



SPoRT Quarterly
Jan. – Mar. 2012

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- 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 Science Advisory Committee (SAC)

The Sixth SPoRT Science Advisory Committee (SAC) meeting was held on February 28–March 1 in Huntsville, Alabama. The SAC meeting is held every two years to review the progress the SPoRT team has made in transitioning unique experimental data and research capabilities to the operational weather community. This year's two and a half day meeting included presentations by SPoRT team members covering the breath of SPoRT research and transition activities, an AWIPS II demonstration, and an interactive conference call with technical staff from SPoRT's collaborating WFOs. The SAC is composed of scientists from the community who are familiar with current observational capabilities and forecasting activities of the National Weather Service. Additionally,

SPoRT invited observers from various other organizations to assist the SAC in their assessment of the SPoRT program. A listing of the current SAC members and the individual presentations can be found on the SPoRT web site http://weather.msfc.nasa.gov/sport/sac_reports/.

On the last day of the meeting, the SAC provided attendees a preliminary assessment of the SPoRT program based on the previous days presentations and discussions. Rusty Billingsley (Southern Region SSD Chief, and Chair) reported that the SAC was quite impressed with the energy, commitment, and progress the SPoRT team has made over the last two years in addressing relevant transition to operation issues. The actions

taken by SPoRT on the expansion of product transitions to other WFOs (based on the recommendations from March 2010 SSD Chief meeting), the initiation of collaborations the National Centers, and the enhanced interactions with scientists from the NOAA Cooperative Institutes exceeded the SAC expectations. The SAC was impressed with SPoRT's recent work with the application of the MODIS Hybrid and RGB imagery, the use of the PsuedoGLM products, and the efforts to "port" the products to the NAWIPS and AWIPS II environment. The SAC also recognized the increased effort to develop more quantitative metrics for measuring success. The SAC's written report containing specific feedback and recommendations will be finalized within the next few months.

Recent Accomplishments

Modeling collaborations with Arctic Region Supercomputing Center Staff

Through collaborations partially funded by the Alaska Space Grant Program, Brad Zavodsky has been closely working with Dr. Don Morton at the Arctic Region Supercomputing Center at the University of Alaska Fairbanks to bring retrieved profiles from the Atmospheric Infrared Sounder (AIRS) into an operational forecast model. Don works very closely with Alaska National Weather Service (NWS) Weather Forecast Offices (WFOs) by providing an operational version of the High Resolution Rapid Refresh configured for an Alaska domain (HRRRAK) to help improve short-term forecasts. Mr. Zavodsky has provided Dr. Morton near-real-time AIRS retrieved profiles and guidance on configuring and running the Gridpoint Statistical Interpolation (GSI) data assimilation system to most effectively bring the observations into the operational forecasting system. Testing of the impact of the AIRS profiles within the system will continue and these specialized forecasts which include the AIRS profiles will be provided each day to Alaska region WFOs.

Experimental Products Developmental Team (EPDT) for AWIPS II

SPoRT has formed an Experimental Products Development Team (EPDT) to focus on the generation of advanced display capabilities for the use of NASA research data in the AWIPS II environment. The use of unique satellite and ground-based weather data in AWIPS II requires non-standard software to properly ingest, analyze, and display the research products for use by NWS forecasters. NOAA has asked SPoRT to expand this effort to bring together staff from SPoRT, NOAA's Cooperative Institutes, and the NWS in order to develop a critical mass of technical expertise (outside of Raytheon's AWIPS II development team) to focus on the demonstration and use of non-operational tools which could eventually be integrated into baseline AWIPS II operations. This team will gain working knowledge of the

WFO Corner

This section reflects contributions directly from forecasters at the various WFOs.

Great Lakes Activities — SPoRT concluded a collaborative modeling research project with the NWS forecast office in Gaylord, MI, examining the impacts of microphysics and lake surface temperature on the simulation of lake-effect snowfall events in the region. Justin Arnott, the Science and Operations Officer at NWS Gaylord identified an event of interest from the 2011 season, which was well observed by local cooperative stations and radar. SPoRT assisted Justin by simulating this well observed

strengths and weaknesses of the AWIPS II environment for the display of future operational data and be a valuable resource for the NWS/Raytheon team charged with developing operational AWIPS II capabilities. While the current size and focus of the EPDT is limited, it is envisioned that the team will expand to include a broader representation of AWIPS II developers and technical staff in the community.

Preliminary Model verification for SPoRT-SERVIR model runs:

SPoRT has partnered with NASA/SERVIR program to improve modeling capabilities over Mesoamerica and provide the means to produce systematic verification to determine weather forecast model performance over the region. In support of this effort, preliminary verification statistics have been generated for daily WRF model runs from October to December 2011 over a domain covering Central America and the Caribbean. SPoRT scientists have developed a suite of scripts to generate model verification statistics using the National Center for Atmospheric Research Meteorological Evaluation Tools (MET) package. Surface and upper-air point error statistics were produced along with gridded precipitation verification statistics using available observational data within the NCEP Global Data Assimilation System prebufr files, and the Climate Prediction Center morphing (CMORPH) product for ground-truth precipitation. The results are being used to provide SERVIR with recommendations for improving the model configuration used for weather forecasts over the region.

event using a variety of parameterization schemes representing the planetary boundary layer and cloud microphysical processes in order to understand how these parameterizations impact the resulting simulations. Schemes emphasizing the production of graupel tended to produce precipitation maximums nearer to the lake shore, whereas schemes preferring the development of snow extended the band of precipitation further inland. Results from this case study were used to guide changes to the WRF-EMS configuration used at the Gaylord forecast office for the 2012 season. During the 2012 season, SPoRT assisted by performing a control experiment based upon the previous Gaylord configuration in order to isolate the impact of changes in microphysics. In addition, SPoRT and the Gaylord WFO collaborated to perform an additional series of forecasts comparing the use of the default NCEP Sea and Great Lakes surface temperature composite versus the use of the SPoRT Great Lakes surface temperature composite. Although changes in SST and resulting changes in ice cover had some minor impacts, larger impacts were obtained from changes in the microphysics by selecting a double-moment representation available from the Morrison scheme. Results from these experiments were presented by Justin Arnott and Andrew Molthan (SPoRT) during the 20th Great Lakes Operational Meteorology Workshop held in mid-March in downtown Chicago, Illinois. Results from the experiments will also be briefed to other Great Lakes forecast offices during an upcoming webinar hosted at NWS Eastern Region Headquarters.

Morristown/Knoxville — The Morristown/Knoxville WFO is often challenged to forecast the presence of low clouds and fog within variable terrain. They have found value in the high-resolution MODIS spectral difference imagery and hence requested a hybrid version of this product. However, forecasters are not limited to just this single new forecast product to address this problem. Plans are being developed to integrate a new RGB and low cloud and fog product (produced by NESDIS/STAR/CIMSS) into

the forecast process. The SPoRT/NWS coordination call from March focused on RGB imagery transition as well as user methods for product evaluations.

Raleigh — In January SPoRT team members Gary Jedlovec and Geoffrey Stano visited the NWS Forecast Office in Raleigh, North Carolina. The visit was a culmination of several discussions between SPoRT and members of the Raleigh office, specifically meteorologist Gail Hartfield and science and operations officer Jonathan Blaes about their interest in SPoRT activities. The Raleigh office has been particularly interested in the total lightning activities SPoRT leads with several forecast offices as well as other MODIS products, such as the MODIS-GOES Hybrid.

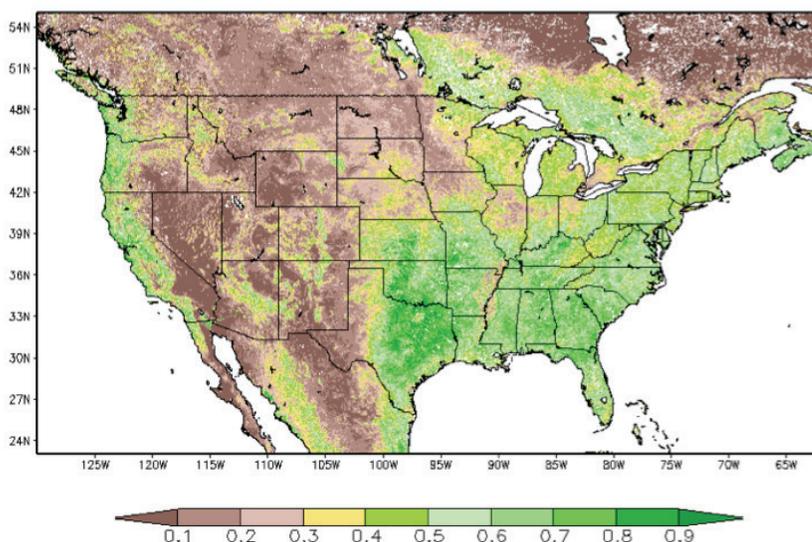
During the visit, the Raleigh office staff provided a insight to several initiatives they are involved in pertaining to lightning observations and forecasts, many of which are led by Gail Hartfield. Additionally, the forecasters provided feedback about their own local forecast issues. Gary and Geoffrey provided an overview of the SPoRT program and specifically highlighted total lightning and MODIS-GOES hybrid imagery applications.

Due to Raleigh's location, the office is not covered by either the North Alabama Lightning Mapping Array or the Washington, DC Lightning Mapping Array. This prevents SPoRT from being able to collaborate on total lightning projects unless new networks are installed. However, the MODIS-GOES hybrid imagery and RGB products were of interest to the forecasters. SPoRT has recently provided hybrid imagery for four products; 3.9 μm , 11 μm , water vapor, and spectral difference imagery. The SPoRT team is currently creating a visible image hybrid for use at Raleigh. These products were first ingested in early March and the Raleigh office is currently familiarizing themselves with the products. Initial feedback indicates that the upcoming visible hybrid would provide the most benefit this spring and summer for convective events.

Real-time SPoRT MODIS Vegetation Product Update

SPoRT team members have expanded the real-time MODIS Normalized Difference Vegetation Index (NDVI)/Greenness Vegetation Fraction (GVF) composite product domain to include the entire 4-km SPoRT-WRF domain that was run during the 2011 Hazardous Weather Testbed Experimental Forecast Program (EFP). The SPoRT-WRF domain was configured identically to the National Severe Storms Laboratory WRF model runs to make direct comparisons during the 2011 EFP. Prior to February 2012, the real-time MODIS vegetation composite was generated from 23° to

52°N latitude and from 128° to 65°W longitude. This domain did not entirely cover the SPoRT-WRF domain, missing some of southern and far eastern Canada. As a result, the GVF in the model would revert back to the coarser resolution climatological representation in parts of Canada. To obtain full coverage for future SPoRT-WRF model runs, SPoRT subsequently expanded the MODIS NDVI/GVF domain north-eastward to 55°N and 62°W, and revised the real-time processing code accordingly. The real-time SPoRT-MODIS GVF product at 0.04° resolution can be used for local model runs in the WRF Environmental Modeling System (EMS). An instructions document is available upon request for those interested in replacing the climatology GVF with SPoRT-MODIS real-time GVF in the EMS.



Coverage of current, expanded real-time SPoRT-MODIS NDVI/GVF for use in the WRF EMS. Field depicted is the real-time MODIS GVF valid on 1 April 2012.

Blog Highlights

The Wide World of SPoRT blog is just one way forecasters provide feedback on the utility of SPoRT products in operations as part of product evaluation/transition processes. The blog provides a method to use both text and images to highlight the unique capabilities of the experimental data and allows for a greater reach into the satellite meteorology community than just direct feedback to SPoRT. Many decision makers within NOAA and

NASA follow the SPoRT blog. Even product developers, such as those at CIRA, see blog posts about their products (such as the Blended TPW or the GOES Sounder Air Mass RGB product) and use this information to shape product improvements. Users of SPoRT products can greatly benefit from posts describing the experiences of their peers. In fact, you can follow the SPoRT blog via an RSS feed without becoming a blog member.

An image and a paragraph is all it takes to make a post and instructions have been placed on the front page of SPoRT's Website. Recent posts covered topics such as RGB imagery applications for severe weather and aviation forecasts, data assimilation of AIRS over Alaska, impact of MODIS SST product, use of LMA during early Spring severe weather, and more. A few example blog posts are highlighted below.

Michael Folmer, the GOES-R satellite champion of the Hydrologic Prediction Center (HPC), blogged about the utilization of SEVIRI RGB Airmass products to detect a possible "Sting Jet" affecting Scotland early on the morning of January 3rd. Whether this was a classic sting jet situation is unclear, however, the RGB airmass products offer a potential for further evaluations.

Brian Guyer of the Albuquerque, NM NWS office posted about the clever use of the MODIS 1-km False Color product to determine snowfall amounts in the area. The product was overlain with the local spotter network so that forecasters could quickly determine who to call to verify snowfall amounts. Products used in this manner can help save forecasters valuable time and effort. Other posts about RGB Airmass products used at HPC through the remainder of the quarter included observations of the following:

- The development of a strong NW Atlantic storm early in February.
 - Category-3 Tropical Cyclone Giovanna as it moved into Madagascar in mid-February.
 - Characteristics of three northern hemisphere extratropical cyclones on leap day.
 - Positive Vorticity (PV) anomalies and airmass characteristics during the March 2nd severe weather outbreak.
- The main theme of these posts was the use of the RGB products to determine the location of PV anomalies, evaluate airmass characteristics, and potential regions for enhanced wind speeds. Author of these posts, Michael Folmer, wrote how "GOES-R era and even current satellite products could be used to

enhance our understanding of extra-tropical cyclones".

The Huntsville NWS Office made a couple of posts in late January, which garnered some attention by modelers at NASA. The use of the 1-km NASA LIS for evaluating soil moisture has demonstrated utility in operations and has undergone a marked increase at NWS Huntsville lately. Although forecasts issued by the River Forecast Centers can be very valuable in determining the potential for flooding, forecasters are usually at a loss to quantify soil moisture values and determine this threat in a more thorough manner. In-situ soil moisture values are generally few and far between, and the various NASA LIS soil moisture parameters can help fill in the gaps in between these measurements. The Huntsville NWS forecasters are pleased to have access to the North Alabama Lightning Mapping Array (NALMA), which is a network for the detection of total lightning and not just ground strikes, such as that detected by the more commonly known Vaisala Lightning Detection Network. During the morning hours of the March 2nd severe weather outbreak, the warning forecaster at the Huntsville NWS Office used radar data in conjunction with the NALMA data to issue the first Severe Thunderstorm Warning of the day in the northern Alabama area. Importantly, the NALMA data helped forecasters gain a much better lead time on the onset of severe weather, by about 15 to 20 minutes. The NALMA presents forecasters with an opportunity to see the value of total lightning data like that from the GLM on GOES-R.

Lastly, the Corpus Christi office described the use of the 1 km MODIS Sea Surface Temperature (SST) Composite product during a dense fog event from late February to early March and a wind event back in mid-November of last year. This product helped forecasters to properly determine areas for highest wind potential during the November case, and to issue the appropriate marine wind products. In similar fashion, the SST

product "allowed for the determination of the SST values that were critical in accurately forecasting sea fog." So, not only can SST and LIS soil moisture values be useful for modeling purposes, as these cases from the Corpus Christi and Huntsville offices show, they can be useful for situational awareness activities.

Satellite Proving Ground Activities

JPSS Proving Ground Activity

SPoRT personnel are working with science data from the Suomi National Polar-orbiting Partnership (Suomi NPP), launched 28 Oct 2011. Suomi NPP, a joint mission of NASA and NOAA, is the first satellite in the new U.S. Joint Polar Satellite Systems (JPSS) program. SPoRT's focus is to demonstrate the utility of Suomi NPP data to improve situational awareness and short-term forecasts at partner WFOs. SPoRT makes use of several Suomi NPP satellite instruments, particularly the Visible Infrared Imaging Radiometer Suite (VIIRS)—a 22-band imager with MODIS and AVHRR heritage. VIIRS has excellent resolution (370 m) over its entire 3,000 km swath width. Its Day-Night Band will allow improved nighttime detection of low clouds and fog. SPoRT expects to use the hyperspectral Cross-track Infrared Sounder (CrIS) imagery for diagnostic analysis and thermodynamic profiles in data assimilation activities, and the Advanced Technology Microwave Sounder (ATMS) for tropical cyclone weather forecasting and other forecast issues involving atmospheric and surface forcing. Using the officially commissioned instruments, SPoRT will begin retrieving SDRs and EDRs from partners with Direct Broadcast capabilities in the April/May timeframe.

GOES-R RG Activities: Lightning Forecasts

An optimized method for the WRF Lightning Forecast Algorithm (LFA) was developed and tested this past quarter. The WRF LFA consists of two forecast

total lightning threats derived from model-predicted kinematics and micro-physical fields, and a third final product that blends together the first two threats. Threat one is the flux of graupel mixing ratio at the -15°C level while threat two is the vertically-integrated ice in a given model grid column. Both threats are calibrated against total flash rates from the North Alabama Lightning Mapping Array such that the maximum modeled total flash rate is comparable in magnitude to the observed total flash rates for a given training case.

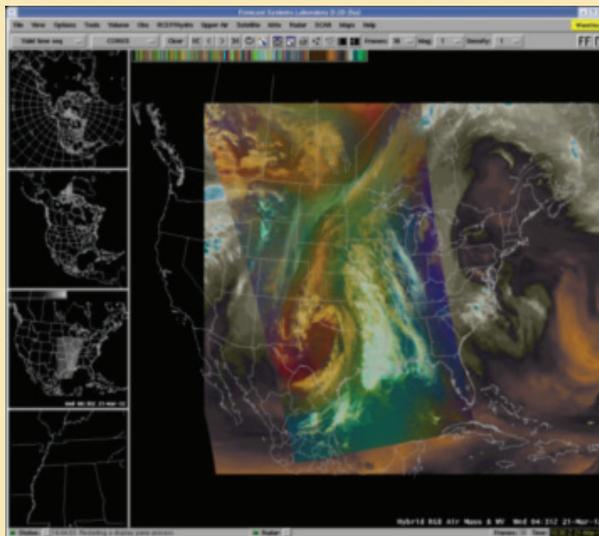
The optimization of the algorithm was done by first increasing the lower bound threshold for threat one (graupel flux at -15°C) in order to reduce false alarm events, particularly during the cool season. The second modification in the optimized algorithm was a change in the final blended product to allow for higher total flash rates during high-end lightning events (i.e., high CAPE/high precipitable water scenarios). Following several tests on sample model convective cases, the optimized source code was packaged and delivered to current modeling applications using the LFA, including the National Severe Storms Laboratory WRF model, the Center for Analysis and Prediction of Storms WRF ensembles, and the Global Systems Division High Resolution Rapid Refresh model.

The Pseudo-Geostationary Lightning Mapper Training Module

The 2012 update to the Pseudo-Geostationary Lightning Mapper (PGLM) training module was completed in March and replaces the previous 2010 version. This can be found on the SPoRT web page (<http://weather.msfc.nasa.gov/sport/training/>) and NOAA's Learning Management System. The 2012 update is primarily for forecasters participating in the upcoming Spring Program hosted by the Hazardous Weather Testbed in Norman, OK. The 2012 update added additional training on new PGLM products and updated the graphics to use AWIPS II examples.

RGB Imagery to WFOs

As part of the GOES-R Proving Ground activity, SPoRT is producing a suite of red-green-blue (RGB) composite images from EUMETSAT's SEVIRI imagery on the MSG and NASA's MODIS instrument on Terra and Aqua to demonstrate the utility of these derived products in forecast operations. Current and future instruments on the JPSS and GOES-R satellites will have similar capabilities. The RGB composites optimally combine the information of three or more spectral channels into a single product more easily viewed by the forecaster. The RGB imagery products SPoRT has transitioned to various National Centers has helped forecasters analyze jet streak locations, marine wind extremes from sting jets, and monitor extratropical transition of tropical storms, among other benefits. With successful RGB imagery transition at places like the National Hurricane Center and Ocean Prediction Center, SPoRT is moving forward to transition RGB imagery to WFOs as part of its GOES-R Proving Ground efforts to expose forecasters to future capabilities. RGB imagery is eventually going to become the norm rather than a unique experimental product and forecasters need to become familiar with their application. Air Mass, Dust and Night-time Microphysics RGB products via MODIS (and eventually VIIRS) are being transitioned to WFOs. Albuquerque has provided a product evaluation via the SPoRT blog and several WFOs are evaluating the product. SPoRT has used its hybrid imagery concept for the Air Mass RGB



to combine it with the GOES water vapor imagery (shown here) so that forecasters can loop the imagery and examine the RGB within the water vapor context, upon which the product is largely based.

SPoRT Visit to the Storm Prediction Center, Norman, Oklahoma

As part of the GOES-R Proving Ground Visiting Scientist Program, SPoRT scientist and atmospheric electricity expert, Geoffrey Stano, visited the Storm Prediction Center (SPC) earlier this year. The purpose was to explore potential new collaborations on the use of total lightning data and other products that would be available the ABI or GLM instruments on the future GOES-R satellites. The visit was the first of a series of National Center trips, as these entities have not been part of previous SPoRT collaborations. The National Centers are potential new partners as their day-to-day activities have a very different perspective than a local forecast office due to their operational domain serving the continental U.S and beyond. During the trip to the Storm Prediction Center (SPC), Geoffrey Stano provided two presentations describing total lightning, its relation to cloud-to-ground observations, the future Geostationary Lightning Mapper (GLM), and SPoRT's own pseudo-GLM products for the Proving Ground. Additionally, Geoffrey had the opportunity to shadow several forecasters to gain a better understanding of SPC operations and to learn how best to incorporate total lightning into those operations. While the SPC does not issue severe weather warnings like a local Weather Forecast Office, total lightning could provide additional insight for SPC forecasters about the convective environment and the strengthening trend of convective storms. This in turn can be used to enhance meso-scale discussions or provide additional information about continuing or ending an active watch.

Publications and Presentations

Journals

- Molthan, A.L. and B.A. Colle, 2012: Comparisons of Single- and Double-Moment Microphysics Schemes in the Simulation of a Synoptic-Scale Snowfall Event, accepted for publication in *Monthly Weather Review*
- Medlin, J.M., G.T. Stano, and B.F. Daly, 2012: Diagnosis of a dense fog event using MODIS and high resolution GOES satellite products with direct model output. *Electronic J. Operational Meteor.*, 13 (2), 16-34.
- Zavodsky, B.T., S.-H. Chou, G.J. Jedlovec Improved Regional Analyses and Heavy Precipitation Forecasts with Assimilation of Atmospheric Infrared Sounder Retrieved Thermodynamic Profiles. *IEEE Transactions on Geoscience and Remote Sensing*, in press.

Conference/ Workshop

- Molthan, A.L. and J. Arnott, 2012: Comparing Physics Scheme Performance for a Lake Effect Snowfall Event in Northern Lower Michigan, presented at the 20th Great Lakes Operational Meteorology Workshop in Chicago, IL
- Arnott, J. and A.L. Molthan, 2012: Seasonal Evaluation of Lake Effect Snow Forecasts from High Resolution WRF Simulations: Sensitivity to Microphysics, Lake Surface Temperatures, and Ice Concentration, presented at the 20th Great Lakes Operational Meteorology Workshop in Chicago, IL

AMS Summary

92nd AMS Annual Meeting New Orleans, Jan. 22–26, 2012

- Lee, T.F., M.H. Bettenhausen, J.D. Hawkins, K. Richardson, G. Jedlovec, and M.R. Smith, 2012: Forecasting Evaluation of WindSat in the Coastal Environment. 10th Symposium on the Coastal Environment.

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Smith, M.K. McGrath, J. Burks, and B. Carcione, 2012: Application Programming in AWIPS II. 18th Conference on Satellite Meteorology, Oceanography and Climate.

Zavodsky, B.T., S.-H. Chou, and G.J. Jedlovec, 2012: Improved Impact of Atmospheric Infrared Sounder (AIRS) Radiance Assimilation in Numerical Weather Prediction. 18th Conference on Satellite Meteorology, Oceanography and Climate.

Molthan, A., H. Oswald, and K. Fuell, 2012: Developing and Evaluating Multispectral RGB Satellite Imagery for Applications in National Weather Service Forecast Offices or National Centers. 8th Annual Symposium on Future Operational Environmental Satellites

Molthan, A.L., K.K. Fuell, H.K. Oswald, and J.A. Knaff, 2012: Development of RGB Composite Imagery for Operational Weather Forecasting Applications, presented at the Eighth Annual Symposium on Future Operational Environmental Satellite Systems,

Stano, G.T. and B. Carcione, 2012: Latest Activities and Evaluations as NASA SPoRT Prepares for the Geostationary Lightning Mapper. 8th Annual Symposium on Future Operational Environmental Satellites.

Fuell, K.K., M. Smith, and G. Jedlovec, 2012: Early Transition and Use of VIIRS and GOES-R Products by NWS Forecast Offices. 8th Annual Symposium on Future Operational Environmental Satellites.

Bell, J.R., J.L. Case, F.J. LaFontaine, A.L. Molthan, and S.V. Kumar, 2012: Evaluating the impacts of NASA/SPoRT daily greenness vegetation fraction on land surface model and numerical weather forecasts. 16th Symposium on Integrated Observing and Assimilation Systems for Atmosphere, Oceans, and Land Surface (IOAS-AOLS).

Case, J.L., J.R. Bell, F.J. LaFontaine, and C.D. Peters-Lidard, 2012: Effects of Real-time NASA Vegetation Data on Model Forecasts of Severe Weather. 16th Symposium on Integrated Observing and Assimilation Systems for Atmosphere, Oceans, and Land Surface (IOAS-AOLS).

Zavodsky, B.T., J.L. Case, D.M. Kozlowski, and A.L. Molthan. The SPoRT-WRF: Evaluating the Impact of NASA Datasets on Convective Forecasts. 16th Symposium on Integrated Observing and Assimilation Systems for Atmosphere, Oceans, and Land Surface (IOAS-AOLS).

Stano, G.T., 2012: Utilizing Space-based Lightning Observations to Improve Lightning Awareness and Safety. 7th Symposium on Policy and Socio-Economic Research, 22–26 January 2012, New Orleans, LA

Carey, L.D., C.J. Schultz, E.V. Schultz, W.A. Petersen, P.N. Gatlin, K.R. Knupp, A.L. Molthan, G.J. Jedlovec, B.C. Carcione, C.B. Darden, and C.C. Crowe, 2012: Dual-polarimetric radar-based tornado debris signatures and paths associated with tornadoes over Northern Alabama during the historic outbreak of 27 April 2011. Symposium on Tornado Disasters of 2011.

Lough, G., E. Zell, J. Engel-Cox, Y. Fungard, G.J. Jedlovec, P. Stackhouse, R. Homer, S. Bliley, 2012: NASA products to enhance energy utility load forecasting. Third Conference on Weather, Climate, and the New Energy Economy

External Workshops/ Meetings Attend -

AMS Annual Meeting, New Orleans (numerous presentations by SPoRT staff.)

Visitors

Bob Gillen and Jeff Clift (ENSCO, Inc. — January 12, 2012: SPoRT discussions.

Calendar of Events

- AIRS Science Team Meeting, April 24–27, JPL/Pasadena
- NOAA Satellite Science Week, April 30–May 4, Kansas City
- NOAA Testbed Workshop, May 1–3, Boulder
- MODIS Science Team Meeting, May 7–8, Greenbelt
- NSSL/HWT EFP Spring Forecast Experiment, May 7–June 8, Norman
- Suomi NPP Science Team Meeting, May 10–11, Greenbelt
- Suomi NPP Applied Science Workshop, June 21–22, Washington, DC