

SPoRT Quarterly  
July – September 2013

# The SPoRT REPORT

Join SPoRT on:  
NWSSchat @ [nasa\\_sport](http://nasa_sport) or blog  
with us @ <http://nasasport.wordpress.com/>

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

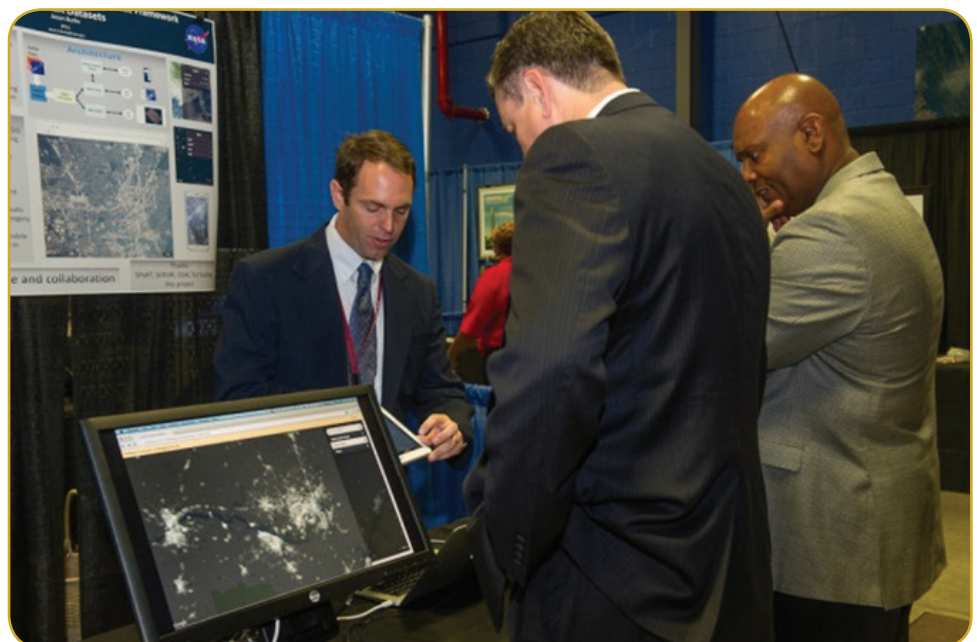
The SPoRT Center is a NASA- and NOAA-funded project to transition unique observations and research capabilities to the operational community to improve short-term weather forecasts on a regional scale. While the direct beneficiaries of these activities are Selected Weather Forecast Offices (WFOs) and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

## Quarterly Highlights

### SPoRT WMS Capabilities Showcased at Marshall Technology Day

Over the last year, SPoRT has been actively developing a Web Mapping Service and Mobile and Web Framework to deliver its datasets to end users on platforms using interactive web maps and GIS software as well as on mobile phones. This framework will streamline the process of delivering SPoRT datasets to users on these platforms and allow SPoRT to extend the reach of its products to a broader user community. The framework was demonstrated during a Marshall Space Flight Center Technology Day Exposition in September.

Jason Burks (left) from SPoRT demonstrates the Common Web Mapping and Mobile Device Framework for NASA Datasets to Center Director Patrick Scheuermann (middle), and Office of Strategic Analysis and Communications Director Bobby Watkins (right).



# New AIRS Ozone Anomaly Product for Identifying Stratospheric Air

SPoRT has been using the Atmospheric Infrared Sounder (AIRS) Total Column Ozone product to diagnose the presence of high-potential vorticity, warm, dry, ozone-rich stratospheric air in Red, Green, Blue (RGB) Air Mass imagery. The presence of stratospheric air is important for identifying regions susceptible to stratospheric intrusions and tropopause folds. Stratospheric intrusions and tropopause folds aid cyclogenesis, produce strong low-level non-convective winds, and also promote or suppress convection by changing the stability of the atmosphere via downward transport of warm, dry, high potential vorticity air.

In late June, SPoRT developed an AIRS Ozone Anomaly product to assign significance to the high ozone values seen in the Total Column Ozone product. Since ozone varies spatially and seasonally, it has been difficult to determine whether the high ozone values represent a significant deviation from climatology to confidently determine the presence of stratospheric air. Van Haver et al. (1996) states stratospheric air can be identified when ozone values are 25% greater than climatology. With that knowledge and the 6-year stratospheric ozone climatology from Ziemke et al. (2011), the percent of normal ozone was

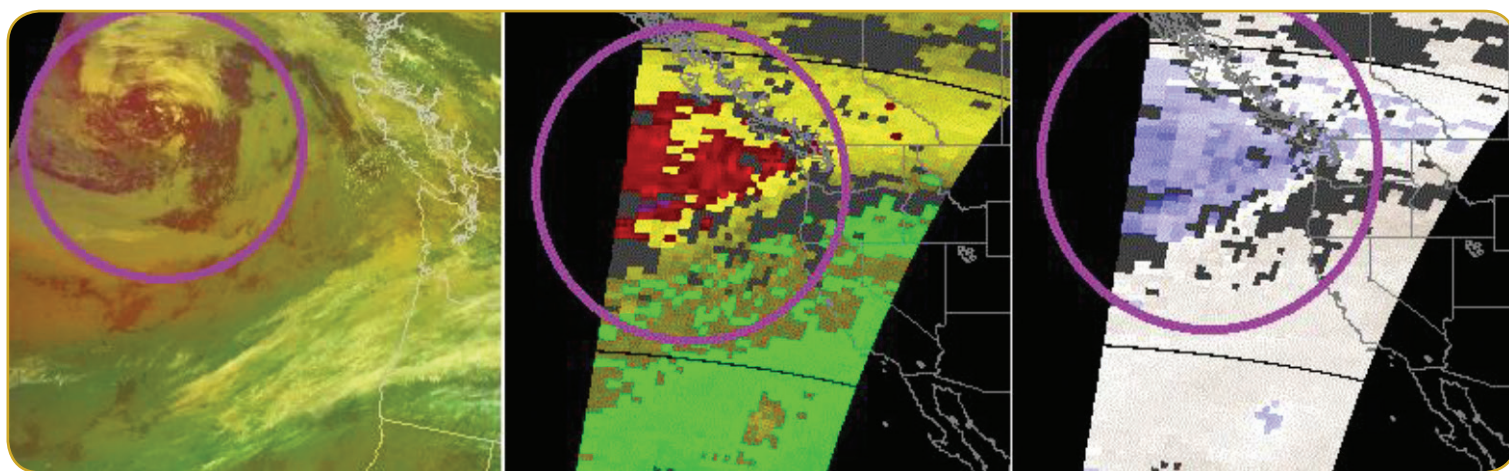
calculated to create the Ozone Anomaly product. The Ziemke et al. (2011) mean monthly mean climatology was derived at 5° latitude resolution from Microwave Limb Sounder integrated ozone profiles.

The ease of interpretation of the Ozone Anomaly product makes it a good compliment to the Total Column Ozone and RGB Air Mass products. Values equal to 100% are equal to climatology, while values greater than (less than) 100% are above (below) climatology. We constructed the color table so that values representative of stratospheric air are shaded blue (125% of normal and greater). The example compares the MODIS RGB Air Mass, Total Column Ozone, and Ozone Anomaly product for 26 June 2013. The MODIS RGB Air Mass image is valid at 1027 UTC, while both Ozone products are valid at 1100 UTC. For the West Coast storm circled in purple, high ozone values are present in the same location as the red/orange regions on the RGB Air Mass image. Comparison of the Ozone Anomaly product confirms the high ozone values are above climatology (regions shaded blue) and representative of stratospheric air based on the criteria from Van Haver et al. (1996).

Product information and access to real-time data can be found on the SPoRT web-page by clicking on “Core Projects” and “AIRS”.

Van Haver, P., D. De Muer, M. Beekmann, and C. Mancier, 1996: Climatology of Tropopause Folds at Midlatitudes. *Geophys. Res. Lett.*, 23, 1033-1036.

Ziemke J. R., S. Chandra, G. J. Labow, P. K. Bhartia, L. Froidevaux, and J. C. Witte, 2011: A Global Climatology of Tropospheric and Stratospheric Ozone Derived from Aura OMI and MLS Measurements. *Atmospheric Chemistry and Physics*, 11, 9237-9251.



Comparison of MODIS RGB Air Mass image (1027 UTC), AIRS Total Column Ozone (1100 UTC), and AIRS Ozone Anomaly (1100 UTC) on 26 June 2013. Purple circle highlights the region of suspected high potential vorticity and stratospheric air on the RGB Air Mass image, as well as corresponding high Total Column Ozone values, and blue shading of greater than 125% of normal anomalies associated with the low pressure system off the West Coast.



# Recent Accomplishments

## New Collaborations with the Langmuir Laboratory Lightning Mapping Array

SPoRT has established collaborations with the developers of lightning mapping array technology at New Mexico Tech University (NMT) in Socorro, New Mexico. SPoRT already works with NMT as they provide the base data for product processing for the Colorado and Houston networks. As of July, SPoRT is receiving real-time data from their experimental network at the Langmuir Laboratory. With these data, SPoRT is facilitating the collaboration between New Mexico Tech and the Albuquerque, New Mexico forecast office to use these data in operations. The end goal will be to coordinate a formal evaluation in the spring of 2014. In addition, these data are now available as part of the Pseudo-Geostationary Lightning Mapper (PGLM) mosaic product for the National Centers.

## SPoRT/SERVIR collaboration with Kenya Meteorological Department

SPoRT continued its modeling collaboration with NASA/SERVIR during this past quarter. The primary activities involved developing an experimental real-time WRF modeling experiment for east Africa to support the Kenya Meteorological Department (KMD). Additional activities involved supporting Weather Research and Forecasting (WRF) model runs over the Central American and Caribbean regions, which are being run in a cloud computing environment using SPoRT Sea Surface Temperature (SST) initialization data.

For the KMD-WRF experiment, a modeling domain was configured for daily control and experimental runs on a 12-km/4-km nested domain using one of SPoRT's weather-in-a-box (WiB) clusters. Forty-eight hour forecasts are being generated each day in real time, initialized at 0000 UTC. The experimental WRF run is generated first and uses a land surface

initialization from NASA Land Information System (LIS) runs conducted over the 12-km WRF domain region, with WRF boundary conditions provided by the NCEP Global Forecast System (GFS) model grids. The LIS data consist of offline Noah land surface model simulations on a 0.03 degree grid (~3 km) forced by Global Data Assimilation System (GDAS) analyses and 8-km Climate Prediction Center Morphing (CMORPH) half-hourly precipitation analyses. The LIS was designed to provide improved, higher-resolution land surface initialization fields to the WRF runs, compared to initializing with GFS model land surface fields. After completion of the experimental WRF runs, the control WRF simulation is made which uses all initial and boundary conditions from the GFS model fields. The real-time daily WRF simulations were implemented on 30 September and a set of control and experiment forecasts will be collected in order to generate verification statistics to determine if the inclusion of LIS initialization can improve skill scores over the GFS-initialized WRF control runs.

## EPDT Code Sprint

SPoRT has led the way in the formation of the Experimental Product Development Team (EPDT). This team's focus is to help promote research-to-operations transition of data and techniques to the AWIPS II platform. SPoRT hosted a three-day EPDT code sprint in Huntsville in September. During the code sprint, sub-groups of EPDT members worked on projects such as the tracking meteogram tool, meteorological Phenomena Identification Near the Ground (mPING) display, mini-EDEX, and extending the AWIPS II RGB displays to support recipes. All of these projects made significant progress during the code sprint and continued the participants learning through real-world, hands-on application of concepts they learned during a previous workshop. The projects initiated during this workshop will be refined and will help to extend the AWIPS II platform to address the meteorological communities' needs.



## SPoRT Visits Alaska

In August, Kevin Fuell and Matt Smith spent a few days at each of the three Alaska WFOs. They showed forecasters SPoRT's RGB and Geosynchronous Earth Orbit (GEO)/Low Earth Orbit (LEO) Hybrid products available in AWIPS, and provided assistance with the ongoing assessments of the Quantitative Precipitation Estimation (QPE) and Cooperative Institute for Research in the Atmosphere (CIRA) Layered Precipitable Water (LPW) products. In Anchorage, they spoke with River Forecast Center (RFC) personnel about how SPoRT might help with hydrological forecast problems, and with Kathleen Cole at the Alaska Ice Desk about how to best provide SPoRT's composite SST product. In Fairbanks, they met with Geographic Information Network of Alaska (GINA) staff at the University of Alaska Fairbanks, discussing possible collaborations with faculty members Dr. Jessica Cherry about hydrologic modeling opportunities. The group also discussed how SPoRT and GINA could work together to improve the delivery speed of SPoRT's current MODIS- and VIIRS-based products by generating them in Alaska. GINA offered two Virtual Machines for product generation using data from their local Direct Broadcast receiving stations. The preparation of these GINA-supplied Virtual Machines is almost complete. Data should be flowing to Alaska WFOs by December.

...continued on page 6

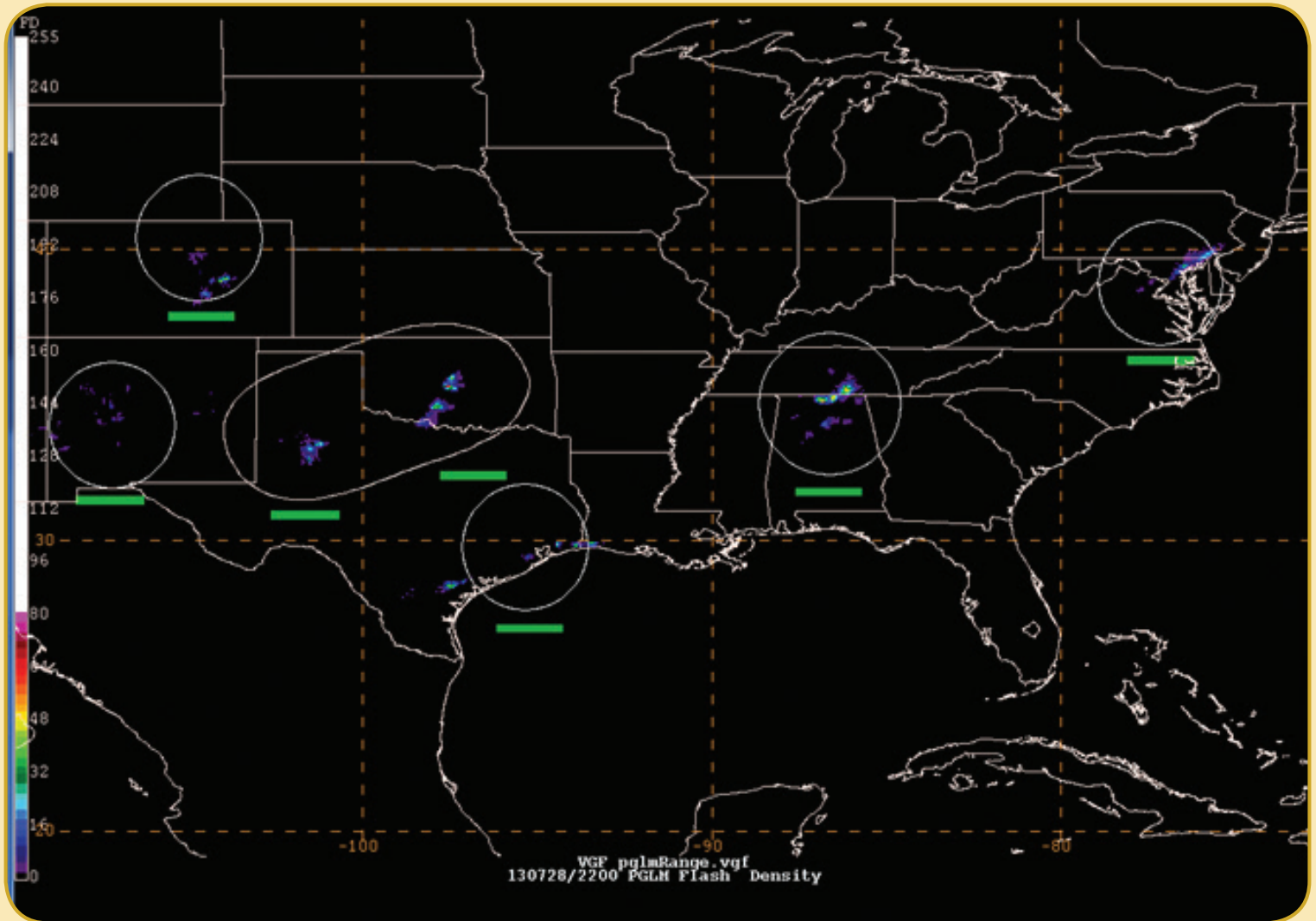
# Satellite Proving Ground Activities

## Pseudo-GLM at the Aviation Weather Center

August saw SPoRT's participation with the Aviation Weather Center's (AWC) Summer Experiment with the evaluation of the PGLM mosaic product and the GOES-R convective initiation product that SPoRT assists in transitioning. This builds off the initial work to provide the PGLM mosaic product to the AWC after the 2012 GOES-R visiting scientist program. Since last year, along with the aid of the AWC satellite champion Amanda Terborg, the PGLM mosaic has undergone a great deal of improvement, ranging from an improved color curve, network range rings, and network status bars. The status bars were the most popular as they let

forecasters know that a lack of data was either due to network outages or a lack of lightning. The two-week evaluation came during a quiet convective period, which limited the assessment. However, discussions with forecasters demonstrated a great deal of excitement in using these data to monitor convection and to support the convective significant meteorology (SIGMET) forecast alerting the aviation community to the potential for future and ongoing convection across the country. A small journal article by forecaster Ed Holicky will likely be published in the near future discussing applications of total lightning data at the AWC. Additionally, the PGLM mosaic has been successful thanks to the collaborative contribution of real-time data from eight lightning mapping arrays across the country.

Although the AWC's summer experiment had few opportunities to evaluate the PGLM in real-time, the opportunity to participate in person was very beneficial to science sharing. This helped generate a great deal of interest for the PGLM data. The AWC satellite champion, with SPoRT's input, conducted a series of training sessions for the AWC forecasters. This was the lead-in effort to move the PGLM mosaic from a demonstration product, to a full, real-time product available on the operations floor. This was accomplished, along with the GOES-R convective initiation product in mid-September. The subsequent goal will be to coordinate with the Storm Prediction Center and move the PGLM mosaic to the operations soon.

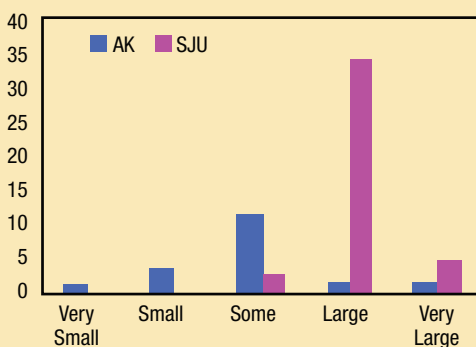


A screen capture of the PGLM mosaic image in N-AWIPS for use at the Aviation Weather Center and Storm Prediction Center. The white lines represent the approximate range of each lightning mapping array, while the colored horizontal bars provide the operational status of each network.

## NESDIS GOES-R QPE/CIRA LPW Summer Assessment: AK and SJU

The summer assessments of NESDIS GOES-R QPE and CIRA LPW took place from 15 July to 15 September. Forecasters from the San Juan (SJU), Anchorage (AFC), Fairbanks (AFG), and Juneau (AJK) National Weather Service offices and the Alaska Pacific RFC participated, completing 77 surveys. SJU forecasters reported fairly consistent under-estimates of precipitation by GOES-R QPE, citing the 15-minute temporal resolution as a possible cause; however, forecasters did issue flood advisories with guidance from NESDIS GOES-R QPE after becoming familiar with this bias. In AK, NESDIS GOES-R QPE performed well compared to radar or gauge estimates in some circumstances, and over- or underestimated in other circumstances, partly due to orographic influences. For the CIRA LPW, forecasters in SJU overwhelmingly indicated that LPW had a “large” impact on their forecast process, while those in AK mostly stated that it had “some” impact on their forecast process. During an atmospheric river event in Alaska, however, forecasters generally found LPW to have a “large” impact.

Rank The Impact of the LPW on the Forecast Process



## RGB Evaluation for Aviation and Cloud Analysis

As part of its GOES-R/JPSS Proving Ground activities, SPoRT conducted an evaluation of several RGB imagery products with partner NWS/WFOs. For

the 15 September to 31 October period, inland WFOs in the Southeast had a higher frequency of occurrence for ceiling and visibility restrictions at local airports due to fog and/or low clouds. The Huntsville, Nashville, Morristown/Knoxville, and Raleigh WFOs participated as well as two WFOs in the Front Range region – Albuquerque and Great Falls. The products examined were the MODIS & VIIRS night-time microphysics and VIIRS day-night band RGB products. These were compared to traditional 11-3.9 $\mu$ m imagery in SPoRT’s Hybrid GEO/LEO product. Nearly 50 official feedback submissions occurred with the Raleigh WFO providing the largest number. Approximately 2/3 of users ranked the nighttime microphysics as having some to very large impact to aid in differentiating fog from other cloud types. Forecasters only had swath imagery from MODIS and VIIRS for these RGB products, yet 60% indicated there was some to large impact to aviation forecasts by having this data. This number is likely to increase when users are able to loop these products from GOES-R/-S. While the feedback statistics are valuable, the comments provided on the form by users were even more useful. SPoRT was able to engage users to reduce latency of product delivery, assist users with RGB color interpretation, and explore details of color change due to particle size. A very interesting blog post by Paul Nutter of Great Falls explored the application of the night-time microphysics RGB to diagnose low-level precipitating clouds that were undetected by radar scans. Amazingly, this same application was independently realized by Brian Guyer in Albuquerque a short time before this post. See both posts on the Wide World of SPoRT Blog (<http://nasaSPORT.wordpress.com/>).

## VIIRS Front Range Assessment

This past July and August, the SPoRT center conducted a JPSS Proving Ground assessment with our Front Range collaborative partners. The four local forecast offices involved were Albuquerque, New Mexico, Boulder, Colorado, Cheyenne,

Wyoming, and Great Falls, Montana. The purpose of this evaluation was to assess the utility of the unique products available from VIIRS, particularly at night. The evaluation covered the DNB radiance and reflectance products, as well as their associated RGB composites, the dust and nighttime microphysics RGBs, and the high-resolution long- and shortwave IR channels. As stated, this project was for the JPSS Proving Ground, but the assessment has applications to the GOES-R Proving Ground thanks to the dust and nighttime microphysics RGBs and the high resolution imagery, which are good proxies for the future Advanced Baseline Imager. The primary goal of the assessment was to focus on the use of these products for fire weather, but with a fairly quiet fire season in the four domains, the focus shifted to the utility of these products at night.

The final report is being written and will be discussed in more detail in the next quarterly report. However, a couple of highlights can be provided now. In the assessments, the nighttime microphysics product proved to be the most popular of the products. Much of this was due to its high resolution as well as being able to help distinguish cloud levels and their makeup. The VIIRS-only DNB radiance product was also quite popular. While it was not as useful at observing smoke plumes at night as anticipated, forecasters were very impressed with the resolution of the product. This allowed for excellent accuracy as to the location of fire hot spots. One recommendation to the SPoRT team was to modify the day-night band radiance (and reflectance) product to make city lights a different color from the fire hot spots. Additionally, there continues to be interest in the RGB composites that will eventually be available aboard GOES-R as the forecasters would like to see these products update more rapidly than currently available with the polar orbiting nature of VIIRS. Space limits the inclusion of all of the imagery here, but an example of most of the products being assessed is available on the SPoRT blog (<http://nasaSPORT.wordpress.com/2013/07/26/favorable-conditions-for-the-viirs-day-night-band-reflectance/>).



## Recent Accomplishments...continued

### NASA Internships

SPoRT supported four NASA interns as part of the MSFC Summer Internship Program from May through August 2013. Tony Cole of the University of Southern Maine in Portland, Maine and Rachel Dryden of Park University in Parkville, Missouri each supported SPoRT's ongoing disasters applications area, working with Andrew Molthan and Jason Burks to examine NASA satellite imagery to assess capabilities for identifying damage as a result of severe weather. Tony examined satellite-based tornado damage tracks from NASA's MODIS and ASTER instruments that resulted from the April 27, 2011 severe weather outbreak in order to quantitatively assess our ability to measure the length and width of damage tracks from space. He also assessed the variability in tornado damage track detection as a function of tornado intensity and

background land surface type. Rachel examined damage scars in MODIS Normalized Difference Vegetation Index (NDVI) imagery resulting from severe hail events in the High Plains during 2011, as a follow-on to research activities previously published by Dr. Molthan. Her analysis combined hail size estimates from National Severe Storm Laboratory radar imagery and NDVI change to quantify areas that experienced hail damage, and then attempted to extend the measured damage area into dollar estimates of total damage. Other SPoRT research and development activities were advanced with support of other NASA internships. Ethan Greene of Mitchell College, New London, Connecticut worked with Brad Zavodsky and members of the University of Alabama in Huntsville (UAH) Information Technology and Systems

Center (ITSC) to develop data mining techniques that allow for rapid acquisition of NASA, NOAA, and other web-based data sets associated with major weather events. Brett Williams of the University of Missouri at Columbia worked with Gary Jedlovec on a local climate study examining long-term trends in precipitation and temperature for North Alabama and Marshall Space Flight Center, part of a larger project to examine potential climate change impacts that could affect MSFC activities. At the conclusion of their activities, each intern developed a lengthy technical paper and a poster similar to an extended abstract and conference presentation. Posters were presented in early August at the MSFC Intern Expo, and Rachel Dryden was awarded a third-place overall poster presentation and cash award.

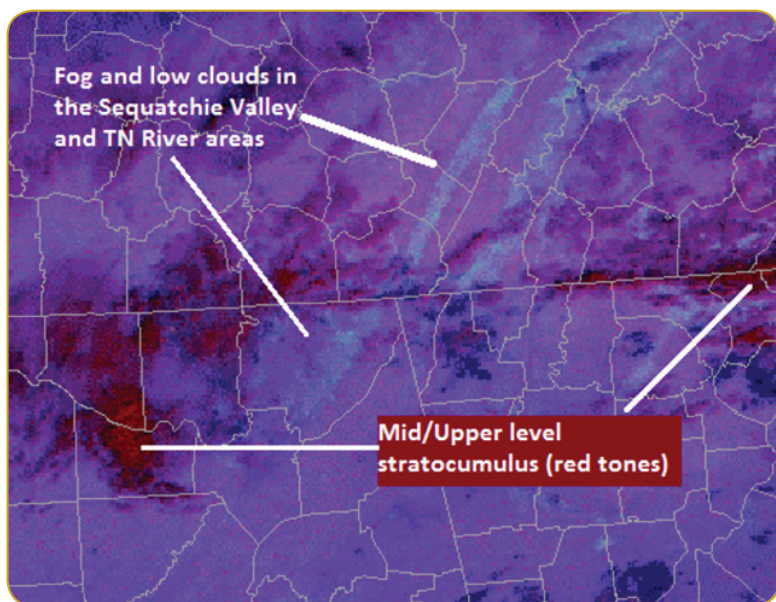
## Training Activities

### Nighttime Microphysics RGB Imagery

A distance learning module has been created for operational users that highlights the application of the nighttime microphysics RGB image composite applied to diagnosis of cloud types, in particular differentiating fog from low clouds. The RGB imagery assists with determining cloud thickness

and temperature in addition to the particle phase and size. This combined information allows one to deduce the cloud type and height. The module audio narration is approximately 8 minutes in length. Both MODIS and VIIRS are used to create the nighttime microphysics RGB imagery as a proxy to future GOES-R/-S capabilities. The module also discusses the VIIRS instrument low-light sensor, or Day-Night Band

(DNB), that detects reflected moonlight. Low cloud features are identified by combining the DNB into an RGB composite with the long-wave IR channel. See the SPoRT Training page (<http://weather.msfc.nasa.gov/sport/training/>).



## Blog Summary

The SPoRT blog experienced a surge in activity during the third quarter of 2013, probably due to a number of evaluations being conducted and an ever-expanding list of collaborators. A total of 36 posts were added to the blog during the quarter, which was the most for any quarter since the blog began in March 2009. Additionally, the blog garnered some 6,768 views during the period, which was the most in any quarter with the exception of the 4th quarter of 2012 (8,412 views). July alone had over 4,000 views, which was the most since the 5,313 views in October 2012.

One of the more popular posts during the month was by blog newcomer, WFO San Juan, Puerto Rico. This post, titled, "Tropical wave brings historic rains to San Juan PR – July 18, 2013" described not only record rains that fell across parts of Puerto Rico during the event, but the assessment of NESDIS GOES-R QPE that were being evaluated by the San Juan WFO. Although new to the SPoRT collaborative partnership, the San Juan WFO has provided valuable feedback during the evaluation of products this summer and has contributed interesting and thought-provoking posts to the SPoRT blog.

# WFO Corner

## Colorado Lightning Mapping Array Collaborations

SPoRT has continued to collaborate with our newest total lightning partners at the Boulder, Colorado and Cheyenne, Wyoming forecast offices. Both participated in a GOES-R visiting scientist program to begin using the Colorado Lightning Mapping Array data in their local offices. Each office has had the opportunity to informally observe the data and SPoRT is continuing to work with each office to finalize displays and to prepare for a spring 2014 evaluation. WFO Boulder will use SPoRT's LMA plug-in for AWIPS II once the AWIPS II program assessment concludes, while WFO Cheyenne is using AWIPS I.

## Huntsville

North Alabama Lightning Mapping Array (NALMA) data have been into AWIPS II at WFO Huntsville since March, including the legacy source density total lightning data. However, Science and Operations Officer, Brian Carcione, and Applications Integration Meteorologist, Kris White, have been examining flash extent density data in an experimental mode during the spring and summer months. A study has been conducted utilizing the source and flash total lightning data from most of the severe convective events during the period. Initial results indicate that flash extent data may be most appropriate for operational purposes. This is beneficial since flash data are more commonly

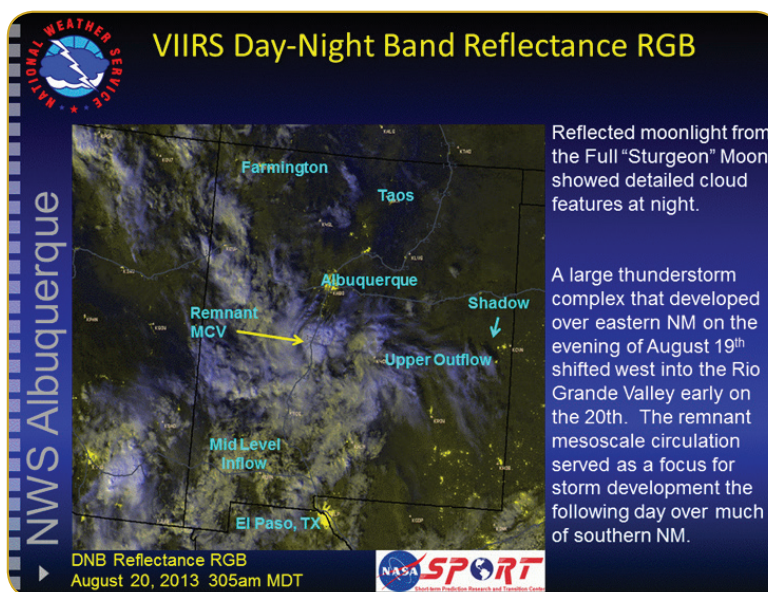
referenced in the scientific literature as well. A new training module should be available to the operational staff by the severe weather season next spring. In addition to the NALMA data, the GOES-R Convective Initiation (CI) product developed by UAH has also been available to WFO Huntsville forecasters in AWIPS II since this summer. We participated in formal evaluations of the CI product late this summer into the early fall (although feedback was limited by the lack of convective events) and an evaluation of the VIIRS DNB and MODIS and VIIRS nighttime microphysics RGBs from mid-September through the end of October. We were proud to be the first WFO on AWIPS II to host the CI and NALMA data sets. We look forward to obtaining the SPoRT LIS soil moisture data soon.

Most of the nine posts during the month of September detailed the use of MODIS and VIIRS DNB and nighttime microphysics imagery during an intensive evaluation held for several WFOs: Albuquerque, Great Falls, Huntsville, Morristown, Nashville, and Raleigh. One of these posts, "Another Benefit of Suomi NPP VIIRS Day/Night Band RGB Imagery", described the potential benefit of DNB imagery over other nighttime imagery, including nighttime microphysics RGBs in specific situations, such as the identification of warm, low clouds over the ocean surface and underneath cirrus. This represents another promising use for the unique DNB imagery, which will be explored further. Another post during the month showed Landsat imagery before and after the floods that devastated portions of the Longmont and Boulder, Colorado areas in September. The images helped to highlight the extreme flooding that took place there and offers more efficient, large-scale assessments of damage areas. The San Juan WFO contributed another post about the evaluation of the NESDIS QPE during a heavy rain event on September 14th. This post and the overall evaluation of the QPE product

by the San Juan WFO indicated the need for improvement to the product, detailing specific triumphs and failures of the data during the evaluation period and since. Product developers are gleaning great detail from their local expertise in tropical weather forecasting and the associated operational issues.

As usual, while we can't mention all posts made during the quarter for this article, we are very appreciative of the efforts of all of our collaborative authors. Please visit the Wide World of SPoRT blog to see these and other posts when you can, at <http://nasasport.wordpress.com>. If you would like to privilege to post on the SPoRT

blog, please send an email to Kris White ([kris.white@noaa.gov](mailto:kris.white@noaa.gov)). Some of our collaborative NWS offices have recently opened office accounts with us. If you'd like to do that, please let us know. Thanks and we hope you'll keep reading!



Graphic created by WFO Albuquerque showing VIIRS DNB Reflectance RGB, 20 August 2013 0905 UTC



# Publications

Molthan, A. L., J. E. Burks, K. M. McGrath, and F. J. LaFontaine, 2013: Multi-sensor examination of hail damage swaths for near real-time applications and assessment. *Journal of Operational Meteorology*, 1 (13), 144-156.

# Proposals Submitted

- GOES-R Visiting Scientist Program: “Expanding Total Lightning to Forecast Office and Aviation Applications”; PI: Geoffrey Stano, Co-Is: Lance Wood (WFO Houston), Tim Garner (SMG), Roland Nunez (CWSU Houston), Deirdre Kann (WFO Albuquerque), James Reynolds (CWSU Albuquerque), Nezette Rydell (WFO Boulder), Rob Cox (WFO Cheyenne), and William Bobb (CWSU Denver).
- GOES-R Risk Reduction: “Integration of Geostationary Lightning Mapper and Earth Networks Total Lightning Detections”; PIs: Geoffrey Stano and Stan Heckman (Earth Networks).

# Visitors

- Dr. Tsengdar Lee, Manager of NASA’s High End Computing Program, visited SPoRT on July 16-17 to receive an update about the SPoRT Program and meet with MSFC management.
- Dr. Bill Lapenta, Director of NOAA/NCEP Environmental Modeling Center, September 7-8

National Aeronautics and Space Administration  
**George C. Marshall Space Flight Center**  
Huntsville, AL 35812  
[www.nasa.gov/marshall](http://www.nasa.gov/marshall)

[www.nasa.gov](http://www.nasa.gov)

# Seminars

- July 17, Four NWS Hollings Scholars gave short presentations to the SPoRT staff on their summer projects in advance of their NWS presentation in Silver Springs. The titles and authors are listed below.
  - Getting to Know Dual-Pol: A Case Study Comparison of C-Band and S-Band Dual Polarization Radars in Northern Alabama, Jacquelyn Ringhausen (Saint Louis University) — NWS, Huntsville
  - A Tornado Climatology by Synoptic and Mesoscale Parameter and Storm Type for the Northern Alabama/South Central Tennessee Region, Kevin Biernat (Central Michigan University) — NWS, Huntsville
  - Squall Line Versus Supercell Tornadoes, Andy Wade (University of Oklahoma) — NWS, Birmingham
  - Improving National Weather Service Tornado Warnings, Addison Alford (University of Oklahoma) — NWS, Birmingham
- July 25, Dr. Mark Whorton (Teledyne Brown Engineering) — Earth Observations from the International Space Station: The Teledyne Multiple User System for Earth Sensing (MUSES). Dr. Whorton gave an exciting presentation of the MUSES system and operations overpass assessments, and preliminary pointing performance analyses. The International Space Station (ISS) is a unique and enabling asset for remote sensing to support many classes of earth science investigations, commercial earth observations, and humanitarian support. Designed as a research laboratory in low earth orbit, the ISS provides a cost efficient observing platform with an orbit that affords near-global landmass coverage from a low altitude

with frequent overpasses and short repeat times. Moreover, the well-defined interfaces, resources, and operations processes facilitate broad utilization by investigators and instrument developers. To more fully utilize the potential of ISS for earth remote sensing, Teledyne is developing the Multiple User System for Earth Sensing (MUSES). MUSES is an inertially-stabilized pointing facility that will accommodate multiple plug-and-play instruments, be capable of robotic instrument servicing, and nullify ISS attitude motions while orienting instruments at targets on the surface of the earth.

- August 5, Aaron Naeger (Atmospheric Science Department, University of Alabama in Huntsville) — Using the WRF-Chem model to Understand the Impact of Saharan Dust Aerosols on Tropical Cyclones.

# Calendar of Events

- October 12-17, 2013: NWS Annual meeting, Charleston, SC
- November 12-14, 2013: GOES-R Satellite Champion visit to SPoRT, Huntsville, AL
- November 12-13, 2013: 2013 Global Precipitation Measurement (GPM) Applications Workshop, College Park, MD
- December 3, 2013: 7th Annual NSSTC Science and Technology Jamboree, Huntsville, AL
- December 9-13, 2013: AGU Fall Meeting 2013, San Francisco, CA
- January 7-8, 2014: Soil Moisture Active Passive (SMAP) Applications Workshop on Health and Disease Exposure, Atlanta, GA
- February 2-6, 2014: AMS Annual Meeting 2014, Atlanta, GA