic Concepts in Sociology, **K. Evans** (1 credit)

PHYS 650: JCET Seminar: Precipitation Science, **W. Olson** (1 credit)

HONR 300: Climate Change Policy, **A. Prados** (3 credits)

**JCET Seminar:**

The 2017-18 cohort of eight JCET graduate students participated in the JCET Seminar listed as graduate course PHYS 650, "Precipitation Science." This semester's seminar is delivered by Bill Olson (JCET). The JCET Seminar has become an important component in the professional development of these young scientists. The seminar series is open to the public and is coordinated by Dr. Susan Hoban, Associate Director of JCET.

Link to [Seminar schedule](#)

Link to [Seminar Website](#)

**JCET Student Activities:**

*JCET Graduate Fellowship for 2018-19 Announced*

Applications for the competitive JCET Graduate Fellowship were solicited, received and reviewed by the Fellowship Committee during this quarter. Ms. Qianqian Song, advised by Zhibo Zhang (Physics/JCET Fellow) was selected to be the JCET Graduate Fellow for academic year 2018-19. The JCET Graduate Fellowship provides a stipend for one year, health care and tuition for the awardee, as well as funds to travel to one conference to present their research.

### *Second Annual Earth Day Symposium*

The JCET graduate students coordinated the second annual Earth Day Symposium, held at UMBC on Friday, April 20<sup>th</sup>. The symposium was held in the Physics Building from 9 AM to 4 PM. The program included participants from Goddard, UMBC, the University of Maryland, George Mason University and Howard University and the local science community. The Symposium was open to the public.

### *JCET Minority University Outreach*

The Howard University students participating in the NASA MUREP MOO project participated in the Earth Day Symposium, thus contributing to JCET's ever-present efforts to strengthen the STEM pipeline for minority students.

### *Air-HARP Field Campaign*

Brent McBride, JCET/Physics PhD student advised by Vanderlei Martins (JCET Fellow), operated AirHARP on-board the B-200 and led field operations on the ground throughout the campaign, while Martins' group members engaged remotely from UMBC. Air-HARP is the version of the Hyper-Angular Rainbow Polarimeter (HARP) [designed and built by Martins' group as a CubeSat] adapted for aircraft use. While AirHARP does not have trace gas sensitivity, measurements of convective clouds and low aerosol levels over eastern Wisconsin will be compared to co-incident observations made by AERONET sun photometer sites and the Advanced Baseline Imager (ABI) on the GOES-R geosynchronous satellite.

## **REPORTED PUBLICATIONS : LISTING OF REPORTS AND ARTICLES**

- Borovoi, A., Konoshonkin, A., Kustova, N., **Veselovskii, I.** (in press). Contribution of corner reflections from oriented ice crystals to backscattering and depolarization characteristics for off-zenith lidar profiling. *Journal of Quantitative Spectroscopy & Radiative Transfer*.
- De Souza-Machado, S. G., Strow, L. L., Tangborn, A. V.,** Huang, X., Chen, X., Liu, X., Wu, W., Yang, Q. (2018). Single-footprint retrievals for AIRS using a fast TwoSlab cloud-representation model and the SARTA all-sky infrared radiative transfer algorithm. *Atmos Meas Tech*, 11(1), 529-550.
- Hearty, T., **Lee, J. N.** (2018). Intercomparison of Surface Temperatures from AIRS, MERRA, and MERRA-2, with NOAA and GC-Net Weather Stations at Summit, Greenland. *J. Appl. Meteor. Climatol.*, 0. [<https://doi.org/10.1016/j.jastp.2018.02.001>]
- Krisna, T. C., Wendisch, M., Ehrlich, A., Jäkel, E., **Werner, F.,** Weigel, R., Borrmann, S., Mahnke, C., Pöschl, U., Andrea, M. O., Voigt, C., Machado, L. A. T. (2018). Comparing Airborne and Satellite Retrievals of Optical and Microphysical Properties of Cirrus and Deep Convective Clouds using a Radiance Ratio Technique. *Atmos. Chem. Phys.*, 18, 4439-4462. [doi.org/10.5194/acp-18-4439-2018](https://doi.org/10.5194/acp-18-4439-2018)
- Veselovskii, I.,** Goloub, P., Podvin, T., Tanre, D., da Silva, A., Colarco, P., Castellanos, P., Korenskiy, M. (2018). Characterization of smoke/dust episode over West Africa: comparison of MERRA-2 modeling with multiwavelength Mie-Raman lidar observations. *Atmospheric measurements technique*, 11, 949-969.
- Wennberg, P. O., Bates, K. H., Crouse, J. D., Dodson, L. G., McVay, R. C., Mertens, L. A., Nguyen, T. B., Praske, E., Schwantes, R. H., Smarte, M. D., **St. Clair, J. M.,** Teng, A. P., Zhang, X., Seinfeld, J. H. (2018). Gas-Phase Reactions of Isoprene and Its Major Oxidation Products. *Chemical Reviews*, 118(7), 3337-3390. [pubs.acs.org/doi/abs/10.1021/acs.chemrev.7b00439](https://pubs.acs.org/doi/abs/10.1021/acs.chemrev.7b00439)

Whiteman, D., Perez-Ramirez, D., **Veselovskii, I.**, Colarco, P., Buchard, V. (2018). Simulations of spaceborne multiwavelength lidar measurements and retrievals of aerosol microphysics. *Journal of Quantitative Spectroscopy & Radiative Transfer*, 205, 27-39.

**Yuan, T.** (in press). On the global character of overlap between low and high clouds. *JGR*.

## **PERSONNEL:**

### ***LISTING OF PROMOTIONS:***

None this quarter.

### ***HIRES:***

None this quarter.

### ***DEPARTURES:***

Dr. Leonid Yurganov - May 15, 2018

Dr. Frank Werner - May 18, 2018

Mary Dawson - June 1, 2018

Dr. William Barnes - July 1, 2018

### ***FACULTY IN NEED OF FUNDING:***

Susan Hoban – working at 90%

Bill Olson - working at 85%

Chung-Lin Shie – working at 75%

Christopher Shuman – working at 25%

Huang Song – Current funding will be depleted in October 2018

Andrew Tangborn – working at 60%