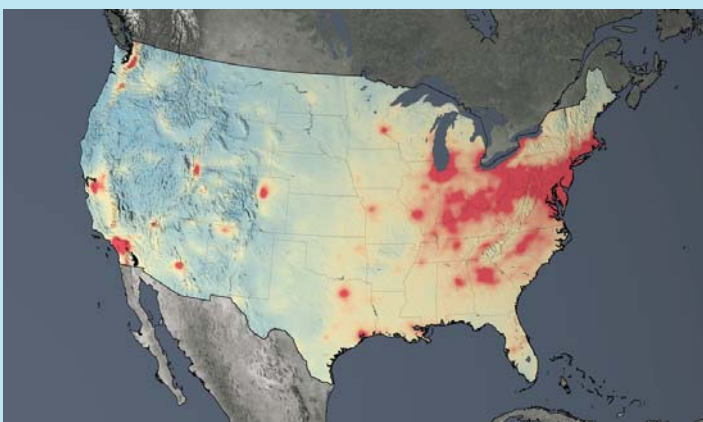


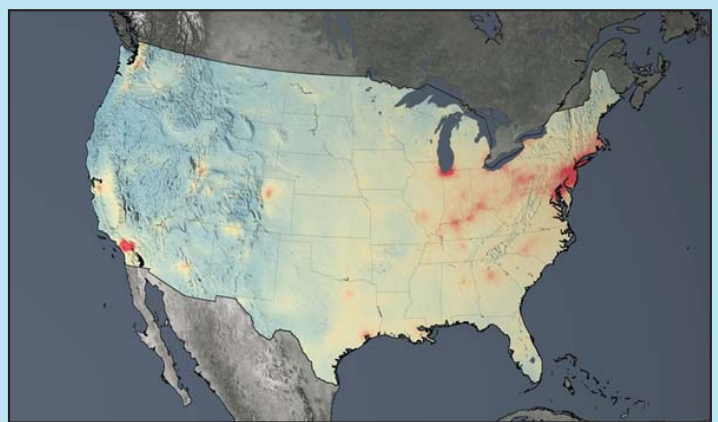
## Worldwide Measurements of NO<sub>2</sub> for 2005-2014

“Rise and fall in air pollution is a hallmark of industrialization, economic activity, and even civil unrest – and it can have far-reaching effects on human health and the environment,” according to **Lok Lamsal** (USRA/614). He and his colleagues at NASA analyze observations of nitrogen dioxide (NO<sub>2</sub>) made by the Ozone Monitoring Instrument (OMI) aboard the Aura satellite and show how NASA’s Aura missions have helped track global pollution trends. Dr. Lamsal led an initial investigation on air pollution trends over US cities, which was published in the journal *Atmospheric Environment* in 2015. This work was expanded to world cities by him and his colleague Bryan Duncan at NASA Goddard Space Flight Center. The 2015 AGU Fall meeting featured the study led by Dr. Duncan on the effects of NO<sub>2</sub> on global air quality in an AGU press release: <http://fallmeeting.agu.org/2015/press-item/global-air-quality-the-impact-of-people-and-cities/>, and was featured on the NASA site: <http://www.nasa.gov/press-release/new-nasa-satellite-maps-show-human-fingerprint-on-global-air-quality>. This study, published in the *Journal of Geophysical Research*, gained much attention: Duncan, B. N., L. N. Lamsal, A. M. Thompson, Y. Yoshida, Z. Lu, D. G. Streets, M. M. Hurwitz, and K. E. Pickering (2016), A space-based, high-resolution view of notable changes in urban NO<sub>x</sub> pollution around the world (2005–2014), *J. Geophys. Res. Atmos.*, 121, 976–996, doi:10.1002/2015JD024121. According to Dr. Duncan, “The United States and Europe [which] are among the largest emitters of nitrogen dioxide ... showed the most dramatic reductions between 2005 and 2014. Researchers concluded that the reductions are largely due to the effects of environmental regulations that require technological improvements to reduce pollution emissions from cars and power plants.”

Drs. Lamsal and Duncan provided the scientific data for animator **Trent Schindler** and producer **Kayvon Sharghi** to create the maps and videos illustrating the changes in NO<sub>2</sub> for 2005-2014 in “NASA Images Show Human Fingerprint on Global Air Quality – Release Materials” (see <http://svs.gsfc.nasa.gov/12094>).



*Nitrogen dioxide concentrations across the United States, averaged over 2005. Image Credit: SVS, NASA Goddard Space Flight Center.*



*Nitrogen dioxide concentrations across the United States, averaged over 2014. Image Credit: SVS, NASA Goddard Space Flight Center.*

Recently, Dr. Duncan, Dr. Lamsal and other colleagues developed a new website, Air Quality from Space, <http://airquality.gsfc.nasa.gov/>, which is specifically devoted to nitrogen dioxide. While the target audience is health and air quality managers, anyone who visits this site has access to data on this atmospheric pollutant from a domestic and worldwide perspective, from US cities to US Power Plants, from World Cities to World Regions. This site also provides  
*(cont'd on page 2)*

*(NO<sub>2</sub> Measurements, cont'd)*

links to two free NASA resources: 1) the NASA Air Quality Applied Sciences Team (AQAAT), “who will work with you on your air quality issues using a combination of satellite data, surface data, and models”, and 2) the NASA Applied Remote Sensing Training (ARSET). (Pawan Gupta leads the ARSET Air Quality Training Sessions at NASA GSFC - see below.)

*(Note: Read about previous NO<sub>x</sub> research by Lok Lamsal in GESTAR Newsletter, Vol. 3, Issue 2, Summer 2014.)*

## **Gupta Leads Air Quality Training Program**

NASA's Applied Remote Sensing Training program (ARSET) aims to increase the use of NASA earth science and model data by policy makers, regulatory agencies, and other applied science professionals in the areas of health and air quality, water resources, ecoforecasting, and disaster management. During the training sessions, the program leads teach participants how to search, access, and download NASA data products and imagery, and how to use and interpret satellite imagery. Training sessions are held online via webinars and in person at workshops, and are available for the following applications: Health and Air Quality (Lead: **Pawan Gupta**, USRA/614), Disasters (Leads: Amita Mehta and Ana Prados), Eco Forecasting (Lead: Cindy Schmidt) and Water Resources (Leads: Amita Mehta and Ana Prados). Dr. Prados is the program manager for the entire ARSET program. At present, there are approximately 17 ARSET team members who can be found at NASA GSFC, JPL, NASA Ames, and NASA Marshall.

For his Health and Air Quality Program, Dr. Gupta's course topics include the following: case studies in air quality analysis, such as urban air pollution, dust and smoke from fires; satellite aerosols and trace gas products, their application and relationship to in-situ monitor data; long-range transport of atmospheric aerosols (or particulate matter) and trace gases; satellite and regional air quality model comparisons; and long-term trends of air quality.

On November 10th, the NASA ARSET Program hosted the first meeting of the Air Quality Working Group (AQWG) at Goddard, where the goal was to facilitate communication among NASA scientists, NASA data product and tool developers, and applied science professionals. NASA scientists and data providers learned about ARSET's air quality trainings and shared information on existing and future NASA air quality products and tools for air quality applications. The meeting also established ways ARSET and AQWG members can work together. Attendees represented a mix of the NASA Goddard population, with people from Codes 586, 610, 612, 613 and 614 and from NASA HQ, along with ARSET team members Dr. Gupta, Ana Prados, and Elizabeth Hook (all from Code 614).

For more information on upcoming workshops and webinars, visit the ARSET website at <http://arset.gsfc.nasa.gov/>. Regarding future Air Quality Working Group meetings, contact Dr. Gupta at [pawan.gupta@nasa.gov](mailto:pawan.gupta@nasa.gov).

## **maniac talks**

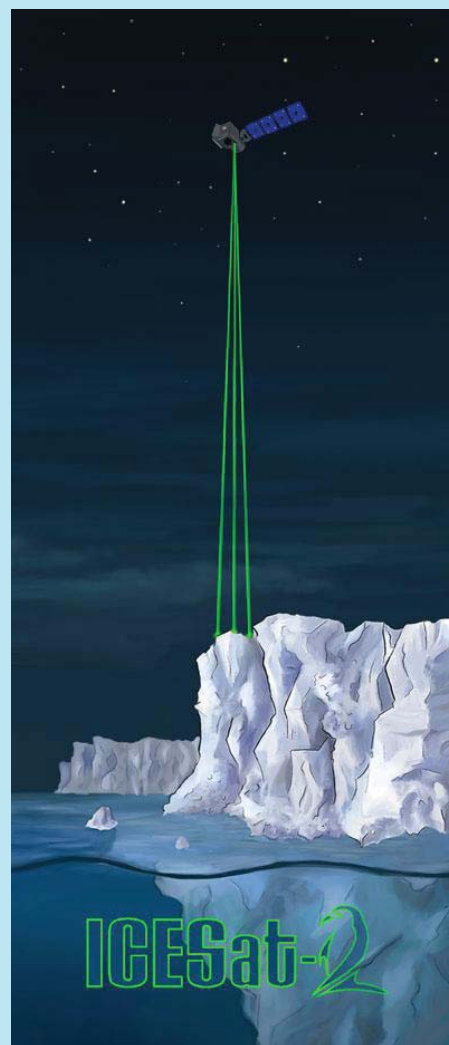
GESTAR thanks the following scientists who presented talks over the winter: *Dr. Spiro Antiochos*, Chief Scientist, Heliophysics Division, GSFC (Nov 2015); *Dr. David Miller*, NASA Chief Technologist, NASA HQ (Dec 2015); *Dr. Ralph Kahn*, Climate & Radiation Laboratory, GSFC (Feb 2016); *Dr. Joel Susskind*, Earth Sciences Division, GSFC (Feb 2016).

These and other previous talks can be viewed online at the Maniac Talk site: <http://maniactalk.gestar.usra.edu/> or the NASA Goddard Atmospheric Sciences page: <http://atmospheres.gsfc.nasa.gov/ext/maniacs/>. Please visit these sites to review the 2016 lineup. Thanks to **Charles Gatebe** and Bill Hyrbyk, respectively, for their continued hosting and scheduling plus video-recording of these events.

## From SCAD to GSFC by way of ICESat-2

In January 2014, after spending six months on program development, Helen-Nicole Kostis launched the ICESat-2 Collaborative Student Pilot Project with two academic institutions: Savannah College of Art & Design in Atlanta and Savannah in Georgia and Bowling Green State University in Ohio. Courses were tailored for the purposes of this project in collaboration with digital media faculty (Deborah Fowler and Clarke Stallworth at SCAD; Bonnie Mitchell and Kim Young at BGSU). The pilot program ended in June 2014, but the program was fully realized in September 2014 with students and faculty continuing to work toward the development of innovative outreach concepts and products for the ICESat-2 mission. In late 2014, Ms. Kostis delivered the following to the ICESat-2 team: 1) a 1.5-minute-long animation, 2) two characters/mascots for the mission, 3) a poster, 4) a lenticular bookmark, 5) design of the new ICESat-2 website.

In early 2015, she worked with three SCAD students for the development of a double-sided poster for the ICESat-2 mission (*image at right*). One of those students was **Adriana Manrique Gutierrez** (SCAD Savannah), who was an integral part of this ICESat-2 student program. Ms. Kostis cites Adriana's involvement with the program since its inception and her familiarity with its efforts, along with her "diversity of skills in engaging various audiences with alternate products". Additionally, Adriana's experience demonstrated the goal of "the pipeline", i.e., beginning as a university student, participating in a program successfully, either as part of a pilot project or an internship, and becoming a full-time employee. It may have taken two years, but the journey along the pipeline reached a conclusion when, in December 2015, after graduating in the fall, Adriana joined GESTAR at NASA Goddard Space Flight Center, working with Dr. Thorsten Markus in Code 615, Cryospheric Sciences Laboratory, and Wade Sisler in Code 130, Office of Communications.



## New Hires

GESTAR welcomes the following members:

- Tobias Bollian** (Code 618)
- David Carvalho** (Code 610.1)
- Javier Concha** (Code 616)
- Adriana Manrique Gutierrez** (Codes 615 & 130)
- Anika (Cartas) Halota** (Code 618)
- Katrina Jackson** (Code 130)
- Jin Liao** (Code 614)
- Yingxi Shi** (Code 613)
- Debra Matthews** (GESTAR Senior Administrative Assistant)

## Moving On

- Matthew Burger** (Space Telescope Science Institute)
- Gabrielle De Lannoy** (Assoc. Professor, Univ. of Leuven, Division of Soil & Water Management)
- Krystofer Kim**
- Batuhan Osmanoglu** (Accepted a Civil Servant position)
- Daniel Perez-Ramirez**

## Awards Ceremonies

On Thursday, January 21st, NASA Goddard's Global Modeling and Assimilation Office (GMAO) held its All Hands Meeting and annual Peer Awards Ceremony. Among this year's awardees were four GESTAR scientists, who also received certificates of commendation and individual monetary awards from GESTAR representatives.

For Scientific Achievement:

**Nikki Privé** (GESTAR/MSU): "For your outstanding work in developing and validating the GMAO OSSE system, including detailed examination of the use of the G5NR nature run for generating synthetic observations."

**Young-Kwon Lim** (GESTAR/MSG): "For exceptional scientific achievements spanning numerous subjects, including high-resolution tropical cyclone simulations, Arctic climate variability, planetary-scale teleconnections and associated Rossby wave dynamics, and extreme weather events. Dr. Lim also authored or co-authored seven peer-reviewed articles in 2015."

**Virginie Buchard-Marchant** (GESTAR/USRA): "For sustained excellence in evaluating GEOS-5 aerosol reanalysis products and for significant contribution to lidar simulators in support of the CATS and ACE missions."

For Outstanding Scientific Contribution by a New GMAO Member:

**Patricia Castellanos** (GESTAR/USRA): "For successful development of geostationary instrument simulators and generation of synthetic observations for the TEMPO, GOES-R, GEMS and SENTINEL-4 satellites."

Later in January on Friday the 29th, Goddard's Climate and Radiation Laboratory (Code 613) held its annual party as well as an awards ceremony at the Rec Center at NASA GSFC. Dr. Lazaros Oreopolous, Lab Chief, presented each recipient with a plaque. Dr. Yuekui Yang represented GESTAR and presented the following awardee with a certificate:

*(Awards Ceremonies, cont'd)*

Best First Authored Paper:

**Andrew Sayer** (GESTAR/USRA) "For excellent and innovative investigations into the physical and radiative properties of tropospheric aerosols and enhancing their retrievals from satellites"

GESTAR congratulates all of the awardees on their well-deserved recognition.

## Grants Awarded

**Ludovic Brucker** (Co-I) (USRA/615), (PI: Stephen Munchak, Univ. of MD College Park, ESSIC), Precipitation Measurement Missions Science Team, Improved Representation of Active and Passive Surface Characteristics in the GPM DPR-GMI Combined Precipitation Algorithm, Jan 2016 - Dec 2018.

**Charles Gatebe** (PI) (USRA/613) - Ocean Color: Simultaneous Marine and Aerosol Retrieval Tool for Characterizing a Geostationary Coastal Ocean Color Sensor, a two-year grant that will support the GEO-CAPE Korean Ocean Color field campaign in coastal Korean waters (called KORUS-OC).

**Mircea Grecu** (PI) (MSU/612), Improved radar models and parameterizations for the GPM combined algorithm, Feb 2016 to Feb 2019.

**Min-Jeong Kim** (PI) (MSU/610.1), All-sky GPM Microwave Imager (GMI) radiance data assimilation products from the GEOS-5 system in support of the GPM mission, Feb 2016 to Feb 2019.

**David Lagomasino** (PI) (USRA/618) - NASA/The New (Early Career) Investigator Program (NIP) in Earth Science. Project title: Linking Carbon and Water Dynamics in the Pursuit of Predicting Peat Collapse in Coastal Blue Carbon Wetland, Sept 2016 - Sept 2019.

*(cont'd on page 6)*

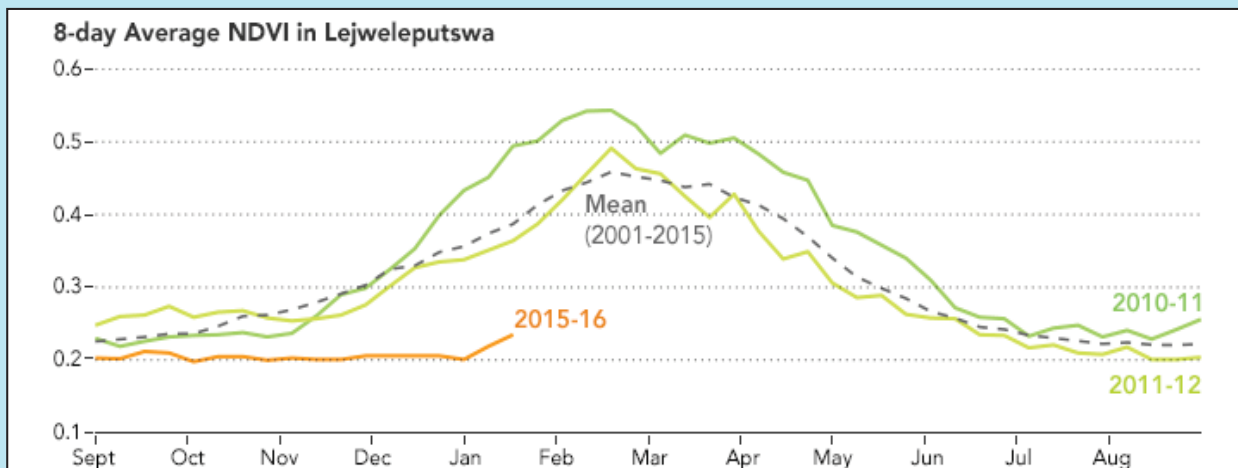
## Anyamba Contributes to EO Image of the Day

On February 3, 2016, the Earth Observatory (EO) posted a story on drought in Southern Africa as its Image of the Day (IOTD). Assaf Anyamba, Jennifer Small and Ed Pak (all of Code 618) provided normalized difference vegetation index (NDVI) and land surface temperature (LST) anomaly data for this article, which highlighted the El Niño-related large-scale drought in Southern Africa (see <http://earthobservatory.nasa.gov/IOTD/view.php?id=87434>). This work is part of the researchers' support to the USDA Foreign Agricultural Service - International Production Assessment Division (USDA/FAS-IPAD) through the Global Agricultural Monitoring (GLAM) system portal: <http://glam1.gsfc.nasa.gov/>. The mission of USDA/FAS/IPAD is to provide objective, timely, and regular assessment of the global agricultural production outlook and conditions affecting global food security, and near-real time global satellite monitoring of agricultural growing conditions is a critical component of these efforts. GLAM provides MODIS imagery using Terra and Aqua satellite information and visualizes MODIS NDVI time series. The GLAM web-based application system was developed by the GIMMS group at Goddard.

Dr. Anyamba explains: "When taken as time series measurements, whether every 8-days or monthly over a long time period, anomalies of either NDVI or LST provide early indicators of regions that are likely to have bumper harvests or reduced harvest due to drought conditions. In a large area of the global tropics, including Southern Africa, Australia and Brazil, variations in agricultural production are in part influenced by the El Niño Southern Oscillation (ENSO) phenomenon. Southern Africa usually experiences drought conditions during El Niño years, and that has been the case during this year's (2015-2016) event. The manifestations of the event are noted by below normal rainfall, higher than normal land surface temperatures, reduced photosynthetic capacity of vegetation shown by negative anomalies in NDVI and expected reduction in agricultural production of various crops."

In the EO IOTD feature, Dr. Anyamba noted that "some areas were hit particularly hard by the drought, [including] Lejweleputswa, a district in northwest Free State. This graph shows how the NDVI for Lejweleputswa this season compares to previous seasons and to the mean from 2001–2015 (dashed gray line)." This drought may see an increase in regional prices of various crop commodities as a result of reduced production. Such information is useful in determining the supply and demand of various agricultural commodities worldwide.

*(Note: Dr. Anyamba's work on drought in Southern Africa was featured in GESTAR Newsletter, Vol. 4, Issue 1, Winter 2015.)*



*(Image from Earth Observatory, with permission from A. Anyamba.)*

*(Grants Awarded, cont'd)*

**Xiaowen Li** (PI) (MSU/612), Constraining ice-particle collection efficiency using TRMM/GPM observations, field campaign data, and cloud models with explicit bin microphysics, Feb 2016 to Feb 2019.

**Liang Liao** (PI) (MSU/612), Rain and snow particle size distribution models and their application to the DPR retrieval Algorithm, Feb 2016 to Feb 2019.

**Edward Nowottnick** (PI) (USRA/614) — NASA/ The New (Early Career) Investigator Program (NIP) in Earth Science. Project title: Investigating Future Spaceborne Lidar Aerosol Typing Capabilities Using Improved Aerosol Optical Properties in the NASA GEOS-5 AGCM, Mar 2016 - Mar 2019.

**Xiping Zeng** (PI) (MSU/612), Using GPM data to examine the effects of cloud dynamics on microphysics, Feb 2016 to Feb 2019.

## Congresswoman Edwards meets with MSU students at USRA

On November 12, 2015, Congresswoman Donna Edwards visited USRA and met with student researchers from Morgan State University who were mentored by various GESTAR scientists and who presented posters of their science research. The Congresswoman also met with high school students who are part of local robotics teams. USRA recently opened a STEM Education Center at its headquarters in Columbia, Maryland, which will provide space for students to conduct robotics work. After engaging with the high school students and operating a robot, she spent time talking with MSU students about their posters and experiences at NASA GSFC.

The MSU student researchers who attended were **Ahmed Abdelmohssen, Rochelle Bailey, Ozaveshe Daniyan, Camilo Diaz, Cherif Haidara, Alexander Newman** and **Tunji Ogiefu**, along with MSU students **Isaiah Aina, Veronique Amang, Drew Grant, Benjamin Hall, Kelechi Neachukwu** and **Randeep Pannu**. MSU administration and staff in attendance included **David Wilson** (President, MSU) along with **Rhonda Billingslea, Dean Collins, Jeffrey Copeland, Victor McCrary, Marvin Perry** and **Gerald Whitaker**. GESTAR members included **Hiren Jethva** (USRA/614), **Daniel Laughlin** (MSU) Program Manager, **Batuhan Osmanoglu** (USRA/618) and **Roger Shi** (MSU/612).



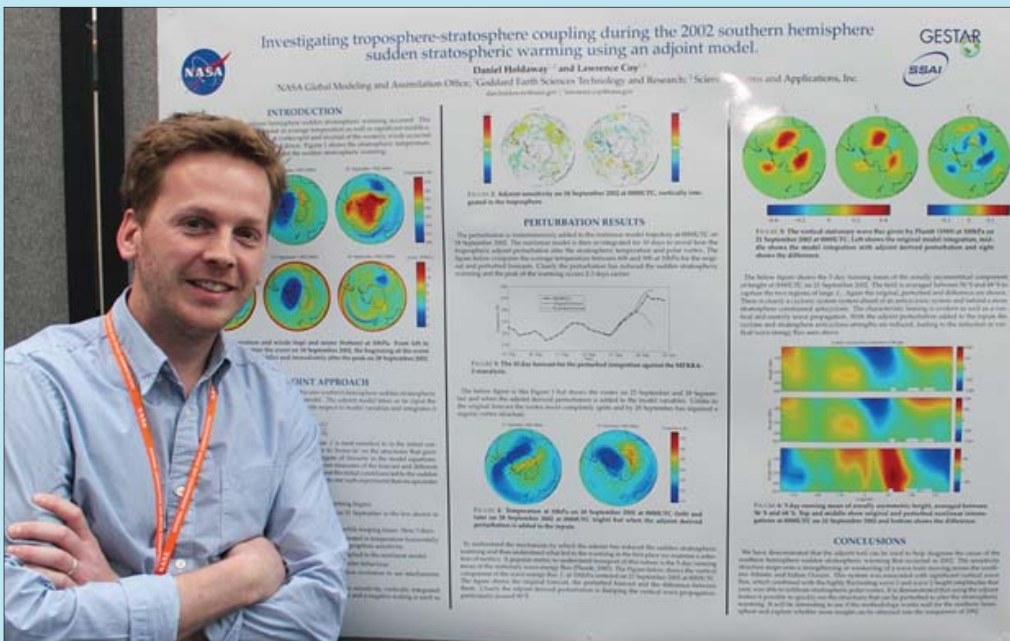
*Ahmed Abdelmohssen (worked with Matthew Kowalewski (614/USRA) presenting to David Cummings and Martin Ruzek, both of USRA HQ. (Image provided by USRA.)*



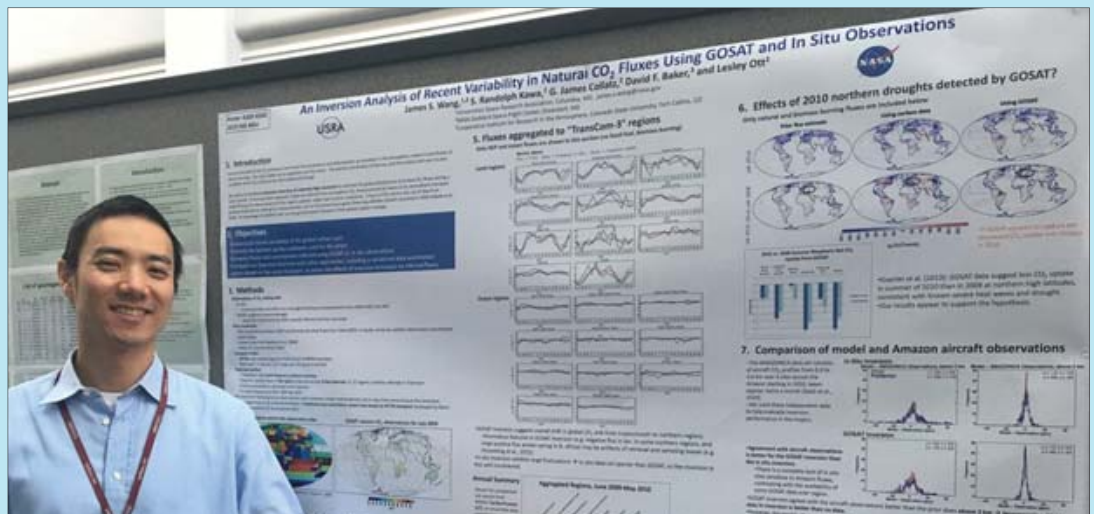
*Camilo Diaz (worked with Ludovic Brucker (615/USRA) presenting to Vince DeFrancisci (USRA HQ) and Anthony Thornton (USRA/Houston). (Image provided by USRA.)*

## SED Poster Party

This year's annual Sciences and Exploration Directorate (SED) Poster Party was held in the Atrium of Building 28 at NASA GSFC on Wednesday, January 27th. Of the 176 poster presentations on display, 14 were presented by the following GESTAR members: Valentina Aquila (614), Yehui Chang (610.1), Jarrett Cohen (606), Allison Collow (610.1), Melanie Follette-Cook (614), Manuela Giroto (610.1), Daniel Holdaway (610.1), Maggie Hurwitz (614), Young-Kwon Lim (610.1), Charles Malespin (699), Tom Oda (610.1), Cecile Rousseaux (610.1), Adrian Southard (699) and James Wang (614). In addition, several GESTAR members were co-authors of poster presentations at the event. (See additional photos on page 8.)

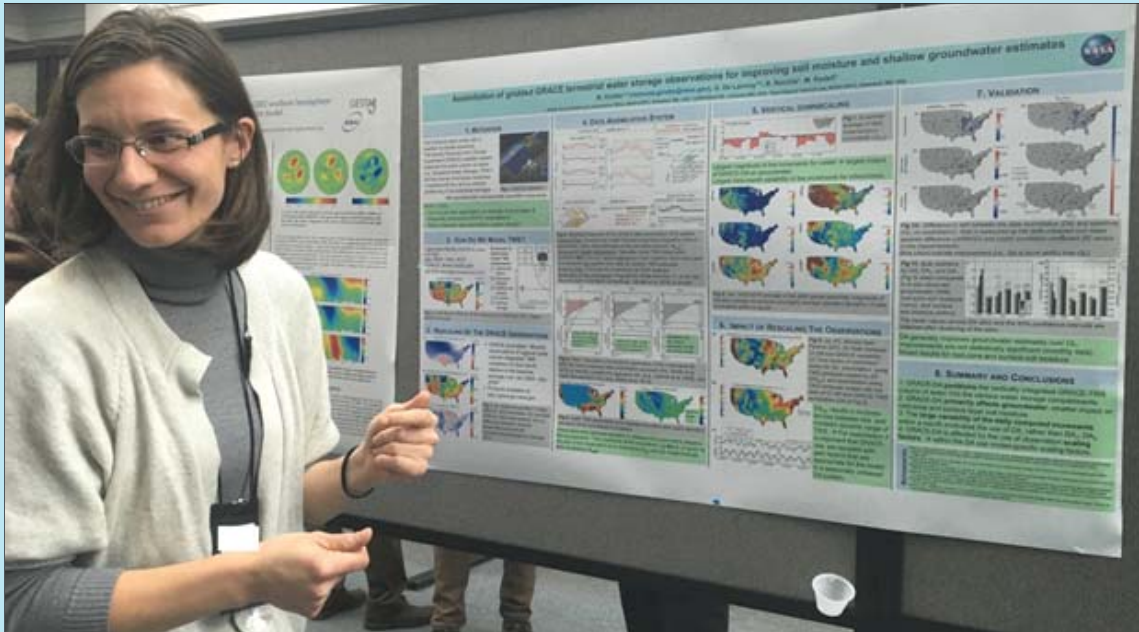


Daniel Holdaway alongside his poster "Investigating troposphere-stratosphere coupling during the 2002 southern hemisphere sudden stratospheric warming using an adjoint model". (Image Credit: C. Rousseaux/USRA)

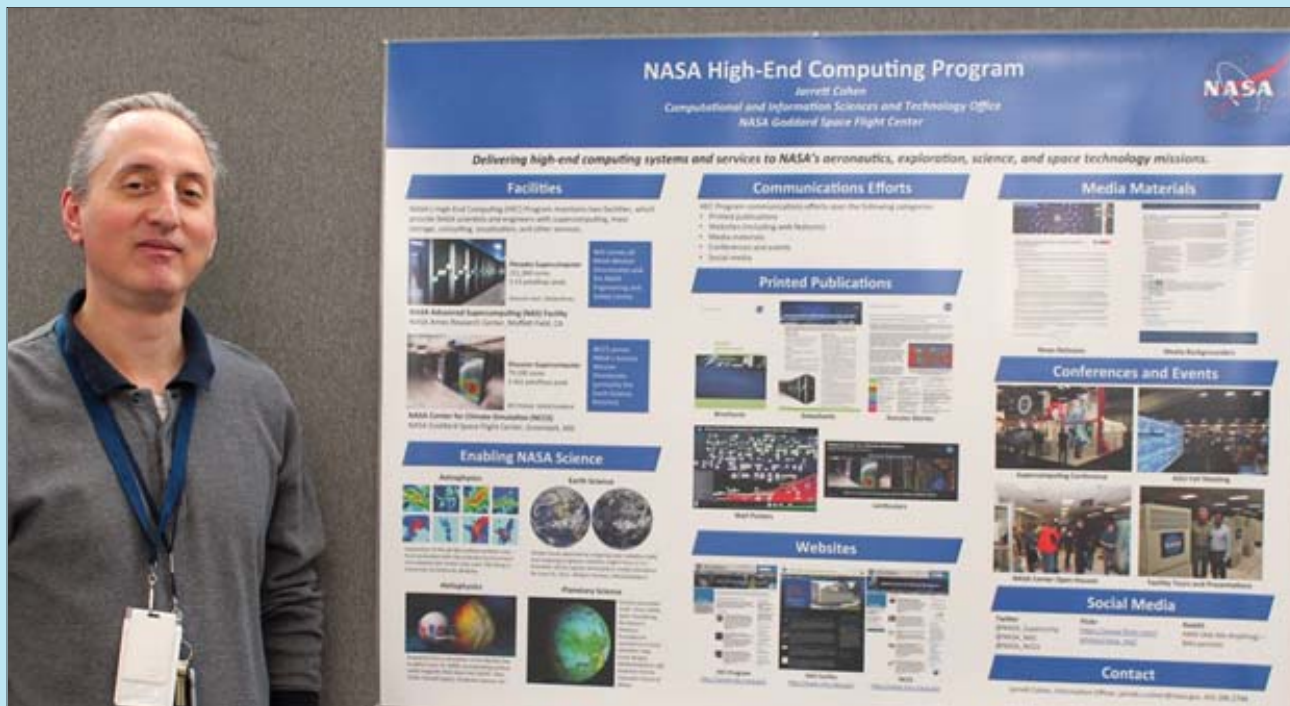


James Wang with his poster titled "An Inversion Analysis of Recent Variability in Natural CO2 Fluxes Using GOSAT and In Situ Observations". (Image Credit: C. Rousseaux/USRA)

*(Poster Party, cont'd)*



*Manuela Girotto was lead author on this poster titled “Assimilation of gridded GRACE terrestrial water storage observations for improving soil moisture and shallow groundwater estimates”. (Image Credit: C. Rousseaux/USRA)*



*Jarrett Cohen authored and presented a poster on the “NASA High-End Computing Program”. (Image provided by J. Cohen/GST)*



## Recent Publications

**Buchard, V., A. M. da Silva, C. A. Randles, P. Colarco, R. Ferrare, J. Hair, C. Hostetler, J. Tackett, and D. Winker** (2016), Evaluation of the surface PM<sub>2.5</sub> in Version 1 of the NASA MERRA Aerosol Reanalysis over the United States, *Atmos. Environ.*, 125, 100-111, doi:10.1016/j.atmosenv.2015.11.004.

**Burkholder, J. B., S. P. Sander, J. Abbatt, J. R. Barker, R. E. Huie, C. E. Kolb, M. J. Kurylo, V. L. Orkin, and D. M. Wilmouth** (2015), Chemical Kinetics and Photochemical Data for Use in Atmospheric Studies, Evaluation No. 18 of the NASA Panel for Data Evaluation, JPL 15-10, 1-1395.

**Ding, J., P. Yang, R. Holz, S. Platnick, K. Meyer, M. Vaughan, Y. X. Hu, and M. D. King** (2016), Ice Cloud Backscatter Study and Comparison with CALIPSO and MODIS Satellite Data, *Optics Express*, Vol. 24, No. 1, 620-636, doi:10.1364/OE.24.000620.

**Draper, C., and R. Reichle** (2015), The impact of near-surface soil moisture assimilation at sub-seasonal, seasonal, and inter-annual time scales, *Hydrol. Earth Syst. Sci.*, Vol. 19, 4831-4844, doi:10.5194/hess-19-4831-2015.

**Duncan, B. N., L. N. Lamsal, A. M. Thompson, Y. Yoshida, Z. Lu, D. G. Streets, and M. M. Hurwitz** (2016), A space-based, high-resolution view of notable changes in urban NO<sub>x</sub> pollution around the world (2005-2014), *Journal Geophysical Research-Atmospheres*, doi:10.1002/2015JD024121.

**Fan, Y., W. Li, K. J. Voss, C. Gatebe, and K. Stamnes** (2015), A neural network method to correct bidirectional effects in water-leaving radiance, *Applied Optics*, Vol. 55, No. 1, <http://dx.doi.org/10.1364/AO.55.000010>.

**Ganeshan, M. and R. Murtugudde** (2015), Nocturnal propagating thunderstorms may favor urban "hot-spots": A model-based study over Minneapolis, *Urban Climate*, Vol. 14, Part 4, 606-621, <http://dx.doi.org/10.1016/j.uclim.2015.10.005>.

**Grotjahn, R., R. Black, R. Leung, M. F. Wehner, M. Barlow, M. Bosilovich, A. Gershunov, W. Gutowski, J. Gyakum, R. Katz, Y. Lee, Y.-K. Lim, and A. Prabhat** (2016), North American extreme temperature events and related large-scale meteorological patterns: Statistical methods, dynamics, modeling, and trends, *Climate Dynamics*, Vol. 46, No. 3, 1151-1184, doi:10.1007/s00382-015-2638-6.

**Hioki, S., P. Yang, B. A. Baum, S. Platnick, K. G. Meyer, M. D. King, and J. Riedi** (2015), Degree of ice particle surface roughness inferred from polarimetric observations, *Atmos. Chem. Phys. Disc.*, Vol. 15, 34283-34323, doi:10.5194/acpd-15-34283-2015.

**Holdaway, D. and Y. Yang** (2016), Study of the Effect of Temporal Sampling Frequency on DSCOVR Observations Using the GEOS-5 Nature Run Results (Part I): Earth's Radiation Budget, *Remote Sens.*, 8(2), 98; doi:10.3390/rs8020098.

**Kirschbaum, D., T. Stanley, and Y. Zhou** (2015), Spatial and temporal analysis of a global landslide catalog, *Geomorphology*, Vol. 249, 4-15, doi:10.1016/j.geomorph.2015.03.016.

**Kumar, S., C. Peters-Lidard, J. Santonello, R. Reichle, C. Draper, R. Koster, G. Nearing, and M. Jasinski** (2015), Evaluating the utility of satellite soil moisture retrievals over irrigated areas and the ability of land data assimilation methods to correct for unmodeled processes, *Hydrol. Earth Syst. Sci.*, Vol. 19, 4463-4478, doi:10.5194/hess-19-4463-2015.

**Lim, Y.-K., S. D. Schubert, S. M. J. Nowicki, J. N. Lee, A. M. Molod, R. I. Cullather, B. Zhao, and I. Velicogna** (2016), Atmospheric summer teleconnections and Greenland ice sheet surface mass variations: insights from MERRA-2, *Environ. Res. Lett.*, 11(2), doi:10.1088/1748-9326/11/2/024002.

*(Publications, cont'd)*

Lin, Z., W. Li, C. K. Gatebe, R. Poudyal, and K. Stamnes (2016), Radiative transfer simulations of the two-dimensional ocean glint reflectance and determination of the sea surface roughness, *Applied Optics*, Vol. 55, No. 6, 1206-1215, doi:10.1364/AO.55.001206.

Liu, J., J. M. Rodriguez, A. M. Thompson, J. A. Logan, A. R. Douglass, M. A. Olsen, S. D. Steenrod, and F. Posny (2016), Origins of tropospheric ozone interannual variation over Réunion: A model investigation, *Journal Geophysical Research - Atmospheres*, Vol. 121, No. 121, 521-537, doi:10.1002/2015JD023981.

Ma, Z., X. Hu, A.M. Sayer, R. Levy, Q. Zhang, Y. Xue, S. Tong, J. Bi, L. Huang, and Y. Liu (2016), Satellite-based spatiotemporal trends in PM<sub>2.5</sub> concentrations: China, 2004–2013, *Environ. Health Perspect.*, 124 (2), 184-192, doi:10.1289/ehp.1409481.

Meyer, K., S. Platnick, G. T. Arnold, R. E. Holz, P. Veglio, J. Yorks, and C. Wang (2016), Cirrus cloud optical and microphysical property retrievals from eMAS during SEAC4RS using bi-spectral reflectance measurements within the 1.88 $\mu$ m water vapor absorption band, *Atmos. Meas. Tech. Disc.*, doi:10.5194/amt-2015-326.

Privé, N. C., and R. M. Errico (2016), Temporal and Spatial Interpolation Errors of High-Resolution Modeled Atmospheric Fields, *Journal of Atmospheric and Oceanic Technology*, Vol. 33, 303-311, doi:10.1175/JTECH-D-15-0132.1.

Sayer, A. M., N. C. Hsu, and C. Bettenhausen (2015), Implications of MODIS bow-tie distortion on aerosol optical depth retrievals, and techniques for mitigation, *Atmos. Meas. Tech.*, Vol. 8, 5277-5288, doi:10.5194/amt-8-5277-2015.

Sayer, A. M., N. C. Hsu, C. Bettenhausen, M. Jeong, and G. Meister (2015), Effect of MODIS Terra radiometric calibration improvements on Collection 6 Deep Blue aerosol products: Validation and Terra/Aqua consistency, *Journal Geophysical Research - Atmospheres*, doi:10.1002/2015JD023878.

Soebiyanto, R. P., W. A. Clara, J. Jara, A. Balmaseda, J. Lara, M. L. Moya, R. Palekar, M. Widdowson, E. Azziz-Baumgartner, and R. Kiang (2015), Associations between seasonal influenza and meteorological parameters in Costa Rica, Honduras and Nicaragua, *Geospatial Health*, Vol. 10, No. 2, doi:org/10.4081/gh.2015.372.

Tao, Z., H. Yu, and M. Chin (2016), Impact of transpacific aerosol on air quality over the United States: A perspective from aerosol-cloud-radiation interactions, *Atmospheric Environment*, 125: 48-60, 2016, doi:10.1016/j.atmosenv.2015.10.083.

*Mark your calendars for GESTAR's  
5<sup>th</sup> Anniversary Celebration  
on Monday, May 9, 2016!*

## GESTAR's Winter Holiday Party, Nov 23, 2015 at the NASA GSFC Rec Center



*Yuekui Yang and Andy Sayer (USRA/613). (Image Credit: A. Houghton)*



*Gabrielle De Lannoy and Joanna Pelc (USRA/610.1 - note, Dr. De Lannoy is now in Belgium). (Image Credit: A. Houghton)*



*Xiaowen Li (MSU/612) and Radina Soebiyanto (USRA/610.2). (Image Credit: A. Houghton)*



*Santiago Gassó (MSU/614), Daniel Laughlin (MSU, Program Mgr.) and Mircea Grecu (MSU/612). (Image Credit: A. Houghton)*

*The GESTAR Team:* Universities Space Research Association (USRA), Morgan State University (MSU), I.M. Systems Group (IMSG), Johns Hopkins University (JHU), Global Science & Technology, Inc.(GST), Institute for Global Environmental Strategies (IGES), and Ball Aerospace and Technologies.  
Visit us at <http://gestar.usra.edu/>.

*The GESTAR Newsletter is published by GESTAR/USRA. Any comments/suggestions/ideas can be forwarded to Amy Houghton, Editor at [ahoughton@usra.edu](mailto:ahoughton@usra.edu).*