

SPoRT Quarterly
July – September 2017

The SPoRT REPORT

Join SPoRT on:
NWSChat @ nasa_sport, @NASA_SPoRT on Twitter,
or blog with us @ <http://nasa sport.wordpress.com/>

Short-term Prediction Research and Transition (SPoRT) Center
NASA Marshall Space Flight Center (MSFC), Huntsville, AL
<http://weather.msfc.nasa.gov/sport/>

The SPoRT Center is a NASA- and NOAA-funded project to transition unique observations and research capabilities to the operational community to improve short-term weather forecasts on a regional scale. While the direct beneficiaries of these activities are selected NOAA Weather Forecast Offices (WFOs) and National Centers, the research leading to the transitional activities benefits the broader scientific community.

Quarterly Highlights

Latest Development Updates for SPoRT-LIS

A parallel, offline version of the real-time Land Information System (LIS) run at SPoRT (i.e., “SPoRT-LIS”) has been implemented that includes data assimilation of Soil Moisture Active Passive (SMAP) enhanced resolution retrievals. In 2015, NASA launched the Soil Moisture Active Passive (SMAP) satellite, which provides near real-time global coverage of soil moisture retrievals each day. This spring, SPoRT

has implemented real-time data assimilation of SMAP soil moisture retrievals into an experimental configuration of the SPoRT-LIS, which is currently being refined and validated quantitatively. The SMAP data assimilation application is part of a NASA ROSES funded effort awarded to the SPoRT team under the Science Utilization of SMAP Mission 2015 solicitation. The SMAP-LIS run assimilates the

first public version of the Enhanced-resolution Level 2 Radiometer soil moisture retrievals, obtained from the National Snow and Ice Data Center. The Enhanced retrieval is delivered on a 9-km Equal-Area Scalable Earth Grid (EASE-Grid), based on Backus-Gilbert interpolation from the SMAP radiometer’s native 36 km resolution. Data assimilation into the Noah land surface model uses the Ensemble

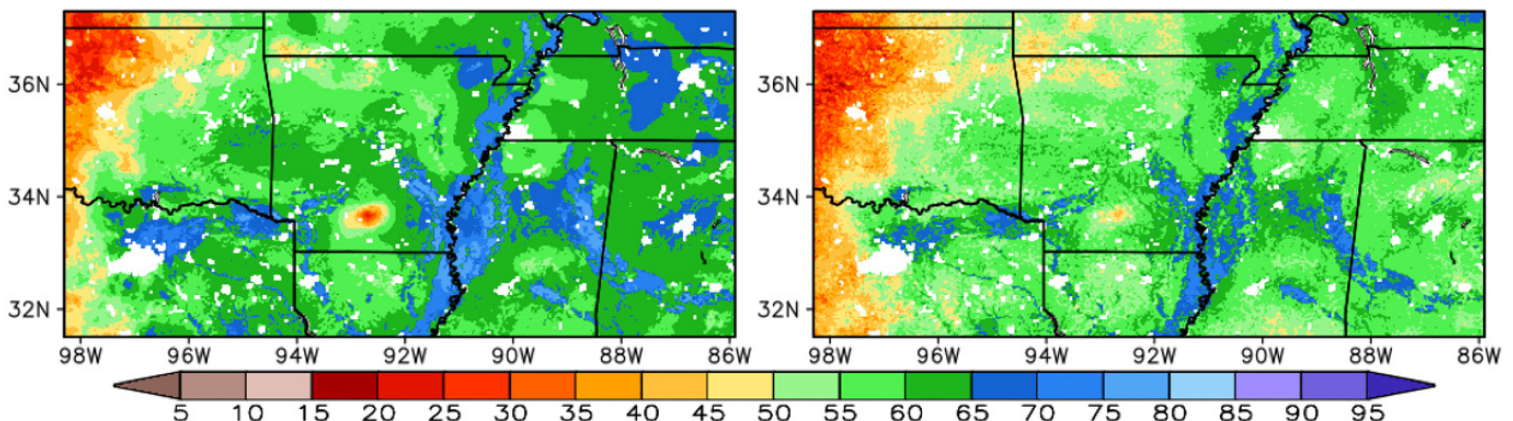


Figure 1. Impact of SMAP-Enhanced data assimilation in the 0-1 m layer, showing the reduction of an anomalous dry area in southern Arkansas caused by erroneous rain gauge data in NLDAS-2 forcing. Left panel: SPoRT-LIS; right panel: SMAP-LIS relative soil moisture (%) at 1200 UTC 24 April 2015.

Recent Accomplishments

GPM Products Used During and After Hurricane Maria

Prior to Hurricane Maria's landfall, SPoRT responded to a request from the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) Southeast River Forecast Center for satellite-based quantitative precipitation estimates (QPE) over Puerto Rico due to fears that the island's two Doppler radars would be damaged by the storm. In fact, both radars sustained significant damage (see image) leaving hydrologic forecasters without a way to determine rainfall amounts for flood forecasting. SPoRT quickly established two websites serving QPE

from the NASA Global Precipitation Measurement (GPM) mission. The static image viewer can be seen [here](#) and the data in the MSFC Earth Science Branch Web Viewer can be seen [here](#). Instructions for ingesting GPM products into the NWS operational decision support system—the Advanced Weather Interactive Processing System (AWIPS)—were also provided to these users, who successfully began ingesting the data. SPoRT will continue to support dissemination of GPM QPE products for as long as the radars are offline and look for additional ways that these data can be integrated into operations to support flood forecasting.

Marshall-Developed Lightning Safety Product Available to All NASA Centers

Mr. Paul Meyer, Dr. Chris Schultz, and Dr. Geoffrey Stano augmented the MSFC Lightning Safety page to include NASA Field Center locations and 10- and 20- mile range rings for each of the NASA Field Centers. This, in conjunction with the new Geostationary Lightning Mapping (GLM) instrument on the geostationary GOES-16 weather satellite provides the entire Agency a view of potential threats from lightning. The lightning data is refreshed at one-minute intervals. Analysis has shown the use of GLM data can provide an additional eight minutes of warning on the first cloud-to-ground flash versus the traditional terrestrial-based cloud-to-ground lightning monitoring systems. This additional time will allow Agency Emergency Operations Centers to provide earlier warning to clear personnel from outdoor activities. The Visible and Infrared satellite imagery on the web page have been upgraded to reflect the GOES-16 Advanced Baseline Imager (ABI) data rather than the older GOES-13 data. The ABI images are refreshed at five minute intervals and are at higher spatial resolution.

SPoRT-LIS Included in the National Wildfire Coordinating Groups Fire Behavior Field Reference Guide

SPoRT-LIS products—used to diagnose land surface characteristics, including soil moisture, vegetation greenness, land surface temperature, and the impact that rainfall has on these model parameters—was included in wildfire community has found value in the LIS model output relative to the prediction of fire start potential and fire dynamics. The products of most interest to the operational wildfire community is the LIS soil moisture and green vegetation fraction output, as they are closely



Damage to NWS San Juan's Doppler Radar in Hurricane Maria. Picture by Ernesto Morales (NOAA/NWS).

tied to the moisture within available vegetation fuels, and they can provide input on the rate of spread if a fire were to start in a specific location. The LIS model has provided a number of positive impacts on the fire weather forecasts with our partners. Because of these successes, there was a desire to include more about the LIS model and its uses for all of the fire community. Working with the SPoRT team, the National Wildfire Coordinating Group (NWCG) Fire Behavior Subcommittee officially included the LIS model into their Fire Behavior Field Reference Guide. This reference guide is only updated about every 10 years and is the primary resource for fire managers. This user's guide is utilized by all fire managers to characterize products and how they can be applied to fire initiation and spread. This field guide is used by a number of agencies, including the US Forest Service, The US Department of Agriculture, Bureau of Land Management, and the National Weather Service. The manual can be found at this location: <https://www.nwcg.gov/sites/default/files/publications/pms437.pdf>

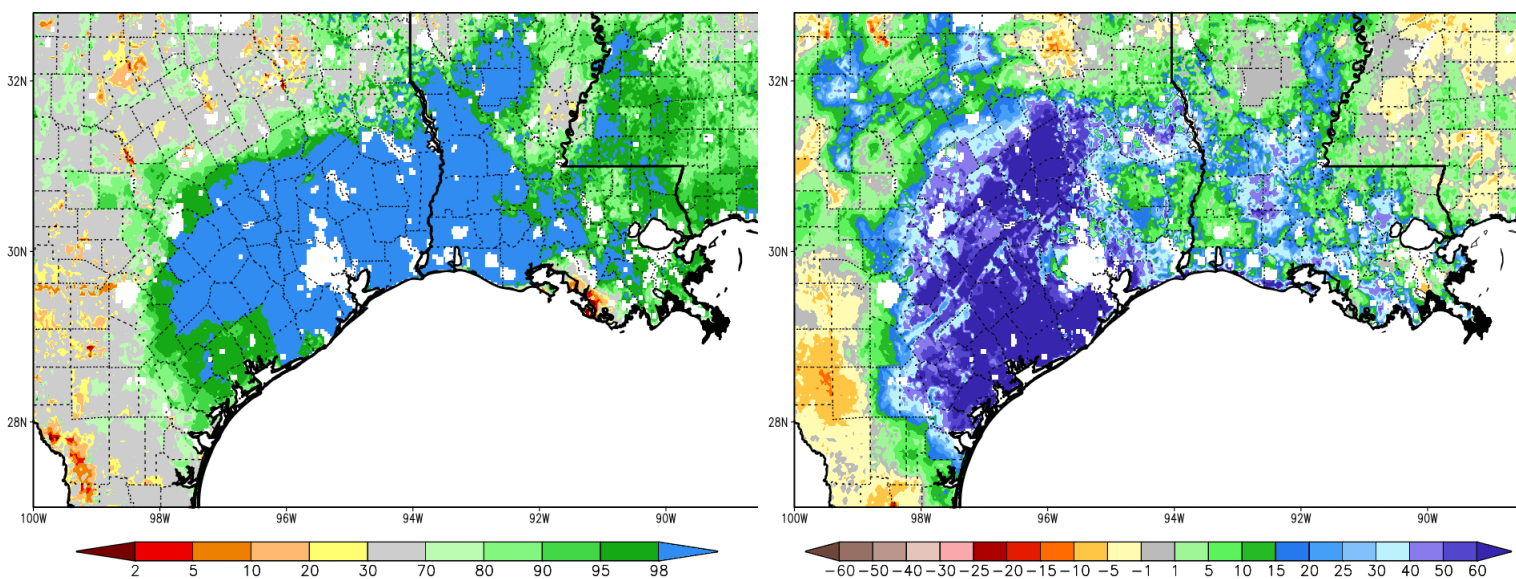
SPoRT-LIS Products Capture Historic Hurricane Harvey Flooding

The SPoRT-LIS (described on page 1) includes a daily, county-based climatological database of modeled soil moisture spanning 1981-2013 from which current conditions can be compared to depict anomalies via percentiles relative to the 33-year distribution. The figure below shows these percentiles for 0-2 m relative soil moisture (RSM) to depict dry anomalies (less than 30th percentile) or wet anomalies (greater than 70th percentile). Following Hurricane Harvey in southeastern Texas, the 0-2 m RSM percentiles are “off the charts” high, with dozens of counties experiencing soil moisture exceeding the [33-year] historical 98th percentile. In fact, the soil moisture was so anomalously moist following Harvey that the **average** daily value across all of Jefferson County, TX (Beaumont/Port Arthur) exceeded **all** values from the entire 33-year database by the end of August! Meanwhile, the one-week change in the 0-2 m RSM percentiles highlight the areas that experienced the most dramatic moistening associated with each storm. Areas primarily west

of the Houston metro experienced the most substantial percentile increases because the soils were historically dry prior to Harvey's impact; whereas, in far eastern Texas and southwestern Louisiana the soils were already quite moist and thus, percentiles did not increase as substantially.

SAR Workshop

SPoRT in conjunction with SERVIR, hosted a workshop to further the two groups knowledge on synthetic aperture radar (SAR). This 2-day workshop was led by SAR experts from the Alaska Satellite Facility, JPL and University of Massachusetts and provided lectures and labs. This was the 2nd consecutive year for a SAR workshop, with last year focusing on an introduction to SAR and flood detection. This year's workshop delved into more complex topics, advanced SAR backscattering characteristics, and applications related to vegetation phenology. On the third day, SPoRT and SERVIR, along with the instructors, mapped out future collaborations to further implement SAR at MSFC. These collaborations include future code sprints and joint proposal writing.



SPoRT-LIS 0-2 m relative soil moisture (RSM) percentile following Hurricanes Harvey (left) and 7-day change in 0-2 m RSM percentile associated with Hurricane Harvey (right).

Quarterly Highlights ...continued

Latest Development Updates for SPoRT-LIS...continued

Kalman Filter algorithm within LIS. The SMAP-LIS simulation consists of an ensemble of 12 model runs, generated by perturbing the model state, forcing, and the assimilated observations. Forcing perturbations to the precipitation, downwelling longwave and shortwave radiation, and soil moisture state are applied every 12 hours. An example of improvement to the relative soil moisture field in the top 1 m of the Noah land surface model is given in Figure 1. An anomalous dry “bull’s-eye” in soil moisture is seen in the SPoRT-LIS over southern Arkansas (left panel on page 1). This feature results from improperly quality-controlled rain gauge (consistently reporting zero) in the North American Land Data Assimilation System-Phase 2 (NLDAS-2) analyses used as forcing input to the SPoRT-LIS simulations. The problem has since been resolved in the operational NLDAS-2, but the erroneous gauge report lasted sufficiently long as to affect the deep soil column in SPoRT-LIS. In the right panel on page 1, we see that after slightly more than 3 weeks of routine data assimilation of the SMAP-Enhanced retrievals (SMAP retrievals first available on 31 March 2015), the resulting pattern of 0-1 m relative soil moisture is greatly improved, having substantially reduced the magnitude of the dry artifact. A comprehensive validation of the SMAP-LIS is underway, which will include evaluating the impacts of SMAP data assimilation fields on short-term regional numerical weather prediction simulations using the NASA Unified-Weather Research and Forecasting (NU-WRF) model.

Outreach Activities

SPoRT engages with our partners and the community in a number of ways, including through the use of social media and participation in outreach activities. You can follow us through Facebook (NASA SPoRT Center) and Twitter (@NASA_SPoRT). SPoRT also maintains the Wide World of SPoRT blog (<http://nasasport.wordpress.com>), where SPoRT scientists and our forecaster partners highlight interesting examples of product use. If you would like privileges to post on the SPoRT blog, please send an email to Kris White (kris.white@noaa.gov).

Wide World of SPoRT Blog

What a busy quarter! The first post of the quarter by Geoffrey Stano announced the initial release of data from the new GLM instrument onboard GOES-16. In fact, the next several posts involved the potential application of these data for operational forecasting in various locations around the CONUS. Due to the very busy tropical season, most other posts during the quarter involved the observations and potential applications of other SPoRT or GOES-16 data sets and imagery. Here are some blog highlights from the third quarter of 2017:

- Geoffrey Stano authored many posts to this quarter detailing observations from the GLM instrument onboard GOES-16, including observations of lightning within hurricanes:
 - <https://nasasport.wordpress.com/2017/07/07/glm-observes-a-long-flash-in-minnesota/>
 - <https://nasasport.wordpress.com/2017/07/21/geostationary-lightning-mapper-glm-over-new-mexico/>
 - <https://nasasport.wordpress.com/2017/09/05/category-5-hurricane-irma-as-observed-by-the-goes16-glm/>
- Jonathan Case authored a few posts which detailed model changes in soil moisture per the SPoRT-LIS over hurricane impacted areas of the Gulf Coast and Florida:
 - <https://nasasport.wordpress.com/>

[2017/08/25/soil-moisture-conditions-over-southeast-texas-prior-to-hurricane-harvey/](https://nasasport.wordpress.com/2017/08/25/soil-moisture-conditions-over-southeast-texas-prior-to-hurricane-harvey/)

- <https://nasasport.wordpress.com/2017/09/12/comparison-of-soil-moisture-response-in-hurricanes-harvey-and-irma/>
- Kris White posted on observations of Hurricane Irma with polar-orbiting microwave imagery and data, while mentioning their use by the National Hurricane Center:
 - <https://nasasport.wordpress.com/2017/09/07/passive-microwave-observations-of-category-5-hurricane-irma/>

Tweets of the Quarter

NASA SPoRT (@NASA_SPoRT) Following
Happy to collaborate with @USNRL to provide @NASARain GPM passive microwave data to @NWSNHC for a clearer picture of #Irma's structure.

Mission Number 37
Miami Center Miami FL
08 2017

d data from an Air For...

NASA SPoRT (@NASA_SPoRT) Following
SPoRT Sea Surface Temperature product shows warm water along projected path of Hurricane #Irma, favorable for maintaining strength.

The path shows the probable path of the storm based on data...

NASA SPoRT (@NASA_SPoRT) Following
Differs in VIIRS IR (blue) & DNB (yellow) from pre- & post-#Irma capture power outages reported by Orlando Sentinel (orlandosentinel.com/weather/hurric ...).

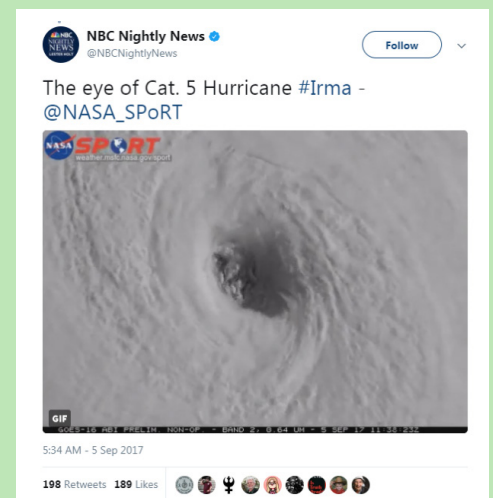
September 12, 2017

Hurricane Imagery Posts

SPoRT was very active during this period, generating and posting many images and loops of tropical systems (Harvey, Irma, Maria, Jose, etc.) that proved to be very popular with followers on Twitter and Facebook. SPoRT's Twitter account had approximately 1.3K followers at the start of June. By the end of September, this number had exploded to over 32.3K, an increase of almost 2,400%. Eight tweets were each viewed over 1M times. The most popular Tweet was a close-up animation of [Hurricane Irma's eye](#) using GOES-16 ABI imagery. This has been viewed over 4.5M times, liked over 26K times, and retweeted over 24K times, including by such high-profile accounts as President Donald J. Trump, NASA, and Univision. The animation was also featured on CNN, The Weather Channel, ABC News, and NBC Nightly News. Another popular post was a [10-day history of Irma](#), which has been viewed over 1.4M times and was also shown on CNN. SPoRT's Facebook account saw a steady increase in followers during this period, growing from 1.5K followers to 2.7K followers – an increase of 86%.

Hurricane Response Interview

SPoRT was asked by local NBC affiliate, WAFF-48, to provide an interview on the imagery that was being shared by the SPoRT Twitter account during this 2017 Hurricane Season. Mr. Jordan Bell, provided WAFF with an interview explaining how the GOES-16 Rebroadcast Site at MSFC was helping to provide SPoRT with the new imagery to create single-channel and RGB products to share with the general public and end-users. Jordan also explained some of the disaster response activities which were taking place within SPoRT.



Transitions and Assessments

Summary of GPM Assessment Feedback

SPoRT conducted an evaluation of GPM Level-2 and -3 products with the Alaska WFOs and Alaska-Pacific River Forecast Center (APRFC). The evaluation stretched from mid-July through August. Assessed products included: Level-2 passive microwave (PM) rain rate and two IMERG rain rates: calibrated precipitation and HQ precipitation. The HQ precipitation is a gridded passive microwave-only (no geostationary IR included) product that extends beyond 60 degrees North and South. This was the forecasters' first experience with it. Forecasters were familiar with the L2 swath data and their operational impact was 'some' or 'high' in roughly 65% of their uses. They frequently compared this product with rain gauge totals, finding under-, over-, and accurate- estimates. But these data are still very useful in Alaska's large extremely data-void regions. Due to the latency of IMERG (4+ hours), these two products did not have significant operational impact during this evaluation. Forecasters wanted to continue use of all of these GPM products operationally – even if only for post facto analyses.

Participation in HWT Spring Experiment

Over the course of four weeks, multiple SPoRT team members participated in the Spring Experiment at the NOAA Hazardous Weather Testbed. GOES-R and JPSS Proving Ground products and visualizations developed by SPoRT for multispectral imagery, GLM, and a gridded NUCAPS product from CrIS/ATMS were all evaluated by forecasters. More details of feedback on specific products can be found on [The Satellite Proving Ground at the Hazardous Weather Testbed blog](#).



Publications

- Berndt, E. B., N. J. Elmer, A. L. Molthan, and L. A. Schultz**, 2017: A Methodology to Determine Recipe Adjustments for Multispectral Composites Derived from Next-Generation Advanced Satellite Imagers. *Journal of Oceanic and Atmospheric Technology*, Accepted, *In Revision*.
- Berndt, E.** and M. Folmer, 2017: Utility of Cris/ATMS Profiles to Diagnose Extratropical Transition. *Results in Physics*, submitted.
- Blankenship, C., J. L. Case, W. Crosson, and B. T. Zavodsky**, 2017: Correction of Forcing-Related Spatial Artifacts in a Land Surface Model by Satellite Soil Moisture Data Assimilation. *IEEE Geosci. Remote S.*, Accepted, *In Revision*.
- Case, J. L. and B. T. Zavodsky**, 2017: Evolution of 2016 Drought in the Southeastern United States from a Land Surface Modeling Perspective. *Results Phys.*, Accepted, *In Revision*.
- Colle, B. A., **A. R. Naeger, A. Molthan**, 2017: Structure and Evolution of a Warm Frontal Precipitation Band During the GPM Cold Season Precipitation Experiment (GCPEX), *Mon. Wea. Rev.*, <http://dx.doi.org/10.1175/MWR-D-16-0072.1>.
- Davies, D. K., M. E. Brown, K. J. Murphy, K. A. Michael, **B. T. Zavodsky**, E. N. Stavros, and M. L. Carroll, 2017: Workshop on Using NASA Data for Time-Sensitive Applications. *IEEE Geosci. Remote S.*, **5** (3), 52-58, 10.1109/MGRS.2017.2729278.
- Ghatak, D., B. Zaitchik., **C.R. Hain** and M.C. Anderson, 2017: The role of local heating in the 2015 Indian Heat Wave, *Scientific Reports*, **7** (1), 7707-7712. <https://www.nature.com/articles/s41598-017-07956-5.ris>.
- Hain, C. R.** and M.C. Anderson, 2017: Estimating Morning Change in Land Surface Temperature from MODIS Day/Night Observations: Applications for Surface Energy Balance Modeling, *Geophys. Res. Letts.* *In Press*.
- Kirschbaum, D., **A. Molthan, J. Bell**, R. Gutro, A. Soja, M. Glasscoe, S. Owen, and D. Green, 2017: A View from Above: Earth Observation. *Crisis Response Journal*, **12** (4), 64-67.
- Lorenz, D.J., J.A. Otkin, M. Svoboda, **C.R. Hain**, M.C. Anderson, and Y. Zhong, 2017: Predicting US Drought Monitor (USDM) States using Precipitation, Soil Moisture, and Evapotranspiration Anomalies, Part I: Development of a Non-Discrete USDM Index, *J. Hydrometeorol.*, **18** (7), 1943-1962, <https://doi.org/10.1175/JHM-D-16-0066.1>.
- Lorenz, D.J., J.A. Otkin, M. Svoboda, **C.R. Hain**, M.C. Anderson, and Y. Zhong, 2017: Predicting the US Drought Monitor (USDM) using Precipitation, Soil Moisture, and Evapotranspiration Anomalies, Part II: Intraseasonal Drought Intensification Forecasts, *J. Hydrometeorol.*, **18** (7), 1963-1982, <https://doi.org/10.1175/JHM-D-16-0067.1>.

Presentations

Naeger, A. R., B. A. Colle, and A. Molthan, 2017: Evaluation of Cloud Microphysical Schemes for a Warm Frontal Snowband During the GPM Cold Season Precipitation Experiment (GCPEX), *Mon. Weather Rev.*, <https://doi.org/10.1175/MWR-D-17-0081.1>.

Naeger, A. R., 2017: Impact of dust aerosols on precipitation associated with atmospheric rivers using WRF-Chem simulations. *Results Phys.*, *In Review*.

Schultz, C. J., G. T. Stano, P. J. Meyer, B. C. Carcione, T. Barron, 2017: Lightning Decision Support using VHF Total Lightning Mapping and NLDN Cloud-to-Ground Data in North Alabama. *J. Operational Meteor.*, **5**, 11, 134-145, <https://doi.org/10.15191/nwajom.2017.0511>.

Schultz, C. J., J. J. Coy, J. L. Case, and C. R. Hain, 2017: Land Surface and Lightning Characteristics Associated with Lightning-Initiated Wildfires. *J. Geophys. Res.*, *Accepted, In Revision*.

Sun, L., M.C. Anderson, F. Gao, **C.R. Hain**, J.G. Alfieri, A. Sharifi, G.W. McCarty, Y. Yang, W.P. Kustas, and L. McKee, 2017: Investigating water use over the Choptank River Watershed using a multisatellite data fusion approach, *Water. Resour. Res.*, *In Press*.

Zhou, Y., X. Xiao, G. Zhang, P. Wagle, R. Bajgain, C. Jin, J.B. Basara, M.C. Anderson, **C.R. Hain**, and J.A. Otkin, 2017: Quantifying agricultural drought in tallgrass prairie region in the US Southern Great Plains through analysis of a water-related vegetation index from MODIS images, *Agri. For. Meteorol.*, **246**, 111-122, <https://doi.org/10.1016/j.agrformet.2017.06.007>.

Bell, J., L. Schultz, A. Molthan, E. Berndt, and P. Meyer, 2017: Advantages and applications of synthetic aperture radar as a decision support tool. *National Weather Association 42nd annual meeting*, Garden Grove, CA, Sept. 16-21.

Case, J., P. Gatlin, D. Cecil, J. Bell, and W. Petersen, 2017: Forecasting and monitoring intense thunderstorms in the Hindu-Kush-Himalaya region. *National Weather Association 42nd annual meeting*, Garden Grove, CA, Sept. 16-21.

Case, J. L., C. R. Hain, C. B. Blankenship, and C. J. Schultz, 2017: Land surface modeling and evaporative stress products for increased situational awareness. *National Weather Association 42nd annual meeting*, Garden Grove, CA, Sept. 16-21.

Schultz, C. J., C. R. Hain, J. L. Case, K. D. White, J. J. Coy, 2017: Real-Time Identification of Lightning Initiated Wildfires, *National Weather Association 42nd Annual Meeting*, Garden Grove, CA, Sept. 16-21.

White, K. D., E. Berndt, and C. Gravelle, 2017: From Polar Orbiters to GOES-16: The Evolution of Satellite Red-Green-Blue (RGB) Imagery and Their Applications at National Weather Service Offices. *National Weather Association 42nd Annual Meeting*, Garden Grove, CA, Sept. 16-21.

White, K. D., 2017. NUCAPS Applications for Operational Forecasting. *National Weather Association 42nd Annual Meeting*, Garden Grove, CA, Sept. 16-21.

Satellite Proving Ground Activities

GOES-R STAT Meeting Hosted at SPoRT

Geffrey Stano, Brad Zavodsky, and Emily Berndt participated in the GOES-R Satellite Training Advisory Team (STAT) meeting hosted by SPoRT on September 12-14. STAT team members discussed the status of GOES-16 training materials which include Quick Guides, Quick Briefs, and Job Aids. SPoRT is currently creating official GOES-R training material for GLM and RGB imagery.

GLM Assessment Updates

SPoRT was set to lead an early, operational assessment of the Geostationary Lightning Mapper (GLM) this summer and fall. This would include partnerships with numerous National Weather Service Weather Forecast Offices across much of the United States as well as several Center Weather Service Units (focusing on aviation forecasting). This initial date has been delayed until the spring of 2018 once the GLM data are made available to the National Weather Service. The emphasis of this training will be to focus on understanding the use of GLM data in the day-to-day operations at the collaborating offices and identify cases for development into an applications library. Furthermore, the assessment will be an opportunity to investigate how well GLM works at higher latitudes, where the parallax is greater, as well as identify interesting uses, potential operational products and visualizations, as well as new training efforts. SPoRT would like to thank all of the participating offices and the various regional headquarters for their collaboration and support.

Visits and Visitors

Dr. Jack Kaye

Dr. Jack, Kaye, Associate Director and Research & Analysis Lead for the Earth Science Division at NASA HQ, visited Marshall Space Flight Center 6-7 July. As part of his visit, Dr. Kaye was provided an overview of SPoRT activities, including a discussion of near-future research-focused activities, as well as a briefing on work that has been ongoing related to the use of hyperspectral infrared sounder data for weather research and transition to operations.

Baron Services, Inc.

On 5 September, members of the SPoRT Team visited Baron Services in Huntsville. The objective of the meeting was to discuss opportunities related to potential use of SPoRT value-added remote sensing and modeling products for Baron's customers and to leverage SPoRT training expertise for communicating new imagery and lightning data to their domestic and international users through use of the SPoRT Applications Library.

CWSUs and Kris Bedka

Tom Aimes and Roland Nuñez from the Fort Worth and Houston NWS Center Weather Service Units (CWSUs), who work collaboratively with the FAA to provide aviation weather forecasts for airports in the U.S., visited with the SPoRT Team on 6-7 September in Huntsville. The meeting provided an avenue for the SPoRT Team to better understand the various forecast challenges faced by CWSU forecasters and to provide some information on various aviation-focused SPoRT satellite data products. Mr. Kristopher Bedka from Langley Research Center (LaRC) also visited during this meeting. He is funded by a NASA Data for Operations and Assessment proposal to work with SPoRT to transition value-added icing and turbulence products from geostationary satellites to aviation forecasters. This meeting allowed

for direct communication of product needs and assessment timeframes that will be used by SPoRT to transition both SPoRT-developed products and products developed by LaRC.

Dave Jones

Dave Jones of StormCenter Communications visited with SPoRT on 27 September to discuss his company's GeoCollaborate geospatial analysis software and his work with emergency managers across the U.S. StormCenter plans to test integration of select SPoRT datasets available through web mapping service platforms into their tool for demonstration with their customers.

Summer Interns

During Summer 2017, SPoRT hosted five NASA summer intern students. SPoRT worked with two NASA Office of Education funded projects to obtain students with additional skills in computer coding and remote sensing. Ms. Cruz and Ms. Burrows were part of the Center for Applied Atmospheric Research and Education project led by San Jose State University; Ms. MacNamara, Mr. Kaltenbaugh, and Mr. Cady were part of the Advanced Computing for Earth Sciences project led by the University of Virginia. This section summarizes their activities.

Isa Cruz: Ms. Cruz worked with Dr. Christopher Hain and Dr. Christopher Schultz on a project to examine the antecedent conditions leading up to lightning initiated wildfire events using various NASA remote sensing assets and the NASA Short Term Prediction and Research Transition Center's Land Information System (SPoRT-LIS). It was found that variables of interest included LIS 0-10 cm soil moisture, LIS total column relative soil moisture, MODIS/VIIRS green vegetation fraction (GVF), and the Evaporative Stress Index (ESI). These variables represent moisture and vegetation coverage in

the areas which fires do and do not initiate and were used to document a detailed case study of a lightning initiated wildfire event (the West Mims fire). Results for the West Mims case study showed that dry soil moisture and high vegetation stress was evident before the event and an extended dry period lead to a rapid of expansion of the fire two weeks after the initiation.

Brittany MacNamara: Ms.

MacNamara worked with Dr. Chris Schultz to analyze the location of fire starting lightning flashes relative to the parent thunderstorm's structure. This work was undertaken to determine the precipitation rate/intensity at the location of the fire start and the individual characteristics of the flash that led to the fire. This analysis shows that lightning can start a wildfire under almost any precipitation conditions, and that the dryness of the land surface plays a more significant role in the fire start and growth. Probabilistically, the fire initiation threat is higher for drier fuels, but examples exist where lightning struck in heavy precipitation, smoldered for a few days, and then rapidly grow as the land surface dries. This work was coupled with Ms. Cruz's land surface work helps in the development of a probabilistic wildfire start product currently being developed by SPoRT.

Erica Burrows: Ms. Burrows worked with Dr. Aaron Naeger and used space-borne active lidar measurements from the NASA Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) and the Cloud-Aerosol Transport System (CATS) along with Aerosol Robotic Network (AERONET) ground-based sun-photometer measurements to help characterize aerosol types across East Asia. It was found that the CALIOP and CATS polarization measurements helped differentiate between coarse-mode non-spherical aerosol particles (e.g., dust) versus other spherical

particles (e.g., pollution) across the region. These results are currently being used to help improve the aerosol assumptions internal to satellite aerosol retrieval algorithms.

Tim Cady: Mr. Cady worked with Dr. Aaron Naeger and analyzed an atmospheric river (AR) event that brought over 200 mm of rainfall to the Olympic Peninsula of Washington on 16-17 November 2015, during the Olympic Mountain Experiment (OLYMPEX) field campaign, a collaborative project which involved the deployment of an intensive observation network to examine precipitation processes in complex topography. The OLYMPEX field data was used to validate several different bulk microphysical parameterization (BMPs) schemes in the Weather Research and Forecasting Model (WRF) to identify strengths and weaknesses of the schemes in simulating orographically enhanced precipitation. Results showed that the Predicted Particle Properties (P3) scheme simulated the most accurate precipitation rates during the AR event due to stronger ice-phase processes compared to the other schemes.

Alex Kaltenbaugh: Mr. Kaltenbaugh worked with Dr. Aaron Naeger and also focused on using OLYMPEX field data to validate BMP schemes in the WRF model, but investigated another AR event on 8-9 December 2015 that brought significant rainfall amounts to the Olympic Peninsula. Similar to the 16-17 November case, precipitation rates simulated using the P3 scheme showed overall better agreement to the numerous NASA rain gauge sites across the field site compared to the other schemes.

Dr. Brent McRoberts

Dr. Brent McRoberts from Texas A&M University spent the summer at SPoRT as a member of the NASA's Summer Faculty Fellowship Program. Dr. McRoberts worked with Dr. Christopher Hain on evaluating the global Evaporative Stress Index (ESI) product which is currently being

generated at SPoRT. The project focused on finding relationships between global drought indicators towards a better understanding of improving global drought monitoring and prediction, with an emphasis on the performance of ESI against other precipitation or vegetation-based drought indicators.

Congratulations

NASA Honor Awards

Bradley Zavodsky received the NASA Certificate of Appreciation Honor Award on 11 July. The notation for this award reads "For outstanding leadership of MSFC's Short-term Prediction Research and Transition program during its leadership change."

Chris Schultz and Geoffrey Stano received the NASA/Marshall Innovation Team Award for their role in the Lightning Safety Applications Team. The notation for this award reads "For the outstanding accomplishment of developing an application to provide faster lightning safety warnings to the Marshall Space Flight Center."

Jonathan Case and Bradley, Zavodsky received the NASA/Marshall Innovation Team Award for their role in the Zika Forecast Risk Assessment Team. The notation for this award reads, "For the innovative application of existing methodology to map the potential risk, and to identify and predict the spread of the Zika virus in 50 cities across the U.S."

NASA MSFC Science and Technology Office Peer Awards

Bradley Zavodsky received the Wall Street Award, which was awarded to an individual who demonstrates being fiscally responsible or executes something in a way that provides a great cost advantage for NASA.

Andrew Molthan received the Grand Marshall Award, which was awarded to an individual who makes an effort to ensure and encourage the best out of others related to safety, fairness, morale, or performance.

Aaron Naeger received the Behind the Curtains Award, which was awarded to an individual who works in the background but has a big impact on the success of the organization.



Welcome

SPoRT welcomed three new University of Alabama in Huntsville graduate students to our project starting in August 2017. We are very excited to have them on board and contributing to research areas relevant to SPoRT activities.

Erica Burrows graduated with her Bachelor's degree from San Jose State University. She is working with Dr. Aaron Naeger doing aerosol research for the East Asia region as part of her research activities and anticipates extending that work using satellite observations and incorporating these data into numerical models for her thesis work. Prior to coming to UAH, Erica had summer research experiences for two summers at Marshall Space Flight Center.

Sebastian Harkema graduated with his Bachelor's degree from Central Michigan University. He is working with Dr. Emily Berndt to use next-generation satellite remote sensors (i.e. ABI, GLM, etc.) to analyze winter weather with a primary focus on heavy-banded snowfall for my master's thesis. Growing up in Michigan, near the Lake Michigan shoreline, he knows the impacts of heavy snowfall and look forward to gain a better understanding of these processes using satellites. Prior to coming to UAH, Sebastian had summer research experiences at the National Weather Center and Goddard Space Flight Center.

Douglas Kahn graduated with his Bachelor's degree from the University of Maryland where he majored in Atmospheric and Oceanic Science and minored in Geographic Information Science (GIS). He is working with Dr. Christopher Schultz to develop a tool for real-time analysis of the characterization of wildfire producing storms using lightning. In his studies, he will be using the Geostationary Lightning Mapper along with other ground-based lightning networks and datasets. Prior to coming to UAH, Douglas had various research experiences at WeatherBug, NOAA/NESDIS, and the Sterling NWS Weather Forecast Office.

Upcoming Calendar of Events

- EUMETSAT 2017 (Rome, Italy; October 2-6)
- PMM Science Team Meeting (San Diego, CA; October 16-20)
- SMAP Utilization PI Meeting (Cambridge, MA; October 18-20)
- CYGNSS Applications Workshop (Monterey, CA; October 31-November 2)
- WMO RGB Experts Workshop (Tokyo, Japan; November 7-9)
- Joint Polar Satellite System 1 Launch Date (Vandenberg Air Force Base; November 10)
- NOAA Proving Ground and User Readiness Meeting (Kansas City, MO; November 13-17)
- AGU Fall Meeting (New Orleans, LA; December 11-15)
- AMS Annual Meeting (Austin, TX; January 7-11)

National Aeronautics and Space Administration

George C. Marshall Space Flight Center

Huntsville, AL 35812

www.nasa.gov/marshall

www.nasa.gov