



**U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and
Information Service**

NOAA 2014 Satellite Proving Ground/User Readiness Meeting Summary Report

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1 Introduction

The first 2014 NOAA Satellite Proving Ground/User Readiness Meeting was held 02-06 June 2014, at the National Weather Service Training Center (NWSTC) in Kansas City, MO. This meeting built off of the previous GOES-R Satellite Proving Ground All Hands meeting combining with JPSS due to the ongoing work to unite the science and development of the two programs under one executive board. The goal of this meeting was to determine the path for operational forecasters to achieve GOES-R/JPSS “user readiness” which is defined as operational NWS meteorologists possessing the skills, competencies, and ability to use GOES-R/JPSS data in the forecast process once the data are available in AWIPS. There were a maximum of 63 attendees with an average of 10 remote participants each day.

The agenda for the week featured primarily in-person presentations from National Weather Service Weather Forecast Office (WFO) personnel, Satellite Liaisons, AWIPS-II managers, international partners, and training personnel. The meeting objectives are listed below:

1. Review Satellite Proving Ground program status and discuss areas of synergy
2. Discuss training and future user-readiness for all operational forecasters
3. Highlight specific Satellite Proving Ground activities
4. Discuss how Satellite Proving Ground activities are communicated
5. Explain data delivery and utilization strategies for AWIPS

All the objectives were met through a combination of presentations and many lively discussion periods. Senior members of the 2 programs primarily addressed the first objective in the first session with informative talks. The second objective was addressed throughout the meeting, as all the participants consider training essential. Many action items were identified by the training staff (see Section 2.9 below). Satellite Proving Ground activities (objective 3) were addressed in detail by both the satellite liaisons (see Section 2.3) and by a representative group of NWS Scientific Operations Officers (see Section 2.8). Communication by the program offices (objective 4) is recognized as essential and the program offices were encouraged to continue documentation, meetings such as this one, web sites and various telecons. A very useful session on AWIPS, objective 5, was presented and is summarized in Section 2.6 below.

The broad participation of WFO personnel continued the close partnership between NWS and the program offices with full and open discussion to solve rising issues with the transition to future satellite data and products.

A short summary from each session is given in Section 2. Section 3 sums up the results of the meeting, including action items.

2 Session Summaries

This section summarizes the major topics of interest covered during each session. Copies of the presentations are available on the GOES-R web site at <http://www.goes-r.gov/users/2014-NOAA-Sat-PG-User-Readiness-Mtg.html>.

2.1 Welcome/Opening Session

John Murphy, Director of the NWS Office of Science and Technology (OS&T), opened the meeting with a presentation on overall user readiness in the face of a new era in satellite meteorology. He emphasized that the focus now is changing from demonstrating new and future capabilities to implementation of those capabilities. He also highlighted the Integrated Dissemination Program (IDP) which will deliver NOAA-Wide Dissemination Services in a phased approach that includes NWS Ground Readiness, NWS Telecommunication Gateway (re-architecture), and NWS Next Generation IT Web Services.

Greg Mandt, Director of the GOES-R Series Program, presented a GOES-R series program update, including program milestones and progress towards successful launch and subsequent data assimilation. Mitch Goldberg, JPSS Program Scientist followed with a JPSS Program update, including a review of the Suomi National Polar-orbiting Partnership (SNPP) and JPSS milestones.

Dan Satterfield, Chief Meteorologist at WBOC in Salisbury, MD, gave a pre-recorded video presentation on the challenges of presenting satellite data on air. He said one major issue is there are only two vendors for all weather graphics for television, which is a relatively small market (600-700 TV stations nationwide). Broadcasters are unable to attain satellite data from Aqua, Terra, and Suomi from their vendors. If they choose to show that imagery, they must first download it from the Internet and render it into their graphics software as opposed to it being readily available. Another issue he raised is that the vendors deliver the data online which may pose data delivery problems in the GOES-R era due to bandwidth limitations. He further pointed out the average age of viewers currently watching the news is mid to late 60s, so the key to reaching a younger audience is through the Internet via social media platforms where it is much easier to post and share better satellite imagery. Recent improvements to the satellite imagery from vendors include better color tables, 1km visible imagery, decent water vapor imagery even at 8km resolution, and the ability to zoom in on a particular area.

Wrapping up the session were presentations from our international attendees: Volker Gaertner from EUMETSAT and David Bradley from the Meteorological Service of Canada (MSC). Mr. Gaertner spoke about advances with the new Meteosat Third Generation (MTG) satellites to be launched starting in 2019. They will have better spectral coverage, better spatial resolution, and better time resolution than the current Meteosat Second Generation (MSG) series. Mr. Bradley described the different satellite programs MSC is involved with. He highlighted the Canadian Polar Communications and Weather Mission (PCW) which will have 'GEO-like' continuous imaging of the Arctic circumpolar region with spatial and temporal scales comparable to geostationary satellites. Approval from the government is required to proceed.

2.2 User Readiness/TOWR-G Session

This session began with a NWS Satellite User Readiness overview by Mike Johnson (NWS OS&T). The presentation covered 3 options for bringing new satellite products into operations. Option 1, the baseline,

brings products into centralized NESDIS processing via well-defined NWS and NESDIS processes. The second option would leverage processing points to be built at six NWS Direct Broadcast (DB) locations and then possibly distribute to other NWS sites. The process for updating algorithms at these DB sites is not well defined yet but is likely to be more flexible and agile than option 1. A third option is to demonstrate products at a limited number of sites via LDM. This option should be considered a proving ground or Testbed demonstration versus an operational capability.

Joe Zajic (NWS OS&T) gave an overview of the Test for Operational Weather Readiness with GOES-R (TOWR-G). Its focus is on AWIPS II usage context. The project is comprised of development of representative “Mission Threads,” derivation of validation objectives, and planning and execution of pre-launch end-to-end testing and evaluation activities. TOWR-G provides supporting information for training activities, dataflow decision-making, and component system capability decision-making. A mission thread describes a specific real-world mission action and characterizes the journey that the supporting data take from their use in the mission action all the way back to their observation. Initial threads were identified from the NWS Directives and five comprise Batch One: severe thunderstorm warning, red flag warning, hurricane and tropical storm watch/warning, volcanic ash advisory, and main stem river flood forecast. The thread pathways fall under one of four paths: satellite broadcast network, AWIPS data delivery over SBN, AWIPS data delivery over terrestrial networks, or GOES Rebroadcast (GRB). Eric Guillot (NWS OS&T) followed with a detailed description of several sample mission threads.

Natalia Donoho (User Services Coordinator at NESDIS/OSPO) provided a current operational satellite update and some current hot topics including GOES-East transition to optimized schedules and known data disruptions.

Matthew Seybold (Acting GOES-R Data Operations Manager at NESDIS/OSPO/SPSD) wrapped up the session with a GOES-R data operations and user services presentation. This included description of GOES-R user support teams, product distribution, and the GRB simulators.

2.3 Satellite Liaison Presentations – Current State of Proving Ground User Readiness

Each Satellite Liaison gave a presentation on the current state of their Proving Ground. They were given the following guidelines to follow:

Background of Satellite Liaison Position (1 slide)

1. Where is the Satellite Liaison located (i.e., NCEP or NWS Region)?
2. How long has the Satellite Liaison been in current position?
3. Which NWS forecasters does the Satellite Liaison work with?

Satellite Liaison Training (1 slide)

1. What formal/informal training has the Satellite Liaison received since they have been in the position?

Share Best Practices (i.e., what have the Satellite Liaisons learned over the past few years?)

1. How has the Satellite Liaison prepared/trained their specific users for GOES-R/JPSS imagery/products? From the training provided, what worked well and what did not work well? (1 slide)
2. How does the Satellite Liaison feel the User Community should prepare and train for GOES-R/JPSS? (1 slide)
3. How has the Satellite Liaison worked with product/algorithm developers to ensure the O2R-R2O loop is created/closed? (1 slide)

4. What is the biggest success/accomplishment that the Satellite Liaison has had to date? Please explain. (1 slide)
5. What is the biggest challenge that the Satellite Liaison has had to date? Please explain. (1 slide)

Vision of Satellite Liaison Position

1. Should the Satellite Liaison position be transitioned into Subject Matter Experts (SMEs), and if so, why? (1 slide)
2. How can the Satellite Liaison position build beyond the current responsibilities of organizing algorithms, providing training, and supporting the development/refinement of products/algorithms? (1 slide)
3. How can the Satellite Liaison positions be maintained and retained in order to avoid turnover? (1 slide)

All agreed that one-on-one or small group training between the forecasters and Satellite Liaisons was necessary to achieve a successful product demonstration. These training sessions were short and forecasters were given access to other information for reference at a later time such as product quick guides, blogs, and COMET modules.

Common challenges across all proving grounds for the Satellite Liaisons included:

- Staffing shortages – pushing research and training to the side in order to perform operational duties,
- Data overload – beyond satellite data (i.e. radar, NWP, etc.) from which the forecaster must choose to assimilate into his/her decision-making process, and
- Identification of satellite products that add information not already available to the forecaster.

2.4 Training 1: Conceptual Overview for NWS

LeRoy Spayd Jr. (chief, Training Division, NWS/OCWS) presented the GOES-R Training Plan. Mr. Spayd said that performance goals include:

- Improved NWS short-term forecast and warning operations by optimally using GOES-R digital data,
- Increased use of Digital GOES-R data into operations to support Decision Support Services (DSS) for Weather-Ready Nation (WRN), and
- Development of a GOES-R Operations and Warning (GROW) course.

He said inputs to develop content include: Himawari data sets, test bed experiments, Operations Proving Ground (OPG) Operational Readiness Evaluations, COMET modules, CIRA/CIMSS/SPoRT, GOES-R Liaisons, WMO Virtual Lab, Satellite Operations to Research Proving Ground/User Readiness meetings, etc. The GOES-R training plan will set management expectations for all NWS forecasters to complete GROW through a signed letter from NWS and NWSEO Directors. The plan has five phases:

1. Pre-launch info teasers
2. Baseline training = GROW
3. Science Infusion Week for SOOs and DOHs
4. Ongoing Just-in-Time Training and Resources
5. Integration into Forecast and Warning Operations (Advanced Warning Operations Course and Warn-on-Forecast)

2.5 Himawari 8

A session was devoted to the upcoming launch by the Japanese Meteorological Agency of Himawari 8, which will fly an imager similar to the GOES-R ABI. The launch is scheduled for October 2014 and the satellite is planned to be operational by mid-2015. Bill Ward, NWS Pacific Region Scientific Services Division (SSD) chief, and Michael Folmer, Satellite Liaison, are leading the development of a training plan for Himawari 8. Given the overlap of sensor channels, they plan to ensure the required products are delivered and their capabilities are understood. They will leverage training and algorithms already being used and developed within the GOES-R Proving Grounds.

2.6 AWIPS II

The Wednesday morning session was devoted to AWIPS II. Ronla Henry of NWS OS&T provided an AWIPS II status update. She said that AWIPS II has been deployed at all National Centers, River Forecast Centers, and Regional Headquarters, with groups of 8-10 WFOs installed with at least a 30-day testing period required for AWIPS II activation. The next group cannot install until the previous group successfully completes its activation test. The WFO completion target is 4th quarter of FY15. Ms Henry said the National Centers AWIPS (NAWIPS) migration will employ a center by center field operational test and evaluation strategy from 4th quarter FY14 – 2nd quarter FY16. She pointed out that the Satellite Broadcast Network (SBN) is being upgraded from 30Mbps to 60+Mbps with completion scheduled for October 2014 and new product additions to begin by January 2015. Ms. Henry said her office will be adding new data channels for AWIPS Data Delivery, GOES-R imagery, and other new streams.

Brian Gockel of NWS OS&T briefed on the NWS Ground Readiness Project and said the NOAA IDP plans to deliver NOAA Wide Dissemination Services in a phased approach. Within the IDP, the NWS Ground Readiness Project (GRP) is focused on ensuring the readiness of the NWS IT infrastructure for JPSS, GOES-R, model/guidance, radar, and other products. Some of the NWS Ground Readiness Projects include:

- GRB Assessment and Site Survey Project
- Network Upgrade and Optimization Project
- Satellite Broadcast Network (SBN) Expansion
- GRP Engineering and Coordination

Some GRP Network Projects include:

- Short/medium-term network upgrades bringing increased bandwidth and Trusted Internet Connection Access Provision (TICAP) compliance to OCONUS locations
- Long-term network consolidation and optimization
- Alaska Direct Broadcast Project

Mr. Gockel said the GRP/AWIPS SBN Expansion Project has the following key points:

- The main drivers are GOES-R and model products,
- Network bandwidth is increasing from 30 to 60+ Mbps, Additional data channels are being established,
- Dual illumination and field site cutover anticipated in Aug/Sep 2014,
- Project nominal completion date is set for October 1, 2014,
- Concomitant AWIPS control facilities, ground systems and network upgrades are underway, and
- Bulletins and web pages are being used for outreach to users

Jason Burks briefed on the Experimental Products Development Team (EPDT). The EPDT was originally formed by NASA SPoRT to focus on internal needs. It was expanded when the general need for AWIPS

II development training within the community was expressed. It is jointly funded by GOES-R and NASA SPoRT. The GOES-R EPDT objectives are:

- Create a community environment to share AWIPS II development knowledge,
- Develop technical expertise of AWIPS II within NASA, NOAA's Cooperative Institutes, and NWS,
- Create AWIPS II plug-ins for GOES-R proxy data (ingest, analysis and display), and
- Provide feedback to NWS on external development process and governance of locally developed AWIPS II software.

The team participates in hands-on learning in a classroom setting to learn to develop a plug-in from ingest to display. This is followed by a code sprint in which participants pick projects and work in small groups. Two groups of 14 each have participated so far and requests for a third group have been submitted.

2.7 NWS Operations Proving Ground

Kim Runk, director of the NWS OPG provided an overview of OPG operations. Mr. Runk said the OPG has a dual focus in services and research to operations (R2O). The services side illustrates effectiveness for Decision Support Services (DSS) through communication of hazards, risk, vulnerability and other social science considerations. The R2O side allows for operational readiness evaluations through forecaster endorsement, validation of usability, usefulness for decision making, and workflow impact. Ongoing OPG projects directly relate to at least fourteen recommendations and three best practices from recent service assessments. The first formal Operational Readiness Evaluation (ORE) took place in May 2014 and featured the NASA SPoRT/Meteorological Development Laboratory Meteogram Tracking Tool. Forecasters from the four CONUS NWS Regions, subject matter experts, product developers, trainers, and OPG staff participated in the evaluation. Some outcomes included feedback for the VLab development community, forecasters identified several best practices and alternative uses for the product, and training plans were developed. Plans for 2015 include optimal balance experiments (i.e., evaluating GOES-R scanning strategies), one additional major ORE, clarifying the NWSEO role in ORE process, and transition DSS training curriculum.

Chad Gravelle (Operations Proving Ground Satellite Liaison) presented the plan for the next ORE to take place in late fall and early winter 2014-2015. The GOES-R scanning strategies will be evaluated with an overarching goal to provide guidance to NWS management and the NWS Operational Advisory Team (NOAT) on usefulness of 1-min imagery in NWS operations and the forecasters' ability to assimilate 1-min imagery in real time. The evaluation will be a minimum of four weeks long with four NWS forecasters each week and two subject-matter experts. Cases from the two 3-week long GOES-14 1-min special experiment this summer will be used (convective, fog and low stratus, and fire weather cases). Two control groups will be used to compare NWS forecaster decisions: 1-min vs 5-min and 1-min vs 1-min imagery and future capabilities (e.g., Cloud Top Cooling/Overshooting Tops).

2.8 Operational Presentations

Chad Gravelle (Operations Proving Ground Satellite Liaison) and David Radell (NWS Eastern Region Headquarters SSD) opened the session with an overview. The NWS provides guidance and feedback to the GOES-R/JPSS Satellite Proving Ground on training, utilities, and strengths/weaknesses of baseline and future capabilities to ensure user readiness. The NOAT, consisting of NWS Headquarters staff and Regional SSD Chiefs provide guidance on GOES-R/JPSS science advances, training, and how these relate to achieving Weather-Ready Nation Goals. Currently, 45 WFOs/RFCs and 7 NCEP centers provide feedback on the operational usefulness of GOES-R/JPSS products. The purpose of including a large session on operational presentations is to explain to the PG community how forecasters at

WFOs/RFCs/NCEP Centers have been trained on, used, and evaluated GOES-R/JPSS PG data/imagery/products in the forecast process.

The following guidelines were provided to the operational presenters:

1. WFO/RFC/NCEP Center Involvement in Satellite Proving Ground
 - a. How long has your WFO/NCEP Center participated in the Satellite Proving Ground?
 - b. What GOES-R/JPSS product(s) have been evaluated and for how long?
 - c. What forecast problems has your WFO/NCEP Center addressed with the GOES-R/JPSS product(s)?
2. GOES-R/JPSS Training Experiences
 - a. What were your PG training experiences with GOES-R/JPSS products?
 - b. Was the forecast staff prepared to use the product(s) in operational context (i.e., forecast process and/or warning process or both) after the training?
 - c. Were forecasters provided training addressing real-time validation or verification of the product(s)?
 - d. What were the strengths or deficiencies/weaknesses in the training approaches delivered to the forecasters?
 - e. After the training, was additional content developed to help your forecasters understand or integrate the product(s) into their current forecaster/warning process?
3. GOES-R/JPSS Product Evaluations
 - a. Summarize your WFO/NCEP Center overall evaluation of the product(s).
 - b. What were the strengths and weaknesses of the product(s) when they were used in the forecast process?
 - c. How was the product(s) used with datasets forecasters are comfortable using (i.e., data fusion/integration)?
4. Operational Relevance of GOES-R/JPSS Products
 - a. Do you think the product(s) has a role in the forecast process?
 - b. Were new GOES-R/JPSS based GFE Smart Tools/Initializations developed to use in the forecast process?
 - c. Did the product(s) provide added value for the forecast process and/or operations?
 - d. Should the product(s) be NWS Operational?
5. User Readiness of GOES-R/JPSS Products
 - a. Should the product(s) have additional Satellite PG evaluations?
 - b. What deficiencies do you feel need to be tested or evaluated in the product(s) to ensure NWS implementation and “user readiness”?
 - c. In what way might these products be improved to be operationally useful?

Two presentations were given at a time followed by a 45-minute question and answer discussion session with the two presenters. Most of the offices became involved with proving ground demonstrations from 2010 to present. A few offices were involved much earlier in 2005 and 2008. The presenters all agreed that training the forecasters is not a one-size-fits-all approach. Their training success came from having multiple sources available from one-on-one training, to online modules, to quick reference guides. A common question among them is next steps for the Proving Ground and how products will be transitioned into operations.

2.9 Training 2: Planned Training Approaches

LeRoy Spayd, Jr., Chief, NWS Training Division presented a long list of training actions from the meeting during the week that will be addressed in the coming months. The actions are:

1. Develop an Integrated Satellite Training Plan (GOES R, SNPP/JPSS, Himawari, etc.) plus resource request
2. Plan to provide training in variety of formats to meet needs of learners (videos, quick guides, background modules, etc.)
3. Initiate routine direct coordination with Satellite Liaisons/SMEs
4. Evaluate use of Training portal weather.gov/training or COMET ESRC (Environmental Satellite Resource Center) as searchable database for training materials www.meted.uc.edu/esrc/about.php
5. Provide WFO/Regional satellite focal points with in-residence class experience
6. Develop training development schedule based on new products/new data availability on AWIPS vs websites etc. (ex. SNPP NUCAPS soundings)
7. Develop training for Himawari data to prepare for GOES-R and test training in Pacific Region/Alaska Region/National Centers
8. Develop detailed data/product availability schedule for WFOs to ensure training is ready
9. Work with PDS Executive Producers to incorporate satellite training into forecaster job-competency based tasks (ex. Aviation TAFS)
10. Include 1-2 days of satellite training with liaisons in SOO FY 15, 2-week COMAP
11. Plan to incorporate quick guides and training into AWIPSII collaboration tools
12. Evaluate using NWSchat now for communications with forecasters
13. Focus efforts on preparing training for Fall 2014 OPG ORE evaluating 1-minute data
14. Create one email address for all of us to collaborate on satellite training and clarify roles of current regular satellite calls (e.g. VISIT, COMET, PG, etc.)
15. Create training task team to survey what training is currently available
16. Build training using examples from ALL regions
17. Need travel funding and priority listing by Region for visits and one-on-one contact with forecasters by Satellite Liaisons/SMEs
18. Create SOO team for satellite training to first address immediate needs and then longer term sustainment
19. Ensure all webinars & teletraining are recorded and archived
20. Revive COMET Outreach Program and issue RFP for Satellite R2O
21. Release info and training schedule for AWIPSII archiving capabilities
22. Develop plan to utilize CIMSS archive capability
23. Identify and promote ways to “refresh” forecasters knowledge about satellite data
24. Focus efforts to ensure “operational readiness” for Day 1 use when new satellite data is available
25. TD to increase direct communication with SOOs/DOHs
26. TD to communicate transition details about new LMS vendor starting in FY 15
27. Determine level of training needed for experimental products vs operational products

3 Conclusion

An informal survey was sent to participants after the meeting in which 32 responses were gathered. Participants were very satisfied overall with the meeting agenda including content and structure. The biggest successes from the week were ample discussion periods and the ability to network and interact with colleagues face-to-face. Some issues noted during the meeting were IT-related with limited Wi-Fi bandwidth and the phone cutting out a few times disconnecting the remote attendees. Another complaint was the lack of participation and engagement from the research community. Participants expressed a desire to have a similar meeting in 2015 and suggested having product developers more engaged with on-site in-person participation, adding more time for discussing the actual approach to training and coordination, and improving IT infrastructure (which is already being addressed).

In addition to the list of action items from the training group, the following actions were recorded and are being addressed if not already closed. All new information pertinent to the user will be communicated through the GOES-R website and future meetings and conferences.

Ref #	Action Items
1	Look into more NWSchat interaction among WFOs, liaisons, and developers
2	Establish a "task force" to take feedback provided during the training discussion to establish actions and priorities
3	Determine who is responsible to evaluate feedback from Satellite Liaisons, identify key actions, and assign responsibilities for these actions
4	Determine changes to GROW Briefing necessary to reflect NOAT guidance to make training broader to multiple satellite programs
5	Evaluate COMET Mesoscale Analysis and Prediction Course to see where satellite training can be included
6	Plan to visualize NetCDF4 should be developed
7	NOAT to provide Input to help prioritize satellite products on AWIPS through SBN
8	RGB color blind enhancement curves
9	Work with lead developer to determine what type of NUCAPS training can be made available in preparation for AWIPS II fielding at WFOs
10	NOAT suggest that RGB become a joint GOES-R/JPSS product - also FLS
11	Training division to do more advertising of training portal
12	GOES-R and JPSS need to have a pointer to the training portal
13	A follow-up call between Satellite Liaisons and Training to work on better communication and dialogue and ensure current training is utilized
14	Super rapid scan 1-min mesoscale mode joint study plan with NWS to demonstrate FCST and WRN benefits to operations
15	Himawari baseline production- for Risk reduction science, Proving Ground demos, and training/UR
16	Start planning to organize 2015 PG/User-Readiness Meeting, collect inputs from participants on format and emphasis
17	Greg Mandt direction for NOAT to identify 5 Future Capabilities for early implementation

18	Share NOAT PG/Science Guideline memo with participants
19	New GOES-R Risk Reduction Award PIs participate in Training Information TIM with Training Division
20	Distribute draft JPSS PGRR Call-for-Proposals to NOAT and Liaisons for feedback
21	Portfolio for keeping GOES-R operational
22	Better define R2O process

COMET was instrumental in making the week a success by providing remote access and support to connect the participants who could not attend in person. The staff at the NWS Training Center were exceptional in addressing any concerns for the on-site attendees. The 2nd NOAA Satellite Proving Ground/User Readiness Meeting will take place June 15 – 19, 2015 returning to the NWS Training Center in Kansas City, Missouri.