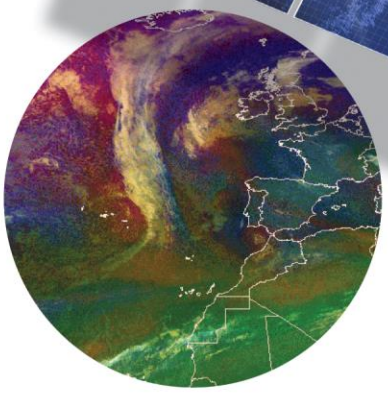
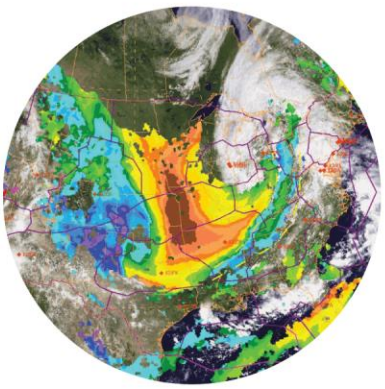
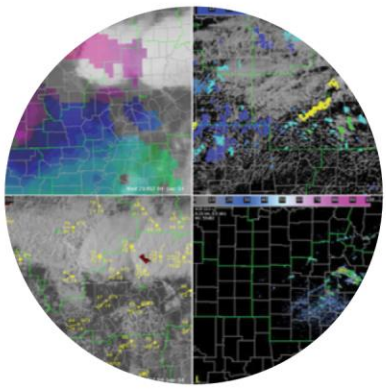
GOES-R Proving Ground

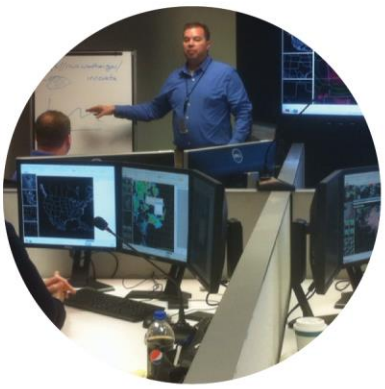
FY14 Annual Report

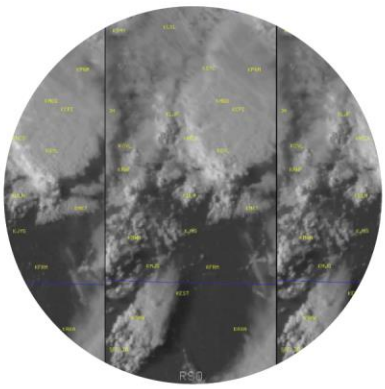
December 18, 2014

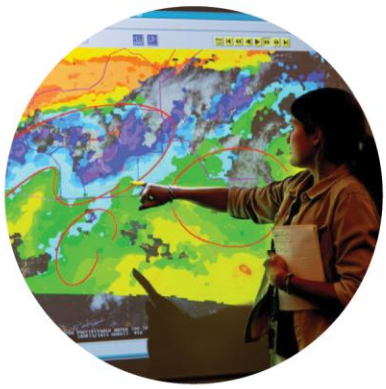












GOES-R Proving Ground FY14 Annual Report[1]

Contents

[1] Cover page images, Top row (from left): Participants at the OCONUS Satellite Proving Ground Technical Interchange Meeting held July 29-August 1, at the Inouye Regional Center in Honolulu, Hawaii; GOES-R RGB Air Mass Product which was transitioned to an NCEP Central Operations supported product, helping NCEP and NWS prepare for the GOES-R-like data flow; Satellite liaisons at an NWS training meeting with CIRA and COMET.
Middle row: Nearcast product example from the AWT 2014 demonstration shows the contrast between dry, stable air and unstable areas; GOES-R Proving Ground logo; GOES-R product 4-panel display from HWT 2014 Spring Experiment (theta-e difference, convective initiation, sat with overshooting tops and surface observations, and radar with probability severe).
Bottom Row: Satellite liaison Chad Gravelle at the Operations Proving Ground AWIPS-2 Tracking Meteogram Evaluation; Three-panel visible imagery animation from GOES-14 Super Rapid Scan Operations for GOES-R (SRSOR) shows the difference between standard or routine 15-minute interval, 5-7 minute interval Rapid Scan Operations (RSO), and one-minute interval SRSOR 0.63 μm visible channel images for the rapidly-developing convection that produced two separate tornadoes in southern Minnesota on May 8. This example highlights the fact that the formation and evolution of the rapidly-developing convection was much more evident and easy to follow with the one-minute imagery; GOES-R Satellite liaison, Amanda Terborg, is shown explaining the GOES-R NearCast product to Aviation Weather Center meteorologists in a September 7 New York Times article on turbulence.

1. Introduction and Background

The Geostationary Operational Environmental Satellite R-Series (GOES-R) Proving Ground (PG) is a collaborative effort between the GOES-R Program Office, selected National Oceanic and Atmospheric Administration (NOAA) Cooperative Institutes, National Weather Service (NWS) forecast offices, National Centers for Environmental Prediction (NCEP), the Joint Center for Satellite Data Assimilation (JCSDA), the NASA Short-Term Prediction Research and Transition Center (SPoRT), and NOAA testbeds where proxy and simulated GOES-R products are tested and evaluated in an operational environment before the GOES-R launch. The objective of the PG is to bridge the gap between research and operations by ensuring that there is two-way communication between product developers and the user communities. The intended outcome is that users will be ready for optimal use of GOES-R products on day-1 of operations.

The next generation GOES will continue providing valuable data to support high impact weather warnings as well as key inputs for global and regional Numerical Weather Prediction (NWP) models. The large volume of GOES-R data will present new challenges and opportunities that require more intelligent integration of information derived from blended satellite products (e.g., geostationary and polar satellite observations), multi-dimensional classification of severe storm potential by combining satellite, radar, in-situ data and models, and new ways of visualizing GOES-R data within the Advanced Weather Interactive Processing System - Version II (AWIPS-II) forecaster workstation. Algorithm developers at NESDIS, NASA SPoRT, and the NOAA cooperative institutes are already creating JAVA-based satellite application plug-ins for AWIPS-II, which will quickly accelerate the transition from research to operations at NWS.

This report will describe the PG activities leading to an evaluation of the operational value of the proxy GOES-R products and user feedback for future improvements. All report content was obtained from demonstration reports and PG participants submitted in FY14.

2. Proving Ground Demonstrations

- **a.** Hazardous Weather Testbed (HWT) Spring Experiment (5 May 2014 – 6 June 2014). Participants included 12 NWS forecasters and 4 broadcast meteorologists.
- **b.** Storm Prediction Center (SPC) 2013 – 2014 Demonstrations (11 June 2013 – 22 August 2014). Participants included forecasters from SPC.
- **c.** National Hurricane Center (NHC) Tropical Cyclone Demonstration (1 August 2013 – 30 November 2013) Participants included forecasters from NHC and scientists from National Environmental Satellite, Data, and Information Service/ Center for Satellite Applications and Research (NESDIS/STAR), Cooperative Institute for Research in the Atmosphere (CIRA), Cooperative Institute for Meteorological Satellite Studies (CIMSS), SPoRT, and NOAA's Office of Oceanic and Atmospheric Research (OAR).
- **d.** Aviation Weather Center (AWC) 2014 Demonstration (1 March 2014 – 1 September 2014) and Summer Experiment (11 August 2014 – 15 August 2014). Participants included AWC forecasters only for the long-term evaluations while the summer experiment included additional participants from Weather Forecast Offices (WFO), Central Weather Service Units (CWSUs), the Alaska Aviation Weather Unit (AAWU), the Federal Aviation Administration (FAA), Lockheed Martin, FedEx, United Parcel

Service (UPS), and research scientists from the Air Force Weather Agency (AFWA), the GOES-R program, and NOAA laboratories.

e. The Satellite Proving Ground for Marine, Precipitation, and Satellite Analysis winter and summer demonstrations (15 January 2014 – 15 April 2014 and 15 May 2014 – 31 October 2014) (ongoing: focus on precipitation and ocean applications). Participants included forecasters at the Weather Prediction Center (WPC), Ocean Prediction Center (OPC), Satellite Analysis Branch (SAB), and Tropical Analysis & Forecast Branch (TAFB). These centers share many common forecast challenges related to heavy rainfall, severe maritime thunderstorms, and explosive cyclogenesis, among others.

f. High Latitude and Arctic Testbed (ongoing: focus on snow/ fog and low stratus/ volcanic ash/ and aviation applications). Participants include NWS Alaska Region, Alaska Pacific River Forecast Center, CIMSS, SPoRT, and University of Alaska, Fairbanks (UAF).

g. Air Quality (ongoing: focus on aerosol product development and applications). Activities led by scientists from University of Maryland Baltimore County (UMBC) and NESDIS STAR; participants include Pennsylvania State University Meteorology Department as well as federal, state, and local air quality forecasters, modelers, and analysts.

h. Pacific Region OCONUS Demonstration (ongoing: focus on tropical cyclones/ heavy rainfall/ and aviation applications) Participants include NWS forecasters and scientists from the University of Hawaii.

i. NWS Western Region Fog and Low Stratus (FLS) Evaluation (1 May 2013 – 1 September 2013). Participants included NWS forecasters at Seattle, WA (SEW), Eureka, CA (EKA), Los Angeles, CA (LOX), and Monterrey, CA (MTR).

j. SPoRT and NWS Southern and NWS Western Region Assessment (May – July 2014). Participants included NWS forecasters at the Albuquerque, Houston, and Denver CWSUs, and six WFOs.

k. NWS Operations Proving Ground (OPG) Operational Readiness Evaluation (ORE) (12-16 May 2014). Participants included four NWS forecasters (one from each CONUS NWS Region), two programmers/developers, a subject matter expert, a training designer/instructor from the NWS Warning Decision Training Branch (WDTB), and four OPG staff members.

3. Funding / Opportunity Announcements

The Proving Ground demonstrations are supported through grants and contracts funded by the GOES-R Program Science Office via proposals for risk reduction research as well as visiting scientist travel grants to participate in the demonstrations. Technical interchange meetings are held throughout the year to review the PG demonstration projects with a major All-Hands meeting of participants during Satellite Science Week and a Proving Ground All-Hands meeting.

4. Significant Outcomes and Product Assessment Highlights

1. For the first time, broadcast meteorologists participated in the Experimental Warning Program (EWP) Spring Experiment at the HWT alongside and to the same degree as the NWS forecasters. The broadcast and NWS participants enjoyed working together during experimental operations, agreeing it was truly educational for both sides as they do not often get the opportunity to interact. Broadcast participation is planned again for HWT 2015 as a result.

2. The OPG-ORE was the first evaluation of its kind. Forecasters were placed in a simulated Weather Forecast Office environment and then led through a diverse array of warning and forecast scenarios that used both archived cases and live data sets.
3. The Super Rapid Scan Operations for GOES-R (SRSOR) 1-minute imagery, from the spare satellite GOES-14, was reactivated for the months of May and August, allowing for forecaster evaluation during the AWC Demonstration (2014) and SPC Demonstration (2014). SRSOR was available in August 2013 for the NHC Demonstration (2013), however due to a quiet hurricane season it was not used. This imagery was meant to emulate the expected temporal resolution of GOES-R and was popular among forecasters, particularly for the excellent situational awareness it provides via the additional detail in areas of rapid convective development.
4. The Fog and Low Stratus products remain on schedule to be operationalized on OSPO ESPC systems and will be delivered to NWS users via the Satellite Broadcast Network (SBN), NCEP Central Operations (NCO) backbone, Direct Broadcast, and possibly AWIPS Data Distribution Service (DDS) as an alternative.

Additional product assessments will be found in the individual Proving Ground and Testbed reports at http://www.goes-r.gov/users/pg-activities-01.html

5. Recent Proving Ground Activities

5.1 Hazardous Weather Testbed 2014

a. For the first time, broadcast meteorologists participated in the EWP Spring Experiment. It was recommended they visit their local WFO for AWIPS familiarization before their arrival in Norman, with those doing so finding it to be quite beneficial. All broadcasters noted the most difficult part about the experiment was learning the Advanced Weather Information Processing System, Version 2 (AWIPS-II) on the fly, and recommended a longer "walkthrough" on Monday. The broadcasters were quick to develop needed AWIPS-II skills, however, and by mid-week were participating just as effectively as the NWS forecasters, providing an alternative perspective not heard in years past. The broadcast and NWS participants enjoyed working together during experimental operations, agreeing it was truly educational for both sides as they do not often get the opportunity to interact. The broadcasters expressed the desire to have most-to-all of the demonstration products in their station offices as they help to highlight areas and storms where hazardous weather is more likely to occur or already occurring.
b. Product feedback from the evaluation was abundant and came in several forms, including daily surveys, daily debriefs, weekly debriefs, 358 blog posts, informal conversations in the HWT and the "Tales from the Testbed" webinars. Common feedback included: suggestions for improving the algorithms, ideas for making the displays more effective for information transfer to forecasters, best practices for product use, and situations in which the tools worked well and not so well.
c. Training, in the form of Articulate PowerPoint presentations for each product, was well received by participants. They were able to complete it before arriving in Norman, and felt prepared to use all of the products by the start of each week.
d. Participants agreed the synthetic satellite imagery comparisons with actual imagery is a legitimate means of evaluating the latest model forecast in real-time, requesting it be produced with additional NWP models. The total lightning products Pseudo-Geostationary

Lightning Mapper (PGLM), Lightning Jump Algorithm (LJA), and ProbSevere model were also favored, providing lead time and confidence to experimental warning issuance. Many forecasters expressed a desire to see the NearCast analyses and forecasts in their home offices, finding the observation-based instability and moisture fields to be unique and successful in highlighting regions of increased or decreased convective potential. Participants found that the Overshooting Top Detection (OTD) algorithm was helpful when monitoring mature convective evolution and decay as it makes obvious where particularly strong updrafts and potential hazardous weather is occurring. They acknowledged that the OTD algorithm would likely have increased utility at night and in areas where radar coverage is lacking. The Convective Initiation (CI) algorithm at times provided lead-time to initial convective development, but was often too erratic and inconsistent for forecasters to use confidently. Finally, participants experienced many situations in which the 1-minute satellite imagery provided operationally-significant information not captured in current 5-15 minute imagery.

5.2 Storm Prediction Center 2014

a. The SPC provides the GOES-R Proving Ground with an opportunity to demonstrate products that have the potential to improve hazardous weather nowcasting and forecasting. After familiarization shadow shifts with SPC forecasters in operations, the participating forecasters took their turn in pseudo-operations. GOES-R proxy products were identified as having potential to fit into the forecast process and to provide unique and complementary information to SPC operations. Initial products implemented into the SPC's operational NAWIPS system experimentally include the OTD algorithm, Cloud Top Cooling (CTC) algorithm and NearCast model. Additionally, GOES-14 SRSOR 1-minute imagery was available to forecasters during periods in May 2014 and August 2014, demonstrating a capability of the GOES-R Advanced Baseline Imagery (ABI). Forecasters were introduced to these products over time and provided one-on-one training on how to properly interpret the information. Bill Line, satellite liaison to SPC, further interacted with forecasters by monitoring and demonstrating the products in operations in real-time. The gradual exposure to appropriate pre-operational GOES-R products and capabilities during multiple seasons and over different weather regimes provided SPC forecasters an opportunity to help determine operational applicability as well as to critique and suggest improvements.
b. Feedback from SPC forecasters regarding their use of the products came in the form of verbal and email communication. Forecasters found the OTD product to be a non-obtrusive means of monitoring the evolution of mature convective systems. The overlay on satellite imagery allows users to easily and quickly spot overshooting-top features and their trends, and proved to be especially valuable at night when it is difficult to manually identify features in IR imagery.
c. Similar to the OTD algorithm, forecasters appreciated the simple display of the Cloud Top Cooling (CTC) product overlay on satellite imagery. This product was utilized by forecasters when monitoring for initial convective development as it signals and quantifies the rate of rapid growth. The NearCast model provided SPC forecasters with an observation-based tool to help monitor the thermodynamic environment. They found value in viewing the evolution of convection with respect to NearCast moisture and instability by overlaying the analyses on satellite imagery.

d. SPC forecasters experienced many situations in which the 1-minute satellite imagery provided operationally-significant information not captured as well (or at all) in current 5-15 minute imagery. The products and capabilities under evaluation were referenced in various SPC forecast products throughout the period.

5.3 National Hurricane Center 2013

a. Despite the potential availability of SRSOR data from GOES-14, there were no SRSO cases due to a quiet season.
b. The RGB Air Mass product continues to be one of the most highly utilized PG products. The training provided by satellite liaison Michael Folmer helped forecasters better understand the application of this product. The Hurricane Specialist Unit (HSU) forecasters found the RGB Air Mass product useful for identifying dry air impinging on TS Erin, suggesting intensification was less likely. The reddish-orange area to the northwest of the storm indicated a region of drier subtropical air in the storm's path. A loop of this and other cases are available from http://rammb.cira.colostate.edu/research/tropical_cyclones/air_mass/cases.asp
c. The exposure to the Natural Color Imagery has led to some discussion at NHC regarding how this product would be produced in real time. AWIPS-II will be the primary display system at NHC during the GOES-R era, but, because of the complexity of the Natural Color algorithm, this product cannot be created directly on that system. Plans are being discussed to generate the product at NHC using their satellite ingest system and then transmit it to AWIPS2 as part of their non-Satellite Broadcast Network data stream.
d. A considerable amount of feedback was obtained in 2013 on the quantitative lightning product, and the qualitative interpretation of the lightning location data. An unanticipated application of the lightning location data occurred during an outage of GOES-east in May of 2013. Meteosat data was used to replace GOES-east, but left a gap in some composite GOES-west, GOES-east products. Marine forecasters used the lightning locations to provide continuity of convective features in the imagery gap.
e. A Local Data Manager (LDM) feed was established between NHC and SPoRT shortly after the 2013 demonstration began. This simplified the delivery of many of the products, including the new RGB products and the Visible Infrared Imaging Radiometer Suite (VIIRS) imagery. In addition, the LDM feed is more efficient than the current ftp methods that were used for product transmission, so the overall bandwidth requirements decreased, despite new products being added. A request was also recently approved to establish LDM feeds to CIRA and CIMSS, which may help reduce the latency of some products, and provide access to new products.

5.4 Aviation Weather Center 2014 Demonstration and Summer Experiment

a. Unlike in previous years, no formal training seminars were conducted during the 2014 demonstration due to staffing shortages. Instead training was conducted via one-on-one verbal discussion with forecasters while on various shifts. To supplement these one-on-one discussions, forecasters also had one page 'quick guides' for each product available in various forms (several electronic training folders and a hard copy binder in operations), as well as '2-minute case studies'.
b. Feedback for the 2014 demonstration period was received via in-depth discussion with forecasters and blog posts.

c. The Flight Icing Threat received the most constructive criticism. Though there was a dramatic improvement in appearance after a change of projection and color bar, and it was noted in previous years that it has the potential to be a valuable icing analysis, forecasters concluded that in its current form it is of little use. They recommended that the version of the algorithm that utilizes the GOES-R DCOMP inputs be somehow integrated with the version provided by NASA's Langley Research Center (LaRC) in the 2013 Winter Experiment, hence adding solutions for icing in areas with higher clouds. Additionally, they suggested working on a way to provide solutions for icing intensity at night, as only a binary yes/no is currently available.
d. Following feedback from last year's experiments, the ABI Cloud Height Algorithm (ACHA) cloud altitude product was revised and evaluated during the 2014 demonstration period. This product was very well received, especially by Center Weather Service Unit (CWSU) and National Aviation Meteorologist (NAM) forecasters who are involved in forecasting for traffic flow operations. With three separate color scales, the product can be tuned to fog and low ceiling forecasts, as well as convection forecasting. The product was also available on a global scale for the World Area Forecast Center desks, providing valuable information in otherwise data sparse areas. Given the high interest, the Satellite Product and Services Review Board (SPSRB) process has already begun to add the cloud altitudes as a baseline product with the other ACHA algorithms. The Fog and Low Stratus product is similarly working down this path, and continues to be widely used in NAM operations.
e. The Nearcast model continued to draw the interest of forecasters, its fields provided valuable information on both the likelihood of convective initiation and the behavior of ongoing convection in the 1-9 hour period. In particular, it provided a means to identify the potential for weaker, low-topped convection as well as more robust convection. Additionally, the new extended CONUS domain of the product provided valuable information for tropical forecasters. It is recommended that this valuable model be considered for operational use in the future.
f. There were two instances in which GOES-14 was taken out of storage for SRSOR 1-minute experiments. This imagery was a popular tool among forecasters and this year forecasters compared 1 to 5-minute data in an effort to determine which update frequency would be most useful for aviation forecasting. In general, the latter was suggested, though forecasters will continue to evaluate this in the future. Events were compiled by the AWC's Science and Operations Officer and will be explored at a later date.
g. One of the most popular tools among forecasters was the simulated imagery. This imagery was again noted as a valuable forecast tool for icing, turbulence, ceiling and visibility, and convection, and was used frequently by AWC and NAM forecasters, and also by a number of CWSU forecasters. These forecasters would like to continue to have this imagery as a forecast tool, but believe it is important that it also be explored as a way in which to familiarize them with the capabilities of the ABI. This was pursued somewhat by turbulence forecasters viewing the three water vapor channels, and will likely be more of a focus in upcoming evaluations.
h. Given the global forecast responsibilities at the AWC, high latitude polar imagery was continuously used in the local generation of the global mosaics used in operations. Currently the VIIRS imagery that the AWC has access to is either CONUS- or Alaska- centric. For this reason, forecasters found it of little use for real-time forecasting. However, they were able to

use it as a means to explore future capability displays, such as the dust enhancement and the nighttime microphysics, both potential possibilities with the GOES-R ABI.

i. Since there is constant collaboration between the AWC and CWSUs for FAA operations, it is vital that both groups have access to the same satellite tools. This is somewhat difficult given the N-AWIPS at the AWC vs. the AWIPS-1 display at the CWSU's, and continuous bandwidth issues experienced by the CWSUs. This matter will be pursued within the next several months. Additional meetings are planned to provide the FAA research team with various GOES-R tools for eventual integration into their weather display systems.

5.5 The Satellite Proving Ground for Marine, Precipitation, and Satellite Analysis 2014

a. Training on the new satellite products was routinely done in one-on-one or small group training sessions, usually conducted in operations. Training was typically on the order of 15-30 minutes and it was determined that bringing the training to the forecasters as opposed to bringing the forecasters to the training was a very successful adaptation. Forecasters then received a "quick guide" on the products and were sent an email that included links to articulate presentations, PowerPoints, or COMET modules as appropriate. Finally, follow-up conversations and on-the-spot training were provided by the satellite liaison when possible.

b. The 2014 winter demonstration focused on applications of the RGB Air Mass product (provided by CIRA and NASA SPoRT) with an emphasis on quantifying the product using ozone retrievals from the Atmospheric Infrared Sounder (AIRS) on the Aqua satellite. Analysts at SAB found the Air Mass product very useful in identifying stratospheric intrusions associated with rapidly deepening extratropical cyclones that affected the U.S., mainly in March 2014. They noted that identifying the red coloring (associated with dry, descending air from the stratosphere) gave the analysts more confidence in the evolution of the storms. The other centers are also utilizing the products regularly and the forecasters are becoming more confident in the interpretation when compared to traditional water vapor imagery to identify significant meteorological features.

c. Additional convective products that were introduced during the 2013 summer demonstrations were used by forecasters when relevant. The GLD-360 Lightning Density product was utilized by SAB and OPC numerous times when analysts and forecasters were assessing the convective threats associated with late winter and early spring storm systems. The quantified lightning data helped with determining the strength of thunderstorms and the potential for heavy rainfall over Arizona in early March 2014. The North America Model (NAM) simulated water vapor imagery, provided to the Proving Ground from CIRA, was used occasionally by SAB and WPC to give the analysts and forecasters a satellite perspective on forcing mechanisms associated with possible heavy rainfall events.

d. The 2014 summer demonstration consisted of new products such as the GOES-R Convective Initiation, Nearcast, and the SPoRT Hybrid Satellite Imagery. Additional products that were introduced in 2013 were included in this demonstration such as the Overshooting Top Detection/Magnitude, GLD-360 Lightning Density, and the GOES-14 Super Rapid Scan Operations for GOES-R (SRSOR). The primary focus for SAB and WPC was heavy rainfall/flash flood events. The primary focus for OPC and TAFB was on maritime thunderstorms in terms of convective mode and possible ambient surface weather associated with those storms.

e. The GOES-R Convective Initiation product received the most feedback during the demonstration, mainly from SAB and WPC. The product was used to identify the potential

for new convective cells associated with heavy rain events and possible flash flooding. In most cases, the product performed well and provided the analysts and forecasters with renewed confidence when used in association with other forecast methods. One suggestion for the future of the product was to replace the percentage probabilities with a more generic "low, probable, likely" scale.

f. The GOES-14 SRSOR data was utilized heavily this year by WPC and SAB for monitoring convective trends. One particular event in mid-August 2014 included numerous mentions of the SRSOR in the WPC Mesoscale Precipitation Discussions (MPD) to analyze the convective organization associated with heavy rainfall in Tennessee associated with a mesoscale convective vortex, where the 1-minute imagery provided a more cohesive assessment of the convective evolution.
g. The Nearcast product was introduced in the latter part of the demonstration, but showed some early promise in helping forecasters identify the potential for heavy rain and flash flooding. WPC and SAB found the theta-e difference variable to be the most useful in highlighting areas of enhanced moisture and instability. The Nearcast product was mentioned a couple times in official WPC (MPD) and SAB (Satellite Precipitation Estimates) text and graphical products to emphasize the potential impacts of the heavy rain events.
h. The most successful part of the Proving Ground activities at these centers over the past year is the confidence that the forecasters have gained in using and analyzing these new satellite products. For instance, the RGB Air Mass product is being used routinely at all four centers and the forecasters and analysts are mentioning its use in the official forecast products, while forgetting to provide feedback to the Proving Ground. This shows that the RGB Air Mass product has earned the forecasters' and analysts' respect and the feedback is shown through those forecast products. OPC forecasters were even able to issue a hurricane-force wind warning for a storm off the Pacific Northwest of the U.S. in late September based solely on a timely MODIS RGB Air Mass image when scatterometer data was unavailable.

5.6 High Latitude Proving Ground 2014

a. The High Latitude Proving Ground (HLPG) is a joint effort supported by the GOES-R and JPSS program offices hosted at the University of Alaska Fairbanks by the Geographic Information Network of Alaska (GINA) and the NOAA Cooperative Institute for Alaska Research (CIFAR). GINA works with the NWS and other sister cooperative institutes – including SPoRT, CIMSS, and CIRA with the aim of prototyping the next generation of satellite products in the unique environment of the Arctic and near-Arctic latitudes. The HLPG focuses on using sensors on polar orbiting satellites as proxies for the upcoming GOES-R channels. This overlap between GEO and LEO capabilities has already been demonstrated through a variety of products in Alaska addressing forecast needs from volcanic ash to low clouds and fog to sea ice. With this collaborative team already in place, GOES-R imagery and products will be transitioned into forecast operations at NWS Alaska Region more quickly and more effectively upon launch of GOES-R.
b. This proving ground collaborated with SPoRT to conclude evaluation of the RGB Night-Time Microphysics product by NWS offices in Alaska. SPoRT generates these products at its own facility as well as at GINA on the University of Alaska Fairbanks campus via virtual machines hosted by GINA. These RGBs are constructed using various channels provided by both MODIS instruments and the VIIRS as proxies for the upcoming GOES-R missions. Kevin Fuell and staff at NASA SPoRT produced a "Quick Guide" document and an

"Articulate Presentations" module as training resources for use by NWS in Alaska. Eric Stevens of GINA provided input to SPoRT during the development of these training materials and traveled to NWS Anchorage in early December to speak with forecasters and NWS management about the evaluation.

c. The period of the evaluation was December 2013 through early February 2014 and products evaluated were the Day-Night Band (DNB) Red, Green, Blue (RGB) composite imagery, the Nighttime Microphysics (NtMicro) RGB, and the SPoRT Hybrid GEO/LEO 11-3.9µm product. There were at least four formal surveys completed by each of the participating NWS WFOs with the majority occurring during the midnight shifts. A total of 32 formal feedback forms were submitted during the assessment as a whole and most of these included individual comments from the users.
d. In 81% of events the NtMicro RGB had "some" to "very large" impact on aviation forecasts, and in 84% of events it had "some" to "very large" impact on differentiating between fog and low clouds. However, users in nine events indicated that a different product provided more confidence or better utility to differentiate low clouds from fog than the NtMicro. The NtMicro RGB was the most preferred of the three products 81% of the time, followed by the DNB RGB at 10%, the Hybrid 11-3.9 µm at 3%, and no preference at 3%.
e. Some specific recommendations based on the assessment results include: A product modification or alternate method that would mitigate the "noise" that occurs in the 3.9 µm channel of the NtMicro and 11-3.9 µm products in very cold (<20ºF) temperatures, which most often occur within high-latitude, over-land locations. Development of products and/ or tools to better "quantify" the qualitative NtMicro RGB to help users more easily interpret resulting colors. For example, a tool could be created to allow sampling of imagery with a "mouse roll-over" that would display individual RGB components that went into making the resulting composite color. Increase availability of RGB imagery by including other polar-orbiting instruments via both domestic and international satellites. High-latitude locations have more frequent passes of polar-orbiting instruments and are better viewed by these satellites compared to geostationary imagers.
f. New products developed by researchers at George Mason University and City College of New York were generated by GINA using the updated Community Satellite Processing Package (CSPP) code from the University of Wisconsin - Madison and delivered routinely to the NWS in Alaska for use during the "spring breakup" flooding period. The 2014 breakup in Alaska turned out to be quite tame, thus it was difficult to assess the utility of these products during a flood event. GINA has continued to generate and deliver these products to the NWS into the summer, with the intention of evaluating whether these products are useful during non-breakup summer flooding.
g. In the area of public outreach, Eric Stevens of GINA has been featured on the NWS television broadcast "Alaska Weather" discussing the advantages of new satellite sensors and how these satellites can help the NWS improve their forecasts and thereby better serve all Alaskans. Recordings of these interviews are available online at https://www.youtube.com/watch?v=KtmXKpqPlQ8&feature=em-subs_digest and www.jpss.noaa.gov/video_gallery.html.

5.7 Air Quality 2014

a. The AQPG provided training and outreach to the air quality satellite user community through a variety of venues in the past fiscal year. In July-August 2014, the AQPG conducted their

second "day in the life" near real-time demonstration of streaming simulated GOES-R ABI aerosol products for a four-week period that coincided with the NASA DISCOVER-AQ field experiment in Denver, Colorado. Members of the DISCOVER-AQ science team evaluated the simulated ABI imagery and provided feedback to NESDIS on the usefulness of the simulated products for monitoring aerosols and coordinating sampling flights. The simulated products are available at http://www.star.nesdis.noaa.gov/smcd/spb/aq/aqpg_2014/index.php.

b. The AQPG also developed training videos, including an Atmospheric Optical Depth (AOD) tutorial and GOES-R overview, and posted them to YouTube for access by the satellite aerosol user community. AQPG team members also presented the videos at the NOAA booth at 2013 Fall AGU meeting. Several more training videos are planned for FY 2015.
c. In addition, the AQPG supported NOAA NESDIS through leveraged effort to conduct the VIIRS Aerosol Science and Operational Users Workshop at the National Center for Weather and Climate Prediction in College Park, Maryland in November 2013. The workshop brought together 65 researchers and air quality forecasters from across the country to learn about the latest updates on VIIRS aerosol data products. Workshop participants provided NESDIS with valuable feedback on product development and near real-time delivery options of VIIRS aerosol data products available from the NESDIS STAR Infusing satellite Data into Environmental Applications (IDEA) website.

5.8 NWS Western Region FLS Evaluation 2013

a. The FLS product suite addresses a critical operational forecast problem for West Coast WFOs by providing probabilistic information to NWS forecasters on exceeding aviation flight rule conditions. It was evaluated from 1 May – 1 September 2013 by four NWS Western Region offices to determine its usefulness in operations. The FLS product suite was referenced in 15 Area Forecast Discussions by the participating WFOs during the evaluation.
b. Forecasters felt the 4km resolution of GOES-15 was challenging to use due to ocean-land elevation differences and airports along the coast.
c. Forecasters noticed that model errors/biases can influence FLS probabilities, especially over the ocean.
d. It was suggested to have regionally relevant examples and statistical product verification in training.
e. Since the evaluation, forecasters are routinely using the products to assess the presence of flight rule conditions.

5.9 NASA SPoRT and NWS Southern Region Evaluation 2014

a. From May-July 2014 was the timeframe for a new total lightning assessment with several SPoRT partners in Southern Region, as well as Western Region. The assessment was enhanced by visiting scientist funds to perform onsite training to all of the new total lightning collaborators as well as the completion of a 3-part training module on total lightning applications. In addition to focusing on severe weather situational awareness, there was a major push to emphasize lightning safety and aviation needs. User feedback was very positive and the assessment reinforced the importance of the total lightning application in a severe weather decision environment with forecasters appreciating the heads-up total lightning gives on storm development. In one case, the total lightning supported a flash flood warning. From the safety side, the forecasters were impressed with the availability of the spatial extent of lightning data. Lastly, the CWSUs used total lightning to monitor convection

within the Terminal Radar Approach Control region around their airport. This helped forecasters to advise the FAA's Traffic Management Unit on how robust convection was and the likelihood that gates would have to be closed for approaching aircraft.

b. SPoRT continued to transition the NESDIS GOES-R Quantitative Precipitation Estimation (QPE) product suite in support of the Algorithm Working Group, even after the formal assessment in 2013. Results of the user feedback from the assessment were provided to developers and the user community, including Pacific Region forecasters with interest in the product. Collaboration with NESDIS and Pacific Region are ongoing for an assessment of the product and a potential use of Himawari's imager data (nearly identical to ABI) within the QPE algorithm. In addition to QPE, demonstration of future ABI high-resolution capabilities continues via near-real-time data from MODIS and VIIRS that is incorporated into current GOES imagery and is referred to as SPoRT Hybrid GEO/LEO imagery. Those in the western portion of the NWS Southern Region find Hybrid imagery valuable and similar application value has spread to northern latitudes, especially SPoRT's Alaska WFO partners.
c. Future GOES-R capabilities will also include multi-spectral (i.e. RGB) channel imagery as already available from geostationary instruments like SEVIRI (on EUMETSAT's MSG). SPoRT developed training and assessed the use of such RGB imagery from current, near-real-time polar-orbiting satellites (Aqua, Terra, S-NPP) within Southern Region coastal and inland WFO locations for use in aviation short-term forecast issues. Specific to this assessment, the 11-3.9μ channel difference imagery from GOES satellites, typically used to detect low clouds and fog, was compared to the Nighttime Microphysics (NtMicro) RGB composite imagery product from MODIS and VIIRS (Aqua, Terra, S-NPP). Operational forecasters evaluated the application of RGB imagery to improve the analysis of clouds and aviation hazards, and more specifically, to determine the utility of the RGB imagery to differentiate low clouds from fog. Of the 3 products involved in the assessment, the NtMicro RGB was the preferred product by 65% of users and 33 of 49 responses indicated some to large impact on aviation forecasts with 67% of users indicating additional value of the NtMicro RGB to have some to very large impact to differentiate fog from low clouds. User feedback suggested a need for additional RGB imagery application training, the use of more international polar-orbiting satellites, and new tools for user interrogation of RGB imagery.

5.10 Tracking Meteogram OPG Operational Readiness Evaluation (ORE) 2014

a. Evaluation sessions focused on the diagnostic Tracking Meteogram (TM) tool, initially developed to assess trends in total lightning for AWIPS-II by SPoRT in collaboration with the NWS Meteorological Development Laboratory (MDL). The goal of this ORE was to assess the tool's practical usability, usefulness for decision making, and potential impacts on workload from the perspective of NWS forecasters.
b. All participating NWS forecasters unanimously endorsed the TM as a useful tool that will add unique value to several specific diagnostic and predictive tasks without posing adverse impacts on operational workflow or forecaster workload. They found it very useful as a forecaster decision aid for tracking and displaying trends with meteorological features (e.g., mesocyclone, reflectivity core, cloud-top temperature, and total lightning data). They used it to interrogate gridded model output, and found it useful for mesoanalysis applications such as, but not limited to, monitoring trends in instability, convective inhibition, shear, and rainfall rates, and at providing an efficient way to extract and communicate meteorological information critical to NWS' core partners. They also felt it would be useful in post event

analysis (i.e., to improve the warning process) to evaluate how trends in data were related to warning decisions.

c. While NWS forecasters believe it will be received well and readily adopted by forecasters in its current version, they recommended two enhancements prior to widespread field implementation: first, that the stationary mode option, AWIPS-2 procedure capability, and tendency information be added to the TM's functionality, and second, a brief TM training video and one-page (front and back) informational handout should accompany the TM's implementation.
d. Based on the results of this ORE, the OPG recommended implementation of the Tracking Meteogram into the AWIPS-2 baseline without reservation.

6. Lessons learned that are relevant to future projects and/or agency priorities:

As a result of the HWT spring experiment, forecasters would like to see synthetic satellite imagery produced with other NWP models as it provides an alternative for visualizing model data and a method for quick model forecast evaluation. Participants had many suggestions for enhancing/improving the ProbSevere Model and LJA, including using the latter as a predictor in the former. While forecasters liked the idea of the CI algorithm and its performance at times, probabilities were often too erratic and noisy to be used confidently in its current form. This version of the Total Lightning Tracking Tool (TLTT) had many limitations including apparent software bugs, and participants agreed it was too labor intensive to use in warning operations. Forecasters felt that the OTD algorithm would be most valuable to forecasters responsible for large forecast domains and ocean areas, but look forward to using it with the increased resolution of the GOES-R ABI.

7. Methods to foster collaborations between research and operations/ applications and external stakeholders

Planned initiatives to foster collaborations between research and operations/applications and external stakeholders are the visiting scientist program, the OPG Operational Readiness Evaluation, bringing forecasters, product developers, and broadcasters to the Hazardous Weather Testbed, monthly science seminars, and broadcaster participation in meetings and future proving ground demonstrations. These methods help to fulfill the goal of aligning the Proving Ground with the NOAA Weather Ready Nation initiative.

The Air Quality Proving Ground relies on a seamless interaction between NOAA and state and federal air quality forecasters who work for other agencies. The AQPG user workshops have demonstrated significant external interest in GOES-R/ABI and S-NPP/VIIRS aerosol products for research and operations. These results will be expanded to include additional training videos a FAQ, and short informational webinars to keep the user community apprised of product updates in between annual workshops that will be posted on the NOAA IDEA website.

8. Project alignment with agency technical and service priorities

The alignment with NWS and NOAA service priorities is coordinated through the NWS Office of Science and Technology and the NWS Operational Advisory Team (NOAT), comprised of the Region Scientific Services Division chiefs and a representative from NCEP.

9. Balance of PG portfolio (incremental evolutionary ideas vs larger revolutionary ideas)

The PG portfolio priorities in order are user readiness for the at-launch baseline products, followed by the new products and applications made possible by the advanced capabilities of the GOES-R instruments. The revolutionary advancements will come from the development of fused products and decision aids that will be possible with enterprise processing systems and early integration into AWIPS-II.

10. Demonstrations of consistent practices with guidelines

Guidelines for PG demonstrations are developed by the Science and Demonstration Executive Board in coordination with the NOAT and satellite liaisons.

11. Efficiency and effectiveness of PG in terms of timeliness, cost savings, cost sharing, re-use and/or low overhead.

Efficiency is achieved through regular virtual technical interchange meetings while resources are used most effectively through partnerships with our Proving Ground partners and NOAA Testbed facility managers. Utilizing forecasters who are already on-site, and at nearby offices, to participate in demonstrations is an effective way to reduce costs in the Proving Ground. They receive product training during regularly scheduled shifts which has no additional cost to the program.

12. Leveraged resources from broader community

Leveraged resources are provided by NASA SPoRT, Cooperative Institute infrastructure, and NOAA Testbeds. Resources from JPSS have provided additional support for select satellite liaisons and the Air Quality Proving Ground activities.

Appendix A: Publications

DeMaria, M., C.R. Sampson, J.A. Knaff and K.D. Musgrave, 2014: Is tropical cyclone intensity guidance improving? *Bull. Amer. Meteor. Soc.*, 95, 387-398. doi: http://dx.doi.org/10.1175/BAMS-D-12-00240.1

Heidinger, Andrew K.; I. Laszlo, C. C. Molling, and D. Tarpley, 2013: Using SURFRAD to verify the NOAA single-channel land surface temperature algorithm. *J. Climate*, 30 (12), pp.2868–2884.

Hillger, D.W., C. Seaman, C. Liang, S.D. Miller, D.T. Lindsey, and T. Kopp, 2014: Suomi NPP VIIRS Imagery evaluation, *J. Geophys. Res. Atmos.*, 119**:**11, 6440-6454, doi:10.1002/2013JD021170.

Hoff, R. M., Kondragunta, S., Ciren, P., Xu, C., Zhang, H. and Huff, A., 2014: Development of synthetic GOES-R ABI aerosol products. *Atmos. Meas. Tech. Discuss.*, 7, 10131-10157, doi:10.5194/amtd-7-10131-2014.

Knaff, J.A., S.P. Longmore, D.A. Molenar, 2014: An Objective Satellite-Based Tropical Cyclone Size Climatology. *J. Climate*, 27, 455-476. doi: http://dx.doi.org/10.1175/JCLI-D-13-00096.1.

Lee, Yong-Keun; Z. Li, J. Li, and T.J. Schmit, 2014: Evaluation of the GOES-R ABI LAP retrieval algorithm using the GOES-13 sounder. *J. Atmos. Oceanic Tech.*, 31 (1), pp.3-19.

Lee, Yong-Keun; J.A. Otkin, and T.J. Greenwald, 2014: Evaluating the accuracy of a high resolution model simulation through comparison with MODIS observations. *J. Appl. Meteor. Clima.*, 53 (4), pp.1046–1058.

Lindsey, D.T., L.D. Grasso, J.F. Dostalek, and J. Kerkmann, 2014: Use of the GOES-R split window difference to diagnose deepening low-level water vapor. *J. Appl. Meteor. Climat.*, 53, 2005-2016.

Miller, S. D., J. Forsythe, P. T. Partain, J. Haynes, R. Bankert, M. Sengupta, C. Mitrescu, J. D. Hawkins, and T. H. Vonder Haar, 2014: Estimating three-dimensional cloud structure from statistically blended active and passive sensor observations. *J. Appl. Meteor. Climat.*, 53, 437-455.

Miller, Steven D., W.C. Straka III, S.A. Bachmeier, T.J. Schmit, P.T. Partain, and Y-G Noh, 2013: Earth-viewing satellite perspectives on the Chelyabinsk meteor event. *Proceedings of the National Academy of Sciences of the United States of America*, 110 (45), pp.18092 18097.

Schmit, Timothy J.; S.J. Goodman, D.T. Lindsey, R.M. Rabin, K.M. Bedka, M.M. Gunshor, J.L. Cintineo, C.S. Velden, S.A. Bachmeier, S.S. Lindstrom, and C.C. Schmidt, 2013: Geostationary Operational Environmental Satellite (GOES)-14 super rapid scan

operations to prepare for GOES-R. *J. Appl. Remote Sens.*, 7 (1), doi:10.1117/1.JRS.7.073462.

Seaman, C., D. Hillger, T. Kopp, R. Williams, S. Miller and D. Lindsey**,** 2014: Visible Infrared Imaging Radiometer Suite (VIIRS) Imagery Environmental Data Record (EDR) User's Guide. *NOAA Technical Report*, National Oceanic and Atmospheric Administration, Washington, DC.

Stano, G. T., 2014: Total Lightning observations and tools for the 20 May 2013 Moore, Oklahoma tornadic supercell. *J. Operational Meteor.,* 2 (7), 71-88 doi: http://dx.doi.org/10.15191/nwajom2014.0207

Stano, G. T., 2014: The Psuedo Geostationary Lightning Mapper. *IEEE Transactions on Geoscience and Remote Sensing*, In Preparation.

Xie, Hua; N.R. Nalli, S. Sampson, W.W. Wolf, J. Li, T.J. Schmit, C.D. Barnet, E. Joseph, V.R. Morris, and F. Yang, 2013: Integration and ocean-based prelaunch validation of GOES-R Advanced Baseline Imager legacy atmospheric products. *J. Atmos. And Oceanic Tech.*, 30 (8), pp.1743–1756.

Appendix B: Conference/Meeting Presentations

Air Quality presentations:

Huff, A.K. and the VIIRS Cal/Val Team, 2014. VIIRS Satellite Products: New High-Resolution Aerosol Products for Air Quality Applications, National Air Quality Conference, Durham, North Carolina, February 11, 2014.

Hoff, R. M., A. K. Huff and S. Kondragunta, 2014. The Response to Fires and Dust Storms in the Exo-urban Environment in the GOES-R Era, AMS Annual Meeting Atlanta, GA, February 4-7, 2014.

Huff, A. K., S. Kondragunta, H. Zhang, P. Ciren, C. Xu, and R. M. Hoff , 2014. The NOAA Satellite Air Quality Proving Ground: Enhancing the Air Quality Community's Ability to Forecast and Analyze Smoke, Dust, and Haze Events using Suomi-NPP/VIIRS and GOES-R/ABI Aerosol Products, AMS Annual Meeting, Atlanta, GA, February 4-7, 2014.

Hoff, R. M., A. K. Huff, S. Kondragunta, H. Zhang, P. Ciren, C. Xu, 2013. NOAA Satellite Air Quality Proving Ground: Providing Near-Real Guidance to Forecasters on Dust and Haze Events using Suomi-NPP/VIIRS and GOES-R/ABI Aerosol Products, Paper IN13C-06, American Geophysical Union Annual Meeting, San Francisco, CA, December 9-13, 2013.

SPoRT conference presentations:

Berndt, E. B., M. J. Folmer, J. Dunion, 2014: A Comparison of the Red Green Blue Air Mass Imagery and Hyperspectral Infrared Retrieved Profiles and NOAA G-IV Dropsondes. Tenth Annual Symposium on New Generation Operational Environmental Satellite Systems, 94th AMS Annual Meeting, Atlanta, GA

Berndt, E. B., B. T. Zavodsky, and G. J. Jedlovec, 2014: Demonstration of AIRS Total Ozone Products to Operations to Enhance User Readiness. GOES-R Science Seminar, 25 July 2014. [Available at http://www.goes-r.gov/users/sci-sem/2014_07_25.html].

Burks, J. E., G. T. Stano, K. Sperow, 2014: Lightning Tracking Tool for Assessment of Total Cloud Lightning within AWIPS II. 26th Conference on Weather Analysis and Forecasting / 22nd Conference on Numerical Weather Prediction, 94th AMS Annual Meeting, Atlanta, GA

Fuell, K. K., B. Guyer, 2014: Integration of RGB "Dust" Imagery into Operations at the Albuquerque Forecast Office. 26th Conference on Weather Analysis and Forecasting / 22nd Conference on Numerical Weather Prediction, 94th AMS Annual Meeting, Atlanta, GA

LeRoy, A., K. Fuell, L. Rosa, 2014: NASA-SPoRT Methodology for JPSS and GOES-R Proving Ground Assessments. 26th Conference on Weather Analysis and Forecasting / 22nd Conference on Numerical Weather Prediction, 94th AMS Annual Meeting, Atlanta, GA

Smith, M. R., K. K. Fuell, J. A. Nelson Jr., M. Lawson, 2014: Using the SPoRT LEO/Geo Hybrid Product in OCONUS Forecasting. 4th Conference on Transition of Research to Operations, 94th AMS Annual Meeting Atlanta, GA

Stano, G. T., 2014: Using the Pseudo-GLM in Warning and Impact-based Decision Support in Preparation for GOES-R. NOAA Satellite Science Week Virtual Meeting 2014

Stano, G. T., C. J. Schultz, L. D. Carey, D. R. MacGorman, and K. M. Calhoun, 2014: A Total Lightning Perspective of the 20 May 2013 Moore, Oklahoma Supercell. Special Symposium on Severe Local Storms: The Current State of the Science and Understanding Impacts, 94th AMS Annual Meeting Atlanta, GA

Stano, G. T., E. J. Szoke, N. Rydell, R. Cox, and R. Mazur, 2014: Colorado Lightning Mapping Array Collaborations through the GOES-R Visiting Scientist Program. Tenth Annual Symposium on New Generation Operational Environmental Satellite Systems, 94th AMS Annual Meeting Atlanta, GA

Stano, G. T., K. M. Calhoun and A. M. Terborg, 2014: Assessment of the Pseudo Geostationary Lightning Mapper Products at the Spring Program and Summer Experiment. Tenth Annual Symposium on New Generation Operational Environmental Satellite Systems, 94th AMS Annual Meeting Atlanta, GA

COMET Program lesson - GOES-R GLM: Introduction to the Geostationary Lightning Mapper. Dr. Geoffrey Stano served as an additional science contributor for the module.

CIRA Conference Presentations:

Beven, J.L., M. J. Brennan, H. D. Cobb III, M. DeMaria, J.A. Knaff, A.B. Schumacher, C. Velden, S.A. Monette, J.P. Dunion, G.J. Jedlovec, K.K. Fuell, and M.J. Folmer, 2014: The Satellite Proving Ground at the National Hurricane Center. *31st Conference on Hurricanes and Tropical Meteorology*. 30-March-4 April, San Diego, CA.

Bikos, D., B. Connell, E. Szoke, S. Bachmeier, S. Lindstrom, A. Mostek, and M. DeMaria, 2013: The SHyMet GOES-R Instruments and Products Training Course, and Other Related Satellite Training for Operational Forecasting. *38th Annual Meeting*, Charleston, South Carolina, 12-17 October, 2013, National Weather Association. Poster.

Brummer, R., E. Szoke, D. Bikos, D.T. Lindsey, H. Gosden, S.D. Miller, M. DeMaria, D.A. Molenar, 2014: CIRA Proving Ground Activities. *EUMETSAT 2014 Meteorological Satellite Conference*, 22-26 September, Geneva, Switzerland.
Brummer, R.E., D.T. Lindsey, L.D. Grasso, D.W. Hillger, E. Szoke, D. Bikos, 2014: Synthetic Satellite Imagery Development at CIRA. *EUMETSAT 2014 Meteorological Satellite Conference*, 22-26 September, Geneva, Switzerland.

Chirokova, G., M. DeMaria, R. DeMaria, J.F. Dostalek, J.L. Beven, 2014: Improving Tropical Cyclone Track and Intensity Forecasting with JPSS imager and Sounder Data. *31st Conference on Hurricanes and Tropical Meteorology*. 30-March-4 April, San Diego, CA.

B. Connell participated in the virtual meeting of the *WMO Virtual Laboratory for Education and Satellite Meteorology (VLab) Management Group* on 25 March 2014. Topics at this meeting included plans for the bi-annual in person meeting of the group hosted by the Center of Excellence (CoE) in Russia in July 2014, discussion of a "Maturity Model" to track how CoEs and Satellite Operators are progressing on training issues, update of activities from the CoEs, and plans for a Climate Virtual Round Table event.

Connell, B., D. Bikos, E. Szoke, S. Bachmeier, S. Lindstrom, A. Mostek, B. Motta, T. Schmit, M. Davison, K. Caesar, V. Castro, L. Veeck, 2014: Satellite Training Activities: VISIT, SHyMet, and WMO VLab. *10th Annual Symposium on New Generation Operational Environmental Satellite Systems* at the *94th AMS Annual Meeting*, Atlanta, Georgia, 2-6 February, 2014.
http://www.goes-r.gov/downloads/AMS/2014/posters/session02/692.pdf

DeMaria, M., A.B. Schumacher, 2014: A Quasi-Equilibrium Theory for Tropical Cyclone Potential Intensity. *31st Conference on Hurricanes and Tropical Meteorology*. 30-March-4 April, San Diego, CA.

Dostalek, J.F., G. Chirokova, K.D. Musgrave, M. DeMaria, 2014: A Comparison of Two Microwave Retrieval Schemes in the Vicinity of Tropical Storms. *31st Conference on Hurricanes and Tropical Meteorology*. 30-March-4 April, San Diego, CA.

Grasso, L.D., D.T. Lindsey, and D. Bikos, 2014: Evaluation of and Suggested Improvements to the WSM6 Microphysics in WRF-ARW Using Synthetic and Observed GOES-13 Imagery. *NOAA Satellite Science Week*, 10-14 March.

Hillger, D.W., 2014: Whatever happened to the US adoption of the metric system? Professional Development Institute (PDI) class, 13-15 January, Colorado State University, Fort Collins, CO.

Hillger, D.W., C. Seaman,Â C. Liang, S.D. Miller, D.T. Lindsey, T. Kopp, 2014: Suomi NPP VIIRS Near Constant Contrast (NCC) Imagery. *AMS Tenth Annual Symposium on New Generation Operational Environmental Satellite Systems.* 2-6 February, Atlanta, GA.

Knaff, J.A., M. DeMaria, S. Longmore, R. DeMaria, 2014: Improving Tropical Cyclone Guidance Tools by Accounting for Variations in Size. *31st Conference on Hurricanes and Tropical Meteorology*. 30-March-4 April, San Diego, CA.

Knaff, J.A., S. Longmore, D.A. Molenar, 2014: Improved Estimates of Tropical Cyclone Surface Wind Structure from Routine Satellite reconnaissance. *NOAA Satellite Science Week.*

Knaff, J.A., S. Longmore, R. DeMaria, 2014: An Improved Method to Estimate Tropical Cyclone Surface Wind Fields from Routine Satellite Reconnaissance. *31st Conference on Hurricanes and Tropical Meteorology*. 30-March-4 April, San Diego, CA.

D. Lindsey gave an invited remote presentation to the Glasgow, Montana NWS office on GOES-R synthetic imagery. This came about as a result of one of D. Lindsey's talks at the AMS Meeting in Atlanta in February, where one of the attendees was from the Glasgow office. Following the presentation, instructions were requested and provided to begin displaying CIRA's synthetic imagery products in their AWIPS.

Lindsey, D.T., 2014: Using simulated imagery to visualize model forecasts. *AMS 26th Conference on Weather Analysis and Forecast/22nd Conference on Numerical Weather Prediction.* 2-6 February, Atlanta, GA.

Lindsey, D.T., L.D. Grasso, K. Apodaca, 2014: Evaluation of and Suggested Improvements to the WSM6 Microphysics in WRF-ARW Using Synthetic and Observed GOES-13 Imagery. K. Apodaca gave a talk entitled "Impact of Lightning Data Assimilation on Northeast Pacific Cyclone Remnants." 31 March- 3 April, Norman, OK.

Lindsey, D.T., L.D. Grasso, D. Bikos, E. Szoke, 2014: Using Simulated Satellite Imagery to Visualize Model Forecasts. *AMS 26th Conference on Weather Analysis and Forecasting,* 2-6 February, Atlanta, GA.

Lindsey, D.T., L.D. Grasso, E. Szoke, 2014: A New Look at the GOES-R ABI Split Window Difference for Convective Initiation Forecasting. *AMS 10th Annual Symposium on New Generation Operational Environmental Satellite Systems*, 2-6 February, Atlanta, GA.

Lindsey, D.T., 2013: Improving forecasts of clouds and convection using simulated satellite imagery. *National Weather Association Annual Meeting*, 8-12 October, Madison, WI.

Longmore, S., A.B. Schumacher, J.D. Dostalek, R. DeMaria, G. Chirokova, J.A. Knaff, M. DeMaria, D. Powell, A. Sigmund, W. Yu, 2014: Lessons Learned From the Deployment and Integration of a Microwave Sounder Based Tropical Cyclone Intensity and Surface Wind Estimation Algorithm into NOAA/NESDIS Satellite Production Operations. *UCAR Software Engineering Assembly*, 7-11 April, Boulder, CO.

Miller, S.D., W. Straka, A.S. Bachmeier, T.J. Schmit, P.T. Partain, and Y-J. Noh, 2014: Fire on High—Unique Perspectives on the Chelyabinsk Meteor from Earth-Viewing Environmental Satellites. *EUMETSAT 2014 Meteorological Satellite Conference*, 22-26 September, Geneva, Switzerland.

Molenar, D.A., 2014: Support and Utilization of the National Weather Service Advanced Weather Interactive Processing System II in a Research Environment *UCAR Software Engineering Assembly*, 7-11 April, Boulder, CO.

Molenar, D.A., 2014: Use of the new real-time AWIPS II standalone workstation in the CIRA Weather Lab including the latest information on AWIPS II deployment as well as CIRA AWIPS II project status, which includes efforts to develop RGB display capabilities in AWIPS II Display 2 Dimensions (D2D) and the National Centers Perspective (NCP). 18 February, CIRA, Fort Collins, CO.

Musgrave, K.D., M. DeMaria, 2014: Further Development of a Statistical-Dynamical Ensemble for Tropical Cyclone Intensity Prediction. *31st Conference on Hurricanes and Tropical Meteorology*. 30-March-4 April, San Diego, CA.

Schumacher, A.B., M. DeMaria, J.A. Knaff, L. Ma, H. Syed, 2014: Updates to the NESDIS Tropical Cyclone Formation Probability Product. *31st Conference on Hurricanes and Tropical Meteorology*. 30-March-4 April, San Diego, CA.

Schumacher, A.B. and M. DeMaria, 2014: Current State of Proving Ground User Readiness at the National Hurricane Center, *GOES-R / JPSS Proving Ground / User-Readiness Meeting*, 2-6 June, Kansas City, KS.

Seaman, C., Y-J Noh, S.D. Miller, D.T. Lindsey and A. Heidinger. 2014: Evaluation of the VIIRS Cloud Base Height EDR Using CloudSat, *STAR JPSS Annual Science Team Meeting*, 12-16 May College Park, MD.

Seaman, C., D.W. Hillger, and S.D. Miller. 2014: Evaluation of VIIRS Imagery, *STAR JPSS Annual Science Team Meeting*, 12-16 May College Park, MD.

Szoke, E., D.T. Lindsey, 2014: The Boulder Weather Forecast Office (WFO) held their Spring Workshops last week for their forecast staff, on 7 April then repeated it on 11 April. E. Szoke gave a talk updating the latest GOES-R Proving Ground news and description of the CIRA Proving Ground products that will be available and might be of use in the coming months.

Szoke, E., R.L. Brummer, H. Gosden, C. Seaman, D. Bikos, S.D. Miller,Â M. DeMaria, D.T. Lindsey, D.W. Hillger, and D.A. Molenar, 2014: More opportunities for forecaster interaction for future operational satellite products â€“ CIRA's activities in the GOES-R and JPSS Proving Grounds. *AMS 4th Conference on Transition of Research to Operations*, 2-6 February, Atlanta, GA.

Szoke, E., D. Bikos, D. Lindsey, D. Molenar, H. Gosden, R. Brummer, S. Miller, and M. DeMaria, 2013: An overview of CIRA Proving Ground NWS interactions. *38th Annual Meeting*, Charleston, South Carolina, 14-18 October, 2013, National Weather Association. Poster and Talk.

Szoke, E., 2013: The great Colorado flood of 9-16 Sep 2013. *38th Annual Meeting*, Charleston, South Carolina, 14-18 October, 2013, National Weather Association. Invited Keynote Address.

CIMSS Conference Presentations:

Cintineo, Rebecca M.; Otkin, J. A.; Jones, T. A.; Koch, S.; Wicker, L. J. and Stensrud, D. J.. Assimilation of satellite and radar observations in a convection-resolving Observing System Simulation Experiment.Conference on Weather Analysis and Forecasting, 26th, and Conference on Numerical Weather Prediction, 22nd, Atlanta, GA, 2-6 February 2014. Boston, MA, American Meteorological Society, 2014, abstract only.

Daniels, Jaime; Bresky, W.; Wanzong, S.; Bailey, A.; Velden, C.; Allegrino, A. and Li, X.. Error characterization of Atmospheric Motion Vectors derived via a nested tracking algorithm developed for the GOES-R Advanced Baseline Imager (ABI). Annual Symposium on New Generation Operational Environmental Satellite Systems, 10th, Atlanta, GA, 2-6 February 2014. Boston, MA, American Meteorological Society, 2014, abstract only.

Feltz, Joleen M.. Automated visualization and data analysis in McIDAS-V. Conference on Environmental Information Processing Technologies, 30th, Atlanta, GA, 2-6 February 2014. Boston, MA, American Meteorological Society, 2014, abstract only.

Gravelle, Chad M.; Mecikalski, J.; Petersen, R.; Sieglaff, J. and Stano, G. T.. Using GOES-R demonstration products to bridge the gap between severe weather watches and warnings for the 20 May 2013 Moore, OK tornado outbreak. Annual Symposium on New Generation Operational Environmental Satellite Systems, 10th, Atlanta, GA, 2-6 February 2014. Boston, MA, American Meteorological Society, 2014, abstract only.

Gravelle, C.; Mecikalski, J.; Petersen, R.; Line, B.; Sieglaff, J. and Stano, G.. Using GOES-R demonstration products to bridge the gap between severe weather watches and warnings for the 20 May 2013 Moore, OK tornado outbreak. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland, 22-26 September 2014. Abstracts. Darmstadt, Germany, European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), 2014, abstract only.

Gravelle, C.; Pavolonis, M.; Calvert, C. and Lindstrom, S.. Transitioning the GOES-R fog and low stratus products from research to operations. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland, 22-26 September 2014. Abstracts. Darmstadt, Germany, European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), 2014, abstract only.

Heidinger, Andrew K.. Performance of the NOAA AWG cloud height algorithm applied to current geostationary and polar orbiting imagers. International Winds Workshop, 12th,

Copenhagen, Denmark, 15-20 June 2014. Copenhagen, Denmark, University of Copenhagen, 2014, abstract only.

Mecikalski, John R.; Jewett, C. P.; Weygandt, S.; Smith, T. L.; Heidinger, A. K.; Straka, W. and Benjamin, S..Convective initiation of 0-6 hr storm nowcasting for GOES-R. Conference on Weather Analysis and Forecasting, 26th, and Conference on Numerical Weather Prediction, 22nd, Atlanta, GA, 2-6 February 2014. Boston, MA, American Meteorological Society, 2014, abstract only.

Nebuda, Sharon; Jung, Jim; Santek, Dave; Daniels, Jaime and Bresky, Wayne. Assimilation of GOES-R Atmospheric Motion Vectors (AMVs) in the NCEP global forecast system. International Winds Workshop, 12th, Copenhagen, Denmark, 15-20 June 2014. Copenhagen, Denmark, University of Copenhagen, 2014, abstract only.

Rogers, Ryan Hunter; Carey, L. D.; Bateman, M.; Stano, G. T.; Monette, S. A.; Feltz, W. F.; Bedka, K. and Fleeger, C.. Total lightning as an indication of convectively induced turbulence potential in and around thunderstorms. Aviation, Range, and Aerospace Meteorology Special Symposium, 4th, Atlanta, GA, 2-6 February 2014. Boston, MA, American Meteorological Society, 2014, abstract only.

Sampson, Shanna; Wolf, W.; Fan, M.; Liu, X.; Yu, T.; Rollins, R.; Jose, V.; Garcia, R.; Martin, G.; Straka W. III; Shiffer, E. and Daniels, J.. GOES-R AWG product processing system framework: R2O. Annual Symposium on New Generation Operational Environmental Satellite Systems, 10th, Atlanta, GA, 2-6 February 2014. Boston, MA, American Meteorological Society, 2014, abstract only.

Sampson, Shanna; Wolf, W.; Fan, M.; Liu, X.; Yu, T.; Zhao, Y.; Rollins, R.; Jose, V.; Garcia, R.; Martin, G.; Straka W. III and Daniels, J.. GOES-R AWG product processing system framework: Near real-time product generation. Annual Symposium on New Generation Operational Environmental Satellite Systems, 10th, Atlanta, GA, 2-6 February 2014. Boston, MA, American Meteorological Society, 2014, abstract only.

Sampson, S.; Wolf, W.; Li, A.; Fan, M.; Yu, T.; Rollins, R.; Zhang, Z.; Jose, V.; Xie, H.; Zhao, Y.; Garcia, R.; Martin, G.; Straka, W. and Daniels, J.. GOES-R AWG product processing system framework: Transitioning algorithms from research to operations. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland, 22-26 September 2014. Abstracts. Darmstadt, Germany, European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), 2014, abstract only.

Schmit, Timothy J,; Goodman, S. J.; Lindsey, D. T.; Rabin, R. M.; Bedka, K.; Cintineo, J. L.; Velden, C.; Bachmeier, A. S.; Lindstrom, S. S.; Gunshor,M. and Schmidt, C.. GOES-14 super rapid scan operations to prepare for GOES-R. Annual Symposium on New Generation Operational Environmental Satellite Systems, 10th, Atlanta, GA, 2-6 February 2014. Boston, MA, American Meteorological Society, 2014, abstract only.

Straka, W.; Wolf, W.; Sampson, S.; Holz, R.; Quinn, G.; Garcia, R.; Martin, G.; Yu, T.; Li, A.; Rollins, R.; Fan, M.; Daniels, J. and Schiffer, E.. Routine validation of the GOES-R multi-satellite processing system framework. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland, 22-26 September 2014. Abstracts. Darmstadt, Germany, European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), 2014, abstract only.

Zhang, H.; Gunshor, M.; Schiffer, E.; Garcia, R. and Huang, A.. GRAFIIR and JAFIIR - Efficient end-to-end semi automated GEO and LEO sensor performance analysis and verification systems. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland, 22-26 September 2014. Abstracts. Darmstadt, Germany, European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), 2014, abstract only.

High Latitude Proving Ground Presentations and Posters:

November, 2013, oral presentation at satellite liaison meeting, NASA/SPoRT, Huntsville, Alabama
December, 2013, media interviews with Alaska Weather television program, Anchorage, Alaska
December, 2013, oral presentation at Suomi NPP SDR Science and Products Review, College Park, Maryland
February, 2014, oral and poster presentations at AMS annual meeting, Atlanta, Georgia
March, 2014, oral presentation at satellite liaison meeting, CIMSS, Madison, Wisconsin
April, 2014, remote oral presentation for JPSS Project Annual Review, College Park, Maryland
May, 2014, remote oral presentation for NWS Alaska Grid and Science Meeting, Anchorage, Alaska
June, 2014, oral presentation at Satellite Proving Ground User Readiness Meeting, Kansas City, Missouri
July, 2014, oral presentation at OCONUS Meeting, Honolulu, Hawaii
August, 2014, oral presentation at Sea Ice Analyst Workshop, Anchorage, Alaska
August 2014, media interviews with Alaska Weather television program, Anchorage, Alaska
September, 2014, oral presentation at satellite liaison meeting, CIRA, Fort Collins, Colorado
September, 2014, oral presentation for NWS Director Louis Uccelinni, Fairbanks, Alaska

Satellite Liaison Presentations:

Folmer, M.J. and D. Plummer, 2014: National Centers Current Satellite Data Capabilities and Look Towards the Future (with AWIPS II). JPSS Data to AWIPS II Workshop, College Park, MD.

Folmer, M.J., A. Stinner, J.M. Sienkiewicz, H. Cobb, C. Schultz, S. Rudlosky, and S. Goodman, 2014: Danger at Sea: Diagnosing and Communicating the Threat for Strong Maritime Thunderstorms. 39th National Weather Association Annual Meeting, Salt Lake City, UT.

Folmer, M.J., A. Orrison, D. Novak, J. Kibler, S. Goodman, and M. Goldberg, 2014: The Forecasting and Monitoring of Convection Associated with Flash Flood Threats. 39th National Weather Association Annual Meeting, Salt Lake City, UT.

Folmer, M.J., D. Novak, A. Orrison, J. Sienkiewicz, H. Cobb, J. Kibler, S. Rudlosky, and S. Goodman, 2014: Preparing for GOES-R at the Satellite Proving Ground for Marine, Precipitation, and Satellite Analysis. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland.

Folmer, M.J., A. Stinner, J.M. Sienkiewicz, H. Cobb, C. Schultz, S. Rudlosky, and S. Goodman, 2014: Danger at Sea: Diagnosing and Communicating the Threat for Strong Maritime Thunderstorms. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland.

Folmer, M.J., 2014: The Satellite Proving Ground for Marine, Precipitation, and Satellite Analysis. SPoRT Science Advisory Committee Meeting, Virtual Presentation, Huntsville, AL.

Folmer, M.J., A. Stinner, J.M. Sienkiewicz, H. Cobb, C. Schultz, S. Rudlosky, and S. Goodman, 2014: Danger at Sea: Diagnosing and Communicating the Threat for Strong Maritime Thunderstorms. The World Weather Open Science Conference, Montreal, Canada.

Folmer, M.J., 2014: GOES-R Program and Training Update. Weather Prediction Center International Desk Seminar, College Park, MD.

Folmer, M.J., 2014: GOES-R Program and HS3 Training Update. Hurricane and Severe Storm Sentinel 3rd Year, Wallops Flight Facility, VA.

Folmer, M.J., 2014: GOES-R Program and Training Update. National Hurricane Center Seminar, Miami, FL.

Folmer, M.J., 2014: The Satellite Proving Ground for Marine, Precipitation, and Satellite Analysis: GOES-R and JPSS Products at OPC, SAB, TAFB, and WPC. Mt. Holly National Weather Service Seminar, Mt. Holly, NJ.

Folmer, M.J., 2014: The Satellite Proving Ground for Marine, Precipitation, and Satellite Analysis. GOES-R/JPSS Proving Ground/User Readiness Meeting, Kansas City, MO.

Folmer, M.J., 2014: The RGB Air Mass Product: A "New" Multispectral Technique for Analyzing Extratropical Cyclones. 2nd Environment Canada/NOAA Collaboration Workshop, Halifax, Nova Scotia.

Folmer, M.J., D. Novak, J. Sienkiewicz, H. Cobb, and J. Kibler, 2014: GOES-R and JPSS Proving Ground Activities at WPC, OPC, SAB, and TAFB. Satellite Liaison Meeting at CIMSS, Madison, WI.

Folmer, M.J., A. Stinner, J.M. Sienkiewicz, C. Schultz, and S. Rudlosky, 2014: Danger at Sea: Diagnosing and Communicating the Threat for Strong Maritime Thunderstorms. 94th AMS Annual Meeting, Atlanta, GA.

Gravelle, C., 2013: Using GOES-R Demonstration Products to Bridge the Gap Between Severe Weather Watches and Warnings for the 20 May 2013 Moore, OK Tornado Outbreak. 38th National Weather Association Annual Meeting Charleston, SC.

Gravelle, C., 2014: Using GOES-R Demonstration Products to Bridge the Gap Between Severe Weather Watches and Warnings for the 20 May 2013 Moore, OK Tornado Outbreak, Remote Talk. January 24th GOES-R Science Seminar.

Gravelle, C., 2014: Using GOES-R Demonstration Products to Bridge the Gap Between Severe Weather Watches and Warnings for the 20 May 2013 Moore, OK Tornado Outbreak. 94th AMS Annual Meeting, Atlanta, GA.

Gravelle, C., 2014: Using a Collaborative Testbed-Proving Ground Paradigm for Bridging Research to Operations. 94th AMS Annual Meeting, Atlanta, GA.

Gravelle, C., 2014: Transitioning the GOES-R Fog and Low Stratus Products from Research To Operations Through the NWS Operations Proving Ground, Remote Talk. 5th NOAA Testbeds and Proving Grounds Workshop, College Park, MD.

Gravelle, C., 2014: Current State of GOES-R/JPSS User Readiness and the Operations Proving Ground. NOAA Satellite Proving Ground/User-Readiness Meeting, Kansas City, MO.

Gravelle, C., 2014: Evaluating GOES-R Scanning Strategies at the Operations Proving Ground. NOAA Satellite Proving Ground/User-Readiness Meeting, Kansas City, MO.

Gravelle, C., 2014: Using The Next-Generation Geostationary Environmental Satellite System in Operational Meteorology. 42nd AMS Conference on Broadcast Meteorology, Olympic Valley, CA.

Gravelle, C., 2014: Satellite Training, Remote Talk. August 18th Joint GOES-R/JPSS Science Seminar.

Gravelle, C., 2014: Training Within the GOES-R Proving Ground: Past, Present, and Future. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland.

Gravelle, C., 2014: Transitioning the GOES-R Fog and Low Stratus Products from Research To Operations Through the NWS Operations Proving Ground. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland.

Gravelle, C., 2014: Using GOES-R Demonstration Products to Bridge the Gap Between Severe Weather Watches and Warnings for the 20 May 2013 Moore, OK Tornado Outbreak. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland.

Line, W., 2013: GOES-R Proving Ground Activities within the Storm Prediction Center. 38th National Weather Association Annual Meeting, Charleston, SC.

Line, W., 2014: A Retrospective Look at the CIMSS NearCast Model Performance during the May 2013 Tornado Events in Central Oklahoma. 94th AMS Annual Meeting Atlanta, GA.

Line, W., 2014: GOES-R Proving Ground Activities within the Storm Prediction Center and Hazardous Weather Testbed Remote Talk. January 24th GOES-R Science Seminar.

Line, W., 2014: Satellite Proving Ground at the Storm Prediction Center and Hazardous Weather Testbed Remote Talk. NOAA Satellite Proving Ground/User-Readiness Meeting Kansas City, MO.

Terborg, A., M.J. Folmer, and W. Line, 2014: The GOES-R/JPSS Proving Ground: A National Centers Perspective. 94th AMS Annual Meeting, Atlanta, GA.

Terborg, A., 2013: The Use of Next Generation Satellite Data in Forecasting High Impact Aviation Weather Events. 38th National Weather Association Annual Meeting Charleston, SC.

Terborg, A., 2014: The GOES-R Proving Ground 2013 summer experiment at the Aviation Weather Center. 94th AMS Annual Meeting, Atlanta, GA.

Terborg, A., 2014: Exploration and implementation of next generation satellite data at NOAA's Aviation Weather Center: The GOES-R Proving Ground. 2014 EUMETSAT Meteorological Satellite Conference, Geneva, Switzerland.

Terborg, A., 2014: AWC Proving Ground User Readiness. NOAA Satellite Proving Ground/User-Readiness Meeting Kansas City, MO.

Terborg, A., 2014: A Perspective from the Skies and Seas... The Aviation Weather Center and Ocean Prediction Center: Geostationary Satellite Applications. Harris Summit.

Posters:

Verification of the GOES-R Fog and Low Stratus Products in Central California – Chad M Gravelle, CIMSS/SSEC/University of Wisconsin-Madison, NWS Operations Proving Ground, Kansas City, MO (Presented at NWA Oct. 2013)

An Overview of the Tampa Bay, FL High-Impact Sea Fog and Low Stratus Event on 23-24 February 2013 – Chad M Gravelle, CIMSS/SSEC/University of Wisconsin-Madison, NWS Operations Proving Ground, Kansas City, MO (Presented at NWA Oct. 2013)

Overview of the 2013 Aviation Weather Testbed Summer Experiment – Steve Lack and Amanda Terborg, CIMSS/SSEC/University of Wisconsin-Madison, AWC, Kansas City, MO (Presented at AMS Feb. 2014)

Assessment of the Pseudo Geostationary Lightning Mapper Products at the Spring Program and Summer Experiment Experiment – Geoffrey Stano and Amanda Terborg, CIMSS/SSEC/University of Wisconsin-Madison, AWC, Kansas City, MO (Presented at AMS Feb. 2014)

Assessment from the AWC Summer Experiment – Brian Pettegrew and Amanda Terborg, CIMSS/SSEC/University of Wisconsin-Madison, AWC, Kansas City, MO (Presented at AMS

Feb. 2014)

SPoRT Assessment Reports of GOES-R Related Products:
Available via NASA/SPoRT Transitions website (http://weather.msfc.nasa.gov/sport/)
LeRoy, A., K. Fuell, G. J. Jedlovec, 2014: Assessment of the GOES-R QPE and CIRA LPW Products in Alaska and Puerto Rico.

Schultz, L., K. White, K. Fuell, G. J. Jedlovec, 2014: VIIRS and MODIS Multi-Spectral Imagery Assessment for Aviation Weather and Cloud Analysis – 2013-14, Fall / Winter.

LeRoy, A., K. Fuell, G. J. Jedlovec, 2014: GOES-R Convective Initiation Product Assessment.
Fuell, K. K., A. LeRoy, G. J. Jedlovec, 2014: VIIRS and MODIS Multi-Spectral Imagery Assessment for Aviation Weather and Cloud Analysis at High Latitude – Winter 2013-14.

Stano, G. T., K. K. Fuell, 2014: Total Lightning Assessment Spring 2014 - Flash Extent & Source Densities (In Prep)