National Aeronautics and Space Administration

SPoRT Quarterly
April–June 2011

# The SPoRT REPORT

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

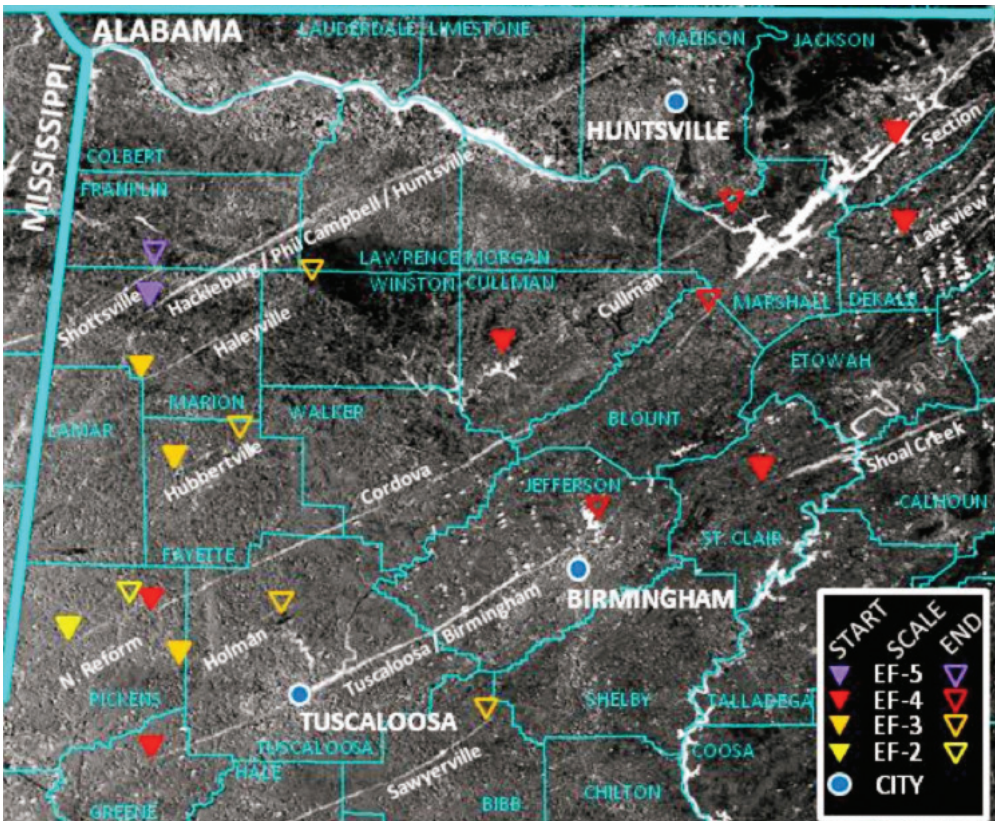
The SPoRT Center is a NASA-funded project to transition unique observations and research capabilities to the operational community to improve short-term weather forecasts on a regional scale. While the direct beneficiaries of these activities are selected Weather Forecast Offices (WFOs) in the Southern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

## Quarterly Highlights

### SPoRT Satellite Analysis Assists With April 27, 2011 Tornado Damage Assessments

The April 25–28, 2011 tornado outbreak will be long remembered across the southeastern United States for its intensity and duration. At its peak on April 27, several large, damaging, long-tracked tornadoes came very close to home for the SPoRT team. The tornadoes damaged several team members' houses, and created a region-wide power outage that kept the Huntsville area—including the SPoRT Center—in the dark for nearly a week.

Once SPoRT was back up and running, the team immediately focused on applying NASA data to help the long storm surveying process underway at a number of partner National Weather Service (NWS) weather forecast offices (WFOs). To aid in these efforts, SPoRT applied previously-documented research to high-resolution NASA satellite imagery. SPoRT routinely



disseminates MODIS true-color composites to partner WFOs at 500-meter resolution within the NWS AWIPS system. Use of the composite minimizes complex interpretation of the resulting imagery and can be easily communicated to survey teams for help in assessment. Kevin Laws, a senior forecaster at WFO Birmingham, AL reported, "We used the data to confirm that the Tuscaloosa tornado start point was in Greene County, as we suspected. This was initially confusing because we had leftover damage from the April 15th event that could have been easily attributed to April 27th. The April 15th paths did not show up on the data, at least not like the 27th."

To supplement the true color imagery, SPoRT produced a 250-meter resolution image of the difference in MODIS red visible channel reflectance obtained before and after the storm. By differencing the pre- and post-event imagery, damage tracks are enhanced due to sharp changes in reflectance where the vegetation has been destroyed. The broad regional view provided by the MODIS difference image illuminates several damage tracks across the region. Many of the strongest, longest lived, and widest track tornadoes are apparent in contrast to other variations. The MODIS difference image captured all but one of the damage paths from the 21 tornadoes categorized as EF–3 or greater in northern Alabama, along with several weaker tornadoes.

SPoRT also requested data from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) instrument flown aboard the Terra satellite. The ASTER instrument provides visible band imagery at 15 meter resolution, but over a smaller coverage area. At higher resolution, ASTER can identify features as small as homes within subdivisions and complex road networks. Visible and near-infrared bands were combined into a color composite that vibrantly displayed vegetation in red and green colors, compared to areas with sparse vegetation that showed up as cyan. These ASTER color composites were provided in a KML format to affected WFOs to supplement other storm data and survey information from the April 27 event. Meteorologists at WFO Huntsville, AL used ASTER imagery to adjust the ground track of an EF–5 tornado that originated near Smithville, Mississippi, and tracked into southern Franklin County, Alabama. Poor road networks and time limitations hampered efforts to obtain a precise path length and end point, but ASTER imagery confirmed that the tornado continued along a 1.6–mile path into southern Franklin County. The ASTER imagery was also used to make several adjustments to a long-track EF–5 tornado that remained on the ground for nearly 130 miles in north Alabama. In addition, SPoRT analyzed ASTER imagery from the Joplin, Missouri EF–5 tornado that struck on May 22, yielding very similar results.

These examples demonstrate the value of remote sensing in disaster assessment and collaboration between the research and end user communities embodied by SPoRT. ASTER and MODIS data contributed to the assessment of the event, and examples from April 27, 2011 (see http://weather.msfc.nasa.gov/sport/tornadoes/) will encourage additional use. Future efforts will focus on image enhancement techniques to improve storm damage detection and means of expediting the release of data to NWS storm survey teams.

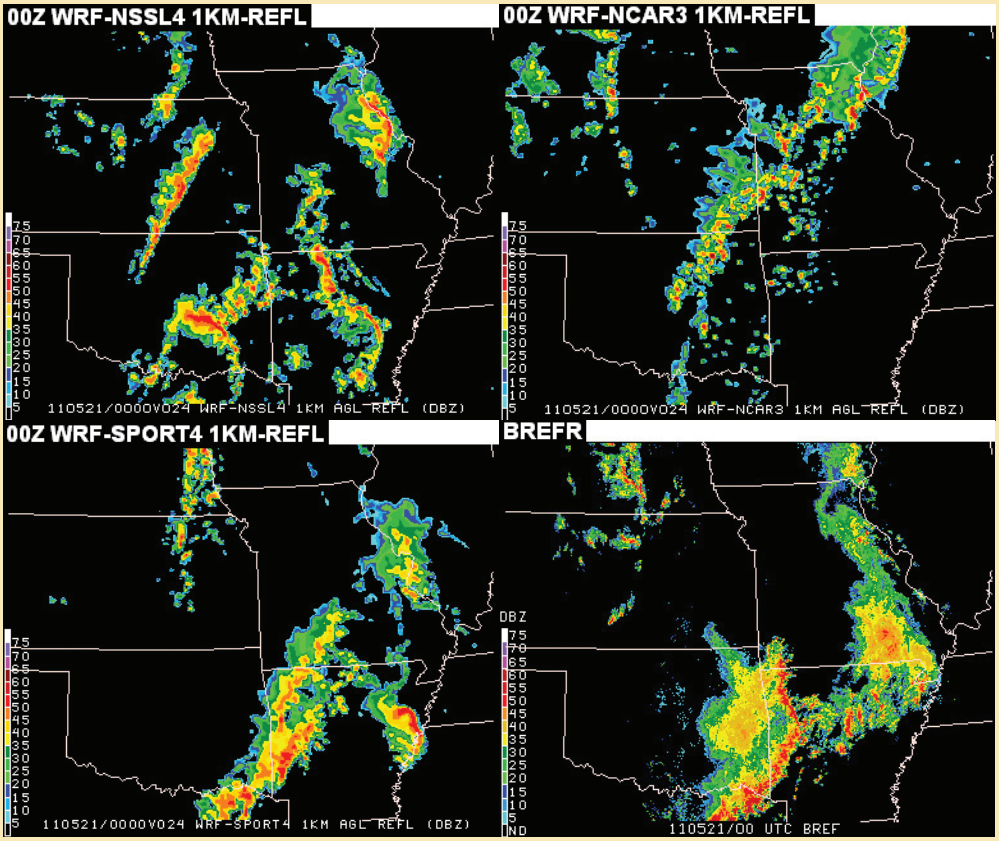



*Figure 1: An example of the NSSL's model comparison page from the EFP. This image shows model produced radar reflectivity from the NSSL-WRF (upper-left), NCAR-WRF (upper-right), and SPoRT-WRF (lower-left), as well as the actual radar observations (lower-right) on May 21, 2011 at 00 UTC. The SPoRT-WRF performed particularly well on this day as it had the best combination of storm intensity and orientation compared to the actual radar observations.*

## SPoRT Spring Experiment

The NASA SPoRT program had a strong presence at the 2011 Spring Experiment, outlined in the previous SPoRT Quarterly article, "SPoRT Involvement in the Hazardous Weather Testbed 2011 Spring Experiment." This article will focus on the results, feedback, and conclusions that came from the three components of the Spring Experiment. These are the Experimental Forecast Program (EFP), the Experimental Warning Program (EWP), and the GOES-R Proving Ground (PG), which spans both activities.

For the EFP, SPoRT produced a configuration of the Weather Research and Forecasting (WRF) model containing unique NASA data and capabilities (hereafter called the SPoRT-WRF). The SPoRT-WRF is unique in that it includes higher resolution land surface information from the real-time NASA Land Information System (LIS), daily greenness vegetation fraction measurements from the Moderate Resolution Imaging Spectroradiometer (MODIS), sea surface temperatures that blend data from MODIS and the Advanced Microwave Scanning Radiometer for the Earth Observing

System (AMSR-E), and assimilation of thermodynamic profiles from the Advanced Infrared Sounder (AIRS). Also, the WRF Lightning Forecast Algorithm (LFA) was implemented in the NASA SPoRT-WRF, NSSL WRF, and the Center for the Analysis and Prediction of Storms (CAPS) ensemble forecasts. For this year's EFP Bill McCaul, Jonathan Case, and Bradley Zavodsky attended for a full week each from May 23 to June 10 respectively.

Participants at the EFP evaluated a number of probabilistic and deterministic forecasts for how well they aided in three unique forecast challenges: severe thunderstorm forecasting, quantitative precipitation forecasting (QPF), and convective initiation (CI) forecasting. Spring Experiment participants worked within the operational Storm Prediction Center (SPC) environment of issuing slight, moderate, or high risks for each weather hazard. The SPoRT-WRF was compared directly to the NSSL WRF at the severe thunderstorm forecast desk.

The NASA SPoRT products had an impact as the differences between the NSSL-WRF and SPoRT-WRF were quite large at times. The overall trend was that the SPoRT-WRF tended to be less aggressive with convective development and severe storms. Preliminary assessments suggest two possible causes. First, the assimilation of AIRS profile data over land resulted in systematic reductions in the total precipitable water field, which may have led to a reduction in water vapor necessary to support intense convection. Secondly, a systematic cooling of the 2-m temperature fields was seen in the SPoRT-WRF model, which may have led to a reduction in the convective available potential energy and subsequent convection. The causes will be investigated by performing additional data denial experiments this summer. Based on these initial observations SPoRT will work to improve the SPoRT-WRF model for evaluation at future EFPs.

The WRF LFA (Figure 2) was used alongside two other methods for assessing the occurrence of convective initiation in the forecast models. All three methods ultimately produced very similar patterns. Only the amplitudes and footprint sizes of the patterns differed slightly between the methods. In most cases, the WRF LFA tended to be more conservative, producing a slightly smaller CI footprint. Based on outputs from both the WRF LFA and other methods, there remains considerable uncertainty about the exact definition of CI. The WRF LFA was used by the convective forecasting team to aid in pinpointing predicted locations of CI. Additionally, CAPS ensemble LFA outputs will be used in future SPoRT/GOES-R research endeavors to refine the calibration of the LFA for convective storms with high lightning flash rates.

The EWP patterns its activities on a local forecast office and evaluates the impact of products in the warning decision process. SPoRT supported the transition of the University of Alabama in Huntsville's SATCAST convective initiation product. However, SPoRT was primarily involved in the development and evaluation of the pseudo-geostationary lightning mapper (PGLM) products. Developed by SPoRT in 2009, the PGLM improves the evaluation of Geostationary Lightning Mapper (GLM) demonstration data until the official proxy product is released. This collaborative effort involves the National Severe Storms Laboratory locally producing and displaying the PGLM from data provided by their own network and the three networks provided by SPoRT (North Alabama, Washington D.C., and Kennedy Space Center). Geoffrey Stano participated as the total lightning expert during the week of May 9–13 and created the PGLM training module used by the forecasters in 2010 and 2011.

SPoRT provided three PGLM products. These include the original PGLM and a flash initiation density that only plots the origin points of flashes. A max density product showed the greatest number of flashes in a particular 8-km grid box in the past 60 or 120 minutes. Figure 3 shows the PGLM and max density in comparison with radar reflectivity. While the PGLM and its variants are more training tools than an actual GLM proxy, evaluators were impressed with the potential to improve lightning safety. The PGLM products aided the assessment of cloud-to-ground lightning initiation and the spatial extent of the lightning threat. Furthermore, the PGLM was assessed to provide lead time on severe weather warnings through the observation of lightning jumps. Evaluators also considered ways to improve the PGLM, which may directly affect how the future GLM data will be displayed. Evaluators requested a cloud-to-ground to intra-cloud ratio product, reiterated interest in a lightning jump algorithm, and expressed interest in improving the maximum density product. SPoRT will use this to improve the PGLM for 2012 and develop an enhanced training module.

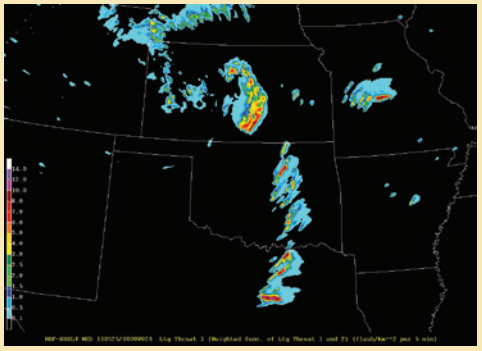


*Figure 2: An example of the Lightning Forecast Algorithm from the NSSL-WRF displayed in N-AWIPS during the Experimental Forecast Program. This particular example is from May 25, 2011 on the day of the tornado outbreak across Oklahoma. The units are flashes per square km per 5 min.*

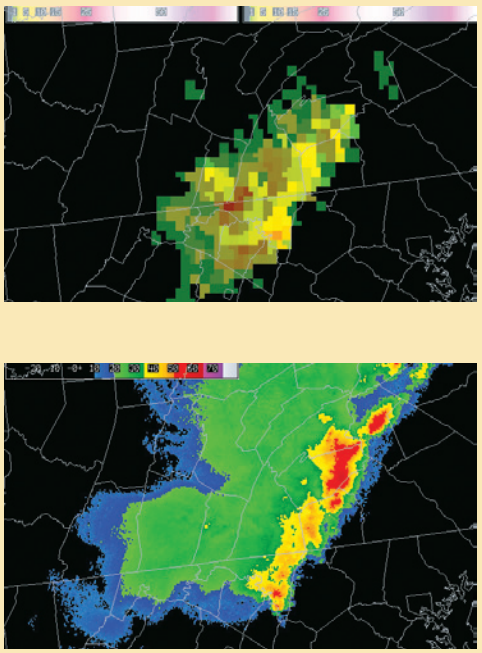


*Figure 3: An example of the 2-min PGLM flash extent density (top, bright colors) and the 60-min PGLM maximum flash density (top, faded colors) in comparison to radar reflectivity (bottom) using data from the Washington D.C. Lightning Mapping Array provided by SPoRT to the EWP. The maximum flash density shows where lightning has been for the past hour and where the threat may still persist, particularly in the stratiform region to the west of the line of storms. The PGLM flash extent observations are strongest in the highest reflectivity region but show that lightning is extending west, well into the stratiform region.*

# Student Interns

SPoRT is hosting three student interns under the Marshall Space Grant Research (MSGR) and the NASA Undergraduate Student Research Project (USRP) programs.

Growing up in St. Louis, MO played a large role in **Danielle Kozlowski's** love for weather. As a senior at the University of Missouri, she is pursuing an undergraduate degree in atmospheric science with minors in mathematics and geographic information systems (GIS). She will graduate this December with her Bachelor's Degree in atmospherics science and will most likely start graduate school in January. This has been her second summer interning here in Huntsville, AL at the NASA SPoRT Center with Bradley Zavodsky, working on research specifically related to AIRS profiles. Her research project is being conducted on a case study from the Super Tornado Outbreak that occurred in Alabama during the month of April. This case study covers the days of April 25–27 where severe weather occurred in both the Central and Southeast United States.

One challenge that forecasters face is using numerical models that do not correctly predict mesoscale convective weather. In order to address this specific forecast challenge, SPoRT produces real-time mesoscale model forecasts using the Weather Research and Forecasting model (WRF-ARW) that includes unique NASA products and capabilities including information from the NASA 4–km Land Information System (LIS), NASA 1–km SPoRT SST analysis and NASA 1–km MODIS Greenness Vegetation Fraction (GVF) analysis, and retrieved thermodynamic profiles from the Atmospheric Infrared Sounder (AIRS), which are assimilated into the local SPoRT WRF model at 0900 UTC. AIRS is a sounding instrument aboard NASA's Aqua satellite that provides temperature and moisture profiles of the atmosphere. Danielle evaluated the impact of AIRS profiles on SPoRT WRF forecasts for a case study from the significant tornado outbreak across Central and Southeastern United States during the days of April 25–27, 2011. Three different forecasts were analyzed including the NSSL WRF, the SPoRT WRF, and the SPoRT WRF without AIRS data. Radar reflectivity simulated from these three forecasts were then verified against radar composites developed by NSSL. Differences between the simulated and observed reflectivity were further investigated using variables that describe how conducive the atmosphere is for convective weather including convective available potential energy (CAPE), total precipitable water (TPW), helicity, convective inhibition (CIN) along with the model atmospheric soundings and observed soundings taken from AIRS. After analyzing these forecasts, initial results show that AIRS data do have an impact on the convective forecasts. However, a further in-depth analysis will be needed to tell whether it was a positive or negative impact.

**Jordan Bell** is a senior at the University of Missouri. Growing up in Missouri, Jordan was first exposed to weather in elementary school. He was instantly hooked and decided to pursue a degree in atmospheric science. Jordan is also working on attaining either his GIS certificate or minor. He has served as treasurer for the campus chapter of the AMS/NWA club for the past 2 years. This coming school year, Jordan will serve as President of the chapter. He is also a Co-Chair for the Mizzou Storm Chase Team. Jordan is working with Jonathan Case on a project to assess

# WFO Corner

## Huntsville (HUN)

Several forecasters used the hybrid routinely in day-to-day operations during the GOES-R evaluation period, and they continue using it in their routine procedures even after the end of the evaluation. MODIS and MODIS-GOES hybrid imagery have been used in concert with routine GOES imagery and radar data to find and track wildfires, which were common across the northern half of the Alabama during the recent dry spell. In addition, soil moisture data from the NASA LIS has been used to help diagnose drought conditions for the WFO's input to the National Drought Monitor.

## Birmingham (BMX)

As part of the 3rd consecutive summer study by BMX, forecasters have used the NASA LIS multilayer surface analysis to look for gradients of moisture and heat flux that could enhance convective initiation and/or growth. Several SPoRT staff and NASA summer interns visited BMX to see its application first hand and collaborate with BMX forecasters. Application of LIS with other AWIPS data sets has been made possible, and SPoRT has worked with NWS Southern Region HQ as well as BMX staff to improve the LDM methodology to ingest LIS. These improvements will be propagated to other SPoRT WFO partners to minimize bandwidth impacts.

## Miami (MFL)

The Miami, FL WFO has been using the LIS in their local WRF model for some time now as well as the MODIS/AMSR-E SST composite developed by SPoRT. A student at MFL is making progress to verify model output against stage IV rainfall data and standard threat score computations. They also intend to compare WRF runs with and without the SPoRT-provided datasets. The CIRA Blended TPW that incorporates microwave retrievals of TWP over land via the Microwave Integrated Retrieval System (MIRS) continues to be a fantastic tool in MFL operations to track surges of moisture from the tropics. Early in June when semi-permanent high pressure occurred over the Southeast, the associated anomaly product showed a large area of below normal TPW across the region with a very strong gradient to the south stretching for over a thousand miles west to east from the southern Gulf across the islands and into the Lesser Antilles. This normally marks a pattern of a potential rapid transition from dry to wet once the ridge breaks down,

the SPoRT Greenness Vegetation Fraction (GVF) derived from Moderate Resolution Imaging Spectroradiometer (MODIS) data, and its impacts on the Noah land surface model and Weather Research and Forecasting (WRF) prediction model. One objective of the project is to compare the 2010 warm season (June 1–Oct. 31) daily SPoRT GVF data to the National Centers for Environmental Prediction (NCEP) climatology that is used in current operational numerical models and assess how these data affect surface fluxes in the NOAH land surface model as run within the NASA Land Information System (LIS). A second objective is to measure the sensitivity and possible improvements to the WRF model using the higher-resolution real-time SPoRT versus the NCEP climatology GVF data. A few severe weather outbreaks were selected from the period of study, using an offline LIS/Noah run to initialize the WRF land surface conditions. The WRF simulations for the selected dates were run with the two datasets to examine the impacts of the SPoRT real-time GVF data on the severe weather episodes.

Growing up in rural northwestern Missouri, **Hayden Oswald** was exposed to many forms of weather. As a junior at the University of Missouri, he is pursuing an undergraduate degree in atmospheric science with minors in mathematics and geographic information systems (GIS). His goal is to pursue a doctoral degree in meteorology and subsequently a career in atmospheric science research with an emphasis on radar meteorology and convective weather. Hayden has been analyzing two new multispectral satellite imagery products under development at SPoRT. The first product is a nighttime microphysics image produced by combining three channels of information into a single red-green-blue (RGB) color composite image. The approach uses a combination of infrared window channels and their differences to contrast cloud properties. Although originally conceived by EUMETSAT for use with the SEVIRI imager, SPoRT is applying its technique to MODIS data. This imagery will provide operational forecasters with a better means of identifying and analyzing nocturnal fog events than what is currently being utilized. The second multispectral product under analysis is air mass imagery used by EUMETSAT to enhance understanding of mid-tropospheric water vapor variations and the dynamical structure of storm systems. For its application to weather analysis over the U.S., MODIS channel differences in an infrared window, ozone, and water vapor channels are used to produce an RGB composite image. While traditional water vapor imagery requires the user to identify features based upon his/her interpretation skills, air mass imagery distinctly separates features such as conveyor belts, vorticity maxima, and fronts associated with atmospheric circulations. This imagery has potential to allow forecasters to track these features in real time, especially when ground-based observations are not available. Since the Advanced Baseline Imager on the GOES-R satellite will have a comparable spectral range to the MODIS imager, both of these image products will also serve as a preview of GOES-R's capabilities to forecasters.

which is what happened later in the month. In addition, this season MFL has observed a persistent easterly wave tracking pattern that bends or breaks off northward toward the FL peninsula as they move across the E. Atlantic and Caribbean islands. This has been observed and tracked nicely with the CIRA Blended TPW and Anomaly products.

## Corpus Christi (CRP)

Forecasters have been using the MODIS, and MODIS-GOES Hybrid 3.9 micron imagery to monitor wildfires. In addition, the SPoRT Enhanced MODIS SST Composite has been used for situational awareness within AWIPS/D-2d and CRP plans to use the SPoRT SST data in local WRF runs upon completion of a hardware upgrade.

## Albuquerque (ABQ)

During the large wildfire events in Arizona and New Mexico, forecasters used the MODIS True Color and Snow-Cloud RGBs to see details in the smoke plume signatures. ABQ also expressed a desire to have a product that can distinguish between near-surface smoke and the upper portions of the plume.

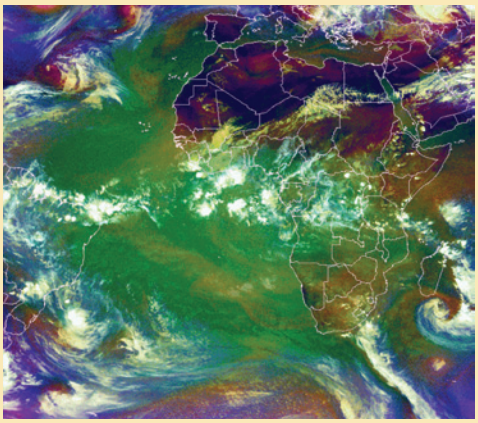
## Melbourne (MLB)

SPoRT has collaborated with MLB to provide the GOES-R AWG proxy product for Convective Initiation developed by the University of Alabama Huntsville. MLB and two other WFOs will begin a testbed evaluation of the product within AWIPS to examine the value of its application before wider implementation with SPoRT partners.

## RGB Imagery made available in NAWIPS for National Centers

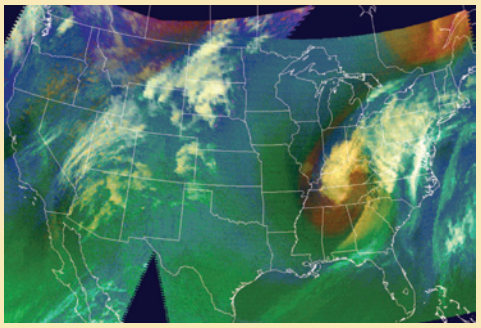
SPoRT has been providing red, green, and blue (RGB) color composite imagery in AWIPS to its WFO partners over the last several years via MODIS single swath data. There have been two primary products: a True Color image (what your eye would see from space) and a Snow-Cloud image (differs snow on the ground from clouds and bare ground). Forecasters in Europe have benefited from EUMETSAT development of standard suite of RGB products via the SEVIRI instrument, in geostationary orbit aboard Meteosat-9. This same benefit will be realized in the future GOES-R era over the U.S., hence, the GOES-R Proving Ground (PG) has sought to begin testing such RGB products in U.S. forecast operations. As a PG partner, CIRA had provided SEVIRI data via Goggle Earth to the National Hurricane Center (NHC) in 2010, but users requested that the imagery be incorporated into their native display system for combined use with existing products. With its previous experience in providing MODIS RGBs

via AWIPS to WFOs, SPoRT developed code to transform the 24-bit SEVIRI RGB product into a file format that uses less than 8 bits to color the image, thereby making the data displayable in NAWIPS used by National Centers. As part of GOES-R Proving Ground activities, SPoRT has begun producing a suite of seven RGB products from SEVIRI products covering the Atlantic Ocean for use by NHC, as well as the Ocean Prediction Center (OPC), in the upcoming 2011 tropical season.



*Air Mass RGB from SEVIRI data formatted by SPoRT to a 95-color display for use within NAWIPS by the National Hurricane Center*

In addition, SPoRT is collaborating with CIRA to transition their RGB products that use channels from the current GOES Sounder, which covers the U.S. but at a lower resolution than the GOES-R ABI. SPoRT is also using the EUMETSAT guidelines to create a standard suite of RGB imagery from MODIS for consistency with EUMETSAT cases and training. Imagery from MODIS and the GOES Sounder are to be provided to SPoRT WFO partners as well as National Centers with a more U.S.-based focus, such as the NWS Hydrometeorological Prediction Center (HPC).



*Air Mass RGB over CONUS using channels from the GOES Sounder (West and East) displayed in NAWIPS. Channels provided by CIRA and formatted to the 95-color requirement by SPoRT*

# Recent Accomplishments

## Eastern Region Collaboration

SPoRT continues to be involved in product evaluation and forecast impact studies within the National Weather Service Eastern Region, collaborating with offices adjacent to the Great Lakes. These forecast offices have previously evaluated a SPoRT Great Lakes Surface Temperature Composite and ice analysis that is based upon the SPoRT sea surface temperature compositing technique, but applied over the Great Lakes, based upon clear sky infrared data from MODIS. Ice analysis is provided through the NOAA Great Lakes Environmental Research Laboratory, with ice pixels set to subzero temperatures so that integration within local versions of the Weather Research and Forecasting Model permits a seamless match between the analysis product and model initialization. SPoRT is developing statistics on product performance to share with Eastern Region forecast offices in response to a request that was submitted during the evaluation period. As the next lake-effect season approaches, SPoRT will continue to provide the Great Lakes temperature product and also plans to collaborate with the regional forecast ensemble effort to evaluate the impacts of various lake temperature initializations and other model physics packages.

## SPoRT Data Assimilation Efforts

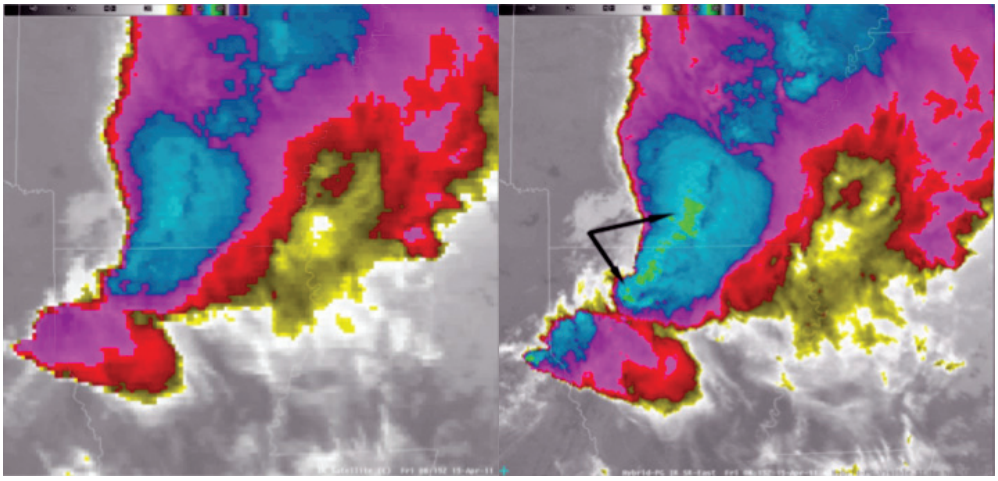
SPoRT has completed development and implementation of a modeling/data assimilation system using WRF/GSI to mimic the current operational configuration at NCEP. SPoRT is running the operational configuration in research mode to evaluate the impact of AIRS profiles and AIRS radiances on numerical weather forecasts in an operational environment. The operational configuration uses a 12-hr "mini-cycle" for assimilation at each forecast time (4 times daily) by beginning a forecast/assimilation cycle at time minus 12-hr and assimilating available observations at three hour intervals until the final (current) analysis time. A 3-hr forecast initialized from the previous analysis is used as the background for each subsequent analysis. The final analysis is then used to initialize the current forecast and to act as the background field for the beginning of the next 12-hr cycle. Scripts necessary to mimic this setup at SPoRT have been developed to assimilate operational conventional and satellite observations. The script is based on V3.3 of WRF and V3 of the Developmental Testbed Center's GSI code. All real-time conventional and satellite observations used within the current operational configuration are obtained in real-time from NCEP's public FTP server and used within the assimilation system. Real-time AIRS L2 profile observations are then obtained from NASA LANCE and added to the NCEP observations for the experiments that test the impact of AIRS profiles.

## WRF LIS Studies

SPoRT successfully added the real-time LIS products in GRIB-2 format into the SPoRT data feed transmitted via the local data manager. This move will enable SPoRT partner offices, such as the NWS Birmingham WFO, to ingest the LIS data for display in AWIPS. The Huntsville WFO has already successfully displayed LIS fields from both the 1-km Alabama and 3-km Eastern U.S. grids into their AWIPS. In addition, the real-time LIS began incorporating the SPoRT-MODIS greenness vegetation fraction (GVF) composite dataset, which has been updated daily using real-time MODIS swath data since June 1, 2010.

## Evaluation of Hybrid Imagery for GOES-R Proving Ground

Eight of SPoRT's WFO partners (ABQ, CRP, HGX, HUN, JAN, MLB, MRX, OHX) evaluated the SPoRT Hybrid Imagery, an ABI-like imagery product demonstrating future GOES-R capabilities, during an intensive evaluation period from April 14 to May 24 ( a week interruption during this period occurred due to April 27 tornadic outbreak). MODIS imagery for the visible, long and short wave IR, as well as water vapor is remapped to the ABI resolution and projection and inserted into a base GOES image. Nearly 40 user surveys were collected during this time, and multiple products were evaluated per survey. About three-fourths of the reviewers were self-described as experienced or experts in satellite applications and indicated that they recommended the product to their peers. The operational application of the hybrid imagery included the examination of dust, smoke, and moisture plumes, but the majority of its use was applied to situations with convective or low cloud features. When asked to rate the impact of the product in operations, 74% indicated that there was "some" to "large" impact in their operations. User comments and blog posts focused on several improvements over standard GOES imagery including more specific identification of cold cloud top area, enhanced view of blowing dust, improved spatial definition of fire hot spots and smoke, improved location and orientation of approaching fronts, and better cloud coverage and structure in the visible imagery.



*Application example from OHX regarding convective cloud features. Left image shows GOES 10.7u channel at 0815Z on April 15, 2011. Right image shows same time except MODIS imagery has been remapped to ABI resolution and inserted. Note the arrows in lower image showing improved detail of the coldest cloud top locations.*

# Recent Publications and Presentations

## Proposals

- Funded collaborations with the JCSDA. A proposal entitled "Improved Impact of Atmospheric Infrared Sounder Radiance Assimilation in Numerical Weather Prediction" submitted to ROSES10 A.24 Enhancing the Capability of Computational Earth System Models and NASA Data for Operation and Assessment with SPoRT scientists Bradley Zavodsky (NASA) as PI and Gary Jedlovec (NASA), Shih-Hung Chou (NASA), and Matthew Rigney (UAHuntsville) as Co-Is was selected for funding. This proposal was submitted to a section of the A.24 call aimed at the Joint Center for Satellite Data Assimilation (JCSDA) with the goal of better understanding why some experiments have shown larger impact from assimilating thermodynamic retrieved profiles instead of raw radiances. Using SPoRT's new "Weather in a Box" desktop supercomputers, parallel analysis and model runs that mimic the operational Gridpoint Statistical Interpolation (GSI) data assimilation system run at the National Centers for Environmental Prediction (NCEP) will be performed using AIRS profiles and AIRS radiances. Then, the analysis impacts of each will be compared to better understand where the assimilation of the radiances may be limited by the operational assimilation methodology.

## Seminars

- April 25, 2011: Use of Satellite-Derived Smoke Emissions and Aerosol Optical Thickness for Air and Water Quality Decision Support Applications—Dr. Udaysankar S. Nair, Earth System Science Center. Abstract: Alabama Forestry Commission (AFC) is responsible for detection and control of wildfire and also for issuing burn permits for prescribe burn activities. Two concerns associated with smoke from wild fires and prescribe burns are adverse health impact and visibility reduction. Currently the AFC do not have access

to forecasts products or modeling systems to assist in decisions related to wildfire control and smoke management. An interactive modeling system is being developed for assisting AFC for decision support related to control burn activities. An emissions database developed using satellite derived smoke emissions will be used for driving this modeling system. In addition, a customized forecasting system for air quality and visibility during wild fire events is also being developed.

- June 28, 2011: Mapping Tornado Damage Tracks with NASA Satellite Data—Dr. Gary Jedlovec, NASA SPoRT Center and Brian Carcione, National Weather Service. Abstract: Satellite remote sensing from MODIS and ASTER played a helpful role in the location of tornado damage paths and assessment. For example, MODIS 250-m single and 500-m multichannel (RGB) imagery was used by numerous forecasters at several WFOs to corroborate their damage assessments with other offices. The ASTER instrument, which provides visible band imagery at 15-m resolution, but over a smaller coverage area was used to identify features as small as homes within subdivisions and complex road networks associated with urbanization. Although visible bands on ASTER are fewer in number and differ slightly from MODIS, combinations of ASTER channels produce vibrant false color composites useful for identifying storm damage tracks. The seminar will focus on the tornado events, satellite data analysis, and integration of satellite and radar data."
- July 26, 2011: Student Presentations:
  - Evaluating the Impacts of NASA Atmospheric Infrared Sounder Profiles on Short-Term Forecasts—Danielle Kozlowski, University of Missouri
  - Developing and Evaluating RGB Composite MODIS Imagery for Applications in National Weather Service Forecast Offices—Hayden Oswald, University of Missouri –Evaluating the Impacts of NASA/SPoRT Daily Vegetation Fraction on Land Surface Model and Numerical Weather Forecasts—Jordan Bell, University of Missouri
  - An Overview of Summer Convection over Central Alabama—Genki Kino, University of Hawaii and NWS Birmingham
- August 25: An Introduction to Cloud Computing and NASA Cloud Services from a Science User Perspective, by Andrew Molthan.

## Publications


Case, J.L., S.V. Kumar, J. Srikishen, and G.J. Jedlovec, 2011: Improving numerical weather predictions of summertime precipitation over the Southeastern U.S. through a high-resolution initialization of the surface state. Wea. Forecasting, In Press. doi:10.1175/2011WAF2222455.1. [Available in early online release form at http://journals.ametsoc.org/doi/pdf/10.1175/2011WAF2222455.1]

Chou, S.-H., 2011: An Example of Vertical Resolution Impact on WRF-Var Analyses. National Weather Association/Electronic Journal of Operational Meteorology. [Available online at http://www.nwas.org/ej/2011/2011.php.]


## Conference

- Chou, S.-H. 2011: Impact of Vertical Resolution on WRF-Var Analyses. 12th WRF User's Workshop, Boulder, CO, June 20–24.

## External Workshops/ Meetings Attend

- Visit to Miami WFO – April 4, Andrew Molthan
- NOAA Satellite Direct Readout Conference, Miami, FL, April 4–8, Andrew Molthan gave a presentation on SPoRT's activities in the GOES-R Proving Ground
- Visit to NHC – April 6, Andrew Molthan
- GOES-R PG Annual Meeting, May 17–19, Boulder, Gary Jedlovec presented results of SPoRT's participation in the GOES-R Proving Ground activities.

# Calendar of Events

- July 11–14, 2011 Southern Thunder Workshop, Norman, OK
- July 26, SPoRT Seminar Series: Intern presentations
- July 26–28, GOES-R Proving Ground OCONUS Meeting, Juneau, AK
- August 16–19, AWIPS2 Satellite Technical Interchange Meeting, Omaha, NE
- August 22–26, WFO Road trip – Jackson, Slidell, Southeast RFC, and Mobile
- August 25, SPoRT Seminar Series: An Introduction to Cloud Computing and NASA Cloud Services from a Science User Perspective, by Andrew Molthan
- August 30–31, SPoRT – WFO Virtual Workshop
- September 28–29, NASA Missions Application Workshop, Arlington, VA.
- October 17–20, 2011 National Weather Association Annual Meeting, Birmingham, AL
- October 20–21, GOES Users Conference, Birmingham, AL.


National Aeronautics and Space Administration

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