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Final Report

NOTICE

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FOREWORD

The following is a Summary Report for the National Oceanic and Atmospheric Administration (NOAA) Satellite Conference (NSC) 2015 for Direct Readout, Geostationary Operational Environmental Satellite (GOES)/Polar Orbiting Environmental Satellite (POES), and /Joint Polar Satellite System (JPSS**)** users. The conference offered an extension of the inaugural 2013 conference that merged past Satellite Direct Readout and GOES Users' Conferences, along with POES, Suomi National Polar-orbiting Partnership (Suomi NPP), JPSS customers and users into one event. This conference included government, public, private, and academic attendees, along with national and international associates.

The theme of the conference was, "Preparing for the Future of Environmental Satellites," – with these goals in mind:

1. Facilitate interaction with and recognition of customers/users of satellite environmental data, products/applications, and services.
2. Improve users' knowledge about access, reception and readiness for data, products/applications, broadcast services, and technology from current and future environmental satellite constellations.
3. Aid in increasing the cohesiveness and collaborative nature between and among environmental satellite programs.
4. Reach out to our customers. Provide them with updates on our current and future systems and receive feedback.
5. Consider all direct and indirect conference costs, including costs of attendance, travel and logistics. Obtain the best conference location for the best value.

Based on feedback received during the week and in the post-conference survey, the NSC-2015 was another success, thanks to the terrific efforts of and contributions by all involved; from the Organizing Committee to everyone who attended.

We hope that this report serves as a complete summary and reference for the NSC-2015, prepared by Janel Thomas (Omitron, Inc.), on behalf of GOES-R (with contributions and editorial support from Richard Reynolds (M2 Strategy), Natalia Donoho (NOAA), Michelle Smith (ADNET Systems, Inc.) and Christopher Daughtrey (Omitron, Inc.) and many members of the NSC-2015 Organizing Committee).

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EXECUTIVE SUMMARY

The NOAA Satellite Conference for Direct Readout, GOES/POES, and GOES-R/JPSS Users was held April 27 through May 1, 2015, at the Greenbelt Marriott Hotel in Greenbelt, Maryland. Over 600 attendees, including product developers, researchers, scientists, forecasters, engineers, and satellite data users, representing government, academia, the international community, and industry were present during the week. This conference was responsible for bringing together users and providers of polar-orbiting and geostationary satellite data, products and applications from the public, private, and academic perspectives. Participation brought members from 36 countries, including NOAA, National Aeronautics and Space Administration (NASA), Department of Defense (DOD), Environment Canada, European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), and the Hydrometeorological Services of countries in North, Central and South America, the Caribbean, and Asia. The NSC-2015 provided a venue and opportunity for greater collaboration between and among environmental satellite users.

Over the next decade, the launch of a new generation of geostationary and polar-orbiting satellites will result in significant changes in data rates, volumes, acquisition, and information content. The changes brought about by these new satellite systems will impact all current and future users of environmental satellites, particularly those who receive data directly from the satellites. As the next generation of satellites becomes operational, all users will need to enhance or replace current receiving equipment and basic processing software. This conference consisted of invited oral and poster presentations with emphasis on environmental satellite technological, scientific, educational, and training opportunities, along with re-broadcast services to raise awareness of upcoming enhancements and to prepare for their use.

Most sessions included time devoted to questions and answers during which the audience and panel members were able to engage in dialog that encouraged everyone's participation. All relevant questions and respective answers are documented in this report. There were also opportunities available for interaction during three dedicated poster sessions (see Appendix B List of Posters). The level of engagement provided by attendees and conference facilitators was certainly a contributing factor to the success of the event. The next NSC is being considered for early 2017.

SESSION 1 – Opening Session

Day one began with welcoming remarks from the NSC co-chairs Natalia Donoho (NOAA/ National Environmental Satellite, Data, & Information Service (NESDIS)/Office of Satellite and Product Operations (OSPO)/Satellite Products and Services Division (SPSD)) and Eric Madsen (NOAA/NESDIS/International and Interagency Affairs Division) including ground rules for the week, registration statistics, a list of all countries in attendance, a brief review of the preconference activities schedule, and a high-level conference overview. They discussed what attendees were to expect during the week, including five days of informative sessions, face-to-face meetings with users and providers, opportunities to brainstorm with colleagues and industry professionals, and interaction with vendors and collaboration at the center of all that is happening with NOAA satellites. Next, Deputy Director Mike Condray (NOAA/NESDIS/OSPO) continued to welcome attendees by presenting the conference objectives, various highlights since the NSC-2013, the status of current GOES and POES operations, and reviewed progress on important actions from the 2013 NSC. A full report on the 2013 NSC action items and responses can be found at satelliteconferences.noaa.gov/2015/actionResponse_2013.html. The full schedule for day one boasted high-level presentations from agencies around the world: NOAA, NESDIS, National Weather Service (NWS), European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), Japan Meteorological Agency (JMA), National Institute for Space Research in Brazil (INPE), China Meteorological Administration (CMA), Korea Meteorological Administration (KMA), and the World Meteorological Organization (WMO).

Session 1 officially kicked off with the opening keynote speaker Manson K. Brown, P.E. (Assistant Secretary for Environmental Observation and Prediction and NOAA Deputy Administrator). He began by discussing NOAA's responsibility to deliver what communities want. Local governments want to learn how to adapt to changes, when to plant, irrigate and harvest. Mr. Brown provided real statistics to reflect the impacts a warming planet has on standards of living, water, food and ecosystems. One such statistic referenced eight United States disasters in 2014 with damages each exhibiting over $1billion in losses. He continued by referencing four NOAA priorities to address a new age in human history when decisions can be made with near-instantaneous data and information. These priorities are: First, increase information and services NOAA provides to help communities become more resilient; Second, evolve the National Weather Service and ensure that it remains world class and second-to-none; Third, invest in observational infrastructure such as ships, planes, buoys, etc.; Fourth, uphold commitment to NOAA's people. Mr. Brown also brought attention to the need to look for new ways to address the challenge of building resilient platforms and emphasized support for open data. NOAA produces not only space-based observations but many in-situ and other earth-based observations. He described the importance of the value chain of satellite observations. Mr. Brown concluded that there is still more work to be done to address the need for a long term goal to secure a more resilient future.

The session continued with a presentation by Dr. Steve Volz (Assistant Administrator, NOAA/NESDIS) on NOAA's established Low Earth Orbit (LEO) and Geostationary Orbit (GEO) platforms. He explained from the Low Earth Orbit, the five satellite combination of JPSS and Polar Follow-On (PFO) will establish NOAA's LEO coverage in the afternoon orbit well into the 2030s. He said cooperative agreements with EUMETSAT and Defense Meteorological Satellite Program (DMSP) (near term) establish the global polar constellation. He stated the four GOES-R series satellites, following on the GOES-N/O/P series, will provide the U.S. continental coverage well into the 2030s. Dr. Volz noted cooperative agreements with EUMETSAT and JMA that established the global geostationary constellation. He noted together these platforms have and will form the backbone of our observing network for the coming decades, with added measurements from other sources to improve Numerical Weather Prediction (NWP) performance. Dr. Volz moved on to discuss the current operational status of in-orbit satellites and noted upcoming launch dates for Joint Altimetry Satellite Oceanography Network

(Jason-3), GOES-R, Constellation Observing System for Meteorology, Ionosphere & Climate (COSMIC-2a) and JPSS-1. He noted that GOES-R will go through 6 months of post-launch testing at 89.5W, followed by 6 months of Level-2 product extended validation also at 89.5W. The operational location of GOES-R will depend on the health of the constellation at the time. Dr. Volz also pointed out that JPSS-1 will be placed in afternoon polar orbit, but the exact location will depend on the health of Suomi-NPP. He added that JPSS-1 is on track for launch no later than second quarter fiscal year (FY) 2017. In Summary, Dr. Volz emphasized the importance of two orbits (LEO and GEO) working together to fulfill one mission.

The next speaker in the session, John Murphy (Chief Operating Officer, NOAA/NWS) focused on NWS readiness for GOES-R and Suomi NPP /JPSS. He said becoming a Weather-Ready Nation (WRN) is about building community resiliency in the face of increasing vulnerability to extreme weather. It involves the entire U.S. weather enterprise working together to achieve far-reaching national preparedness for weather events. Mr. Murphy discussed how traditionally, LEO serves the NWP mission and GEO serves the warning/situational awareness mission. However, he said that distinction is blurring. For example, LEO is frequently used by forecasters to warn on (Alaska Warnings, Offshore winds, etc.) and GEO is used in NWP (improved Atmospheric Motion Vectors (AMVs), radiance assimilation from GOES-R, etc.). He continued by pointing out the key challenges entering the GOES-R/JPSS era, including a need to focus efforts to ensure the most rapid distribution of all data for use by the operational forecast community. He also said the ground-based systems need to be designed for better model forecasts and warning applications. In summary, Mr. Murphy reinforced that both LEO- and GEO-orbiting satellites remain critically important to the forecast and warning mission of the NWS and to the global weather enterprise.

The afternoon progressed with Mr. Sean Burns (Head of the Real-time Services and System Operations Division, EUMETSAT) providing a European perspective of monitoring weather and climate from space. Mr. Burns described the current EUMETSAT polar constellation of MetOp A-B and JASON-2 and its Meteosat series of satellites in geostationary orbit. He noted that the primary Meteosat Third Generation (MTG) mission is to support nowcasting of high-impact weather and provide continuity and enhancement of Meteosat Second Generation (MSG) imagery services with the addition of a new lightning imaging capability. It will also introduce an innovative hyper-spectral sounding mission. The secondary mission is for air quality monitoring over Europe, creating synergy between Sentinel-4, the Indian Remote Sensing (IRS) satellite and imagery. He noted it will be a six satellite program with four MTG-I (imagery) and two MTG-S (sounding) satellites to cover 2019-2040[1]. The European contribution to the Joint Polar System shared with NOAA, is the EUMETSAT Polar System-Second Generation (EPS-SG) that will provide continuation and enhancement of service from mid-morning polar orbit from 2021 to 2040. There will be a twin satellite in-orbit configuration: Metop-SGA optical imagery and sounding mission and Metop-SGB microwave imaging mission. Mr. Burns presented the plan for two series' of 3 successive satellites for 21 years of operations. Jason-3 and Jason-CS/Sentinel-6 will be a continuation and enhancement of the Jason mission from 2015 to 2035. Mr. Burns concluded with the history of NOAA and EUMETSAT and how they have worked together over the years. He mentioned that by listening to the presentations thus far, there is a mirror image between what NOAA is doing and what EUMETSAT is doing monitoring weather and climate from space.

[1] MTG-I imagery mission implemented by a two-satellite system: Advanced imager (FCI) providing full disk imagery every 10 minutes in 16 spectral bands with fast imaging of European weather every 2.5 minutes and a new Lightning Imager (LI) providing total lightning mapping over Europe, Africa and the adjacent oceans. The MTG-S sounding mission includes hyperspectral infrared (IRS) with 3D mapping of water vapor, temperature, and O3 every 30 minutes over Europe and will carry the Copernicus Sentinel-4 Ultraviolet sounder with air quality monitoring, in synergy with the IRS instrument.

Continuing the session Dr. Toshiyuki Kurino (Director, Satellite Program Division, JMA), gave an introduction to Japanese geostationary Meteorological Satellites Himawari-8/9 and user readiness. Himawari-8 launched on October 7, 2014 from the Tanegashima Space Center in Kagoshima, Japan. An experimental pre-operation period was commenced in April 2015, with full operation planned for July 2015 (post conference note: operational imagery became available July, 7 2015). Dr. Kurino displayed an animation comparing Multi-functional Transport Satellite (MTSAT)-2 (hourly in monochrome) with Himawari-8 (every 10 minutes in full color) to demonstrate the enhancement. The launch of Himawari-9 for in-orbit standby is scheduled in 2016. Himawari-8 and -9 will be in operation around 140 degrees East. Dr. Kurino continued his presentation describing user readiness through data distribution methods, HimawariCloud and HimawariCast. To distribute the enormous volumes of Himawari-8/9 imagery, JMA established an Internet cloud service called HimawariCloud for National Meteorological and Hydrological Services (NMHSs) in the East Asia/Western Pacific regions and elsewhere. The HimawariCloud hosts all imagery data in full specification (level 1b). Full disk imagery is divided into ten segments for downloading. The first segment data is to be ready for pulling within eight minutes after observation start time. HimawariCast provides Himawari-8 imagery data (High Rate Information Transmission (HRIT) files and SATellite Animation and Interactive Diagnosis (SATAID) ancillary data files dissemination via communication satellite. The HRIT imagery is divided into ten segments each with fourteen band data files. The first segment is to be disseminated within seven minutes after observation start time. Dr. Kurino concluded by showing examples of enhancement in Himawari-8 level-2 products including cloud products (cloud mask, type, phase, and top height) and improvement in AMV retrievals and contribution to nowcasting and NWP models.

Next, a summary on the National Institute for Space Research (INPE) was given by Dr. José Antonio Aravéquia (Director, Centro de Previsão de Tempo e Estudos Climáticos (CPTEC)/INPE). He said the mission of INPE is to be the national reference center in space science and technology, maximizing returns to society in the form of products and services, industrial policy and diffusion of knowledge. He said the focus is particularly on space technology and science, Earth observation and system sciences, meteorology and climate including their numerical modeling and forecasting efforts. For example, he noted the Earth Science Center (CCST) provides technical and scientific information to guide public policies of mitigation and adaptation to global environmental changes. Dr. Aravéquia then described the work of his center in Geophysics, Astrophysics, and Aeronomy. He described the weather and climate forecasting services and its impacts on all phases of Brazilian life. One example of services he cited is the Amazônia Program, which includes monitoring of deforestation in the Amazônia Legal region. He then described the satellite data collection systems and satellite control and tracking operations. Dr. Aravéquia concluded with a status of NOAA-INPE cooperation including the proposed GEONETCast Americas (GNC-A) and COSMIC-2 agreements that are expected to be signed soon. The GNC-A agreement focuses on the joint management of the services and the increase in the GNC-A broadcast bandwidth which he pointed out, should allow for the inclusion of new products as well as for the overall improvement of the GNC-A services. He said the COSMIC-2 agreement addresses INPE's participation in the COSMIC-2 distributed S-band ground station network with the installation and operation of a receive-only COSMIC-2 ground station in Brazil.

Dr. Xuebao Wu (Head, CMA International Affairs) gave an update on Chinese Meteorological Satellite Programs on behalf of Caiying Wei (Deputy Director, National Satellite Meteorological Center). Dr. Wu began with the current status of FengYun (FY) Meteorological Satellites, which include both geostationary (FY-2 and FY-4) and polar-orbiting (FY-1 and FY-3) satellites with each expected to last into the mid-2020s and beyond. She said FengYun GEO currently has three satellites in operation (FY-2D and FY-2E in full disk and FY-2F in regional rapid scan) and one in storage (FY-2G) at 99.5 degrees East. FengYun LEO currently has two satellites in operation (FY-3B and FY-3C) providing global coverage 4 times per day. Dr. Wu provided further information on the instrument suite and associated ground systems. She also described many applications and an analysis of a recent typhoon. Dr. Wu

continued by describing the long-term satellite dataset that has been established and showed how to access CMA's various data systems. She finished her talk with a description of the future FengYun program; the scheduled launch for GEO FY-4A will be in two years with main instruments to include: Geo Interferometric Infrared Sounder (GIIRS), Advanced Geosynchronous Radiation Imager (AGRI), Lightning Mapper Imager (LMI), and Space Environment Package (SEP). For LEO recognizing that global even distribution of sounding data is of great significance for the 6-hour NWP assimilation window, she noted one approach is to constitute a three orbital fleet including Metop (mid-morning), NPP (afternoon), and FY-3 (early morning).

The current status and future plan of the KMA satellite program was presented by Dr. Sang-Jin Lyu (Director, Satellite Analysis Division, KMA). Dr. Lyu began his talk with the current status of the Communication, Ocean and Meteorological Satellite (COMS) geostationary satellite that was launched in June 2010, including its observational modes (full disk every 3-hours, extended northern hemisphere (ENH) every 15 minutes, and local (1000 km x 1000 km) 8 times per hour). He discussed COMS data services, and cooperation with other Asian countries. Dr. Lyu proceeded to discuss improvements that are underway for COMS and its utilization for composite images, disaster mitigation, short-term/nowcasting, climate/environment monitoring, agriculture, ocean meteorology, and hydrology. He continued by providing examples of some of the 16 baseline products and NWP support that COMS provides. Dr. Lyu continued with a description of the development of the Geo-KOMPSAT-2 (GK-2) program, GK-2A for the next-generation meteorological mission and space weather monitoring and GK-2B for the ocean color and atmospheric trace gas monitoring mission. The Advanced Meteorological Imager (AMI) will include 16 spectral bands similar to the Advanced Himawari Imager (AHI) or the Advanced Baseline Imager (ABI). He also discussed the development of the ground system, products, applications and data services. Dr. Lyu provided a graphical depiction of COMS Meteorological Imager vs. GK-2A AMI showcasing the AMI to have four times the spatial and temporal resolution, three times the number of channels, and three-and-a-half times the number of products than the COMS MI. He concluded by describing KMA's LEO satellite program that is under development and planned for launch/utilization in 2022. Incorporation of LEO to the GK-2A will create a satellite joint operation system that mutually complements and creates synergy.

The final presentation of the day was a Keynote Address by Dr. Wenjina Zhang (Director, Observing and Information Systems Department, WMO Space Programme). Dr. Zhang began with a background of the current Vision of the Global Observing System (GOS) in 2025 which, he said needs updating and a longer perspective. The WMO commission for basic system called for a Vision of WMO Integrated Global Observing System (WIGOS) in 2040, being developed in 2015-2016 in order to guide upcoming plans. The main drivers for updating the 2025 vision, Dr. Zhang noted, are emerging user requirements not captured in the Vision-2025, advances in technology, and changes in the providers' community. Dr. Zhang discussed some of the challenges for WMO members including consideration that the planet will be warmer, leading to more extreme weather and climate events; the population will have increased 28% with growing settlements in coastal regions and megacities; and the water-food-energy nexus to society will loom as a major global challenge in 2040. He reviewed five key considerations for the WIGOS Vision in 2040: earth system approach vs. disciplinary approach, quantitative assessments of observations impacts, improving measurement precision and long-term consistency from earth observations to earth information systems, and going beyond coordination to start international planning. Dr. Zhang noted how difficult it is to anticipate user needs 25 years ahead as users are unaware of potential future capabilities. Dr. Zhang emphasized the need for planning and coordination between the users and data providers to better understand the user needs and stimulate a prospective view. He concluded his talk with the cost benefits of satellite data showing the socio-economic benefits of satellite systems.

To conclude the first day, Dr. Mike Kalb (Deputy Director, NESDIS Center for Satellite Applications and Research (STAR)) provided the Session 1 wrap-up. He reminded attendees of the "Why?" of building satellites. He said they provide environmental information and products that enable important environmental decisions at many space and time scales; the benefits outweigh the costs. He contended that we must sustain the cost/benefit ratio by continuing to develop and improve the application of the data from the satellites. He noted that Earth-observing satellites have very nearly become a global enterprise such that it is vital that the users continue to provide, coordinate, and communicate information to keep the costs and benefits ratio sustainable. Dr. Kalb then concluded with a brief description of STAR and its major activities:

- Delivers leadership for NESDIS research, development, validation and maintenance of satellite-derived products and applications from NOAA's operational geostationary and polar-orbiting satellites and from non-NOAA research and international satellites;
- Develops new environmental applications, techniques and algorithms for transforming raw satellite observations into scientifically meaningful, quality-assured and calibrated environmental measurements and products, and develops the pre-operational computer codes to implement them;
- Supports the calibration and validation of all satellite sensors used in NOAA's satellite operations, and develops methods and maintains systems for inter-calibrating NOAA satellite data with other satellites in the international constellation of research and operational satellites;
- Collaborates with other NESDIS and NOAA offices, universities, NASA and other U.S. agencies, and with international organizations on exchange and evaluation of operational and research satellite data and products.

SESSION 2 – Current and Future Programs and Systems

Day two of the conference began with an Opening Keynote Address by Dr. Albert Martis (Vice President, WMO Region IV) on the benefits of satellite imagery. Dr. Martis reviewed the history of meteorology before the era of satellites and described how meteorologists used hand-plotted surface and upper-air maps until the late 1960s. He pointed out that early hurricane airplanes were called Hurricane Hunters until satellite imagery became available to pinpoint the hurricanes and change the flights to Hurricane Reconnaissance. Through the WMO, he said hurricane early warning has become enhanced and reliable. Dr. Martis concluded by quoting, "At the end of the day, it is about saving lives and property."

Session 2.1 - Current and Future GOES – Are You Ready?

Session 2.1 began with a briefing on the current status of GOES presented by Mark Danehy (Branch Chief, NOAA/NESDIS/OSPO/Mission Operations Division (MOD)/Engineering). He described the current GOES constellation, having 2 operational systems (GOES-13 in the East position and GOES-15 in the West position), and 1 on-orbit standby (GOES-14 at 105 degrees West) which can be activated to support GOES East or GOES West in 6 hours and also supports Super Rapid Scan Operation for GOES-R (SRSOR) as requested. He reviewed GOES performance status, real-time data delivery services, scan strategy and GOES-East optimized schedule. He provided examples of improved coverage through creation of GOES-13 Rapid Scan Operations (RSO) South America Frames and of GOES-15 alternate RSO restoration used to monitor Tropical Cyclone Ana. GOES-14 SRSOR provided very unique data and offered a glimpse into the possibilities that will be provided by the ABI on GOES-R in 1-minute mesoscale imagery. He concluded with an updated GOES flyout chart with fuel-limited lifetime phase added.

The session continued with Greg Mandt (System Program Director, NOAA/NESDIS/GOES-R) briefing on the future of GOES-R. He provided quick overviews of the earth-pointing instruments: ABI and GOES Lightning Mapper (GLM); and the space weather instruments: Space Environment In-Situ Suite (SEISS), Magnetometer, Extreme Ultraviolet and X-ray Irradiance Sensor (EXIS), and Solar Ultra-Violet Imager (SUVI). Mr. Mandt also discussed the GOES-R Proving Ground (PG) which bridges the gap between research and operations by utilizing current systems (satellite, terrestrial, or model/synthetic) to emulate future GOES-R capabilities. He said the proving ground infuses GOES-R products and techniques into NWS operations with emphasis on Advanced Weather Interactive Processing System (AWIPS) and transitioning to AWIPS-II and puts prototype GOES-R products in hands of forecasters. He noted this allows open lines of communication between developers and forecasters. He concluded with examples of some of the various outreach efforts such as GOES Rebroadcast (GRB) simulators, GOES-R science seminars, and online training modules.

The last presentation in Session 2.1 focused on GOES and GOES-R joint operations. Matt Seybold (GOES-R Data Operations Manager, NOAA/NESDIS/OSPO/Satellite Products and Services Division (SPSD) explained product distribution including the data flow pathways, direct readout, and the status of McIDAS Translation for GOES-R. Mr. Seybold also elaborated on product readiness and operations activities such as the Data Operations Exercises (DOEs), product portfolio status and data availability milestones. He concluded his presentation describing user support that includes the GOES-R Product Help Team and the GOES-R Product Operations Team, both specific to GOES-R, the mixed legacy GOES-13/14/15 and GOES-R constellation, and the out-year GOES-S and GOES-T.

Session 2.1 concluded with a designated question and answer period summarized below:

Q Regarding GOES-R data what is the availability, capabilities, and timing?

A Matt Seybold: Level-1b products will reach certification in post-launch test while L2 products will be available later, during the extended validation period. As far as distribution goes, GRB and Product Distribution and Access (PDA) requests are validated through the Office of Satellite and Product Operations (OSPO) and requests are submitted through user services email.

Q Regarding rapid scan, will it cover the same areas as GOES-13?

A Matt Seybold: It's a different approach with GOES-R having 3 domains, there is an equivalency in the mesoscale that Tim will touch on (Session 2.2 - GOES-R Sees the Earth), but it's not 1-to-1.

Q If GOES-R goes in the west position can they ask for a sector to cover Easter Island?

A Tim Schmit: If GOES-R is placed in the west, it will be covered every 15 minutes from the full disk scan. If GOES-R is in the flex mode, a mesoscale sector could be placed there.

Q There was no link to Comprehensive Large Array-data Stewardship System (CLASS) on the diagram, connection to back-up site?

A Matt Seybold: I did leave the back-up portions of the diagram off and didn't draw in the redundant flows. For GOES-R, the distribution does go back to the satellite and then to distribution.

Q Is there a possibility for users to get a remap of the ABI data? Will there be a way for the user to remap the data themselves?

A Tim Schmit: ABI specific, there is potential for remapping, level-0 storage would be the non-remapped data, not calibrated. The GRB data is remapped to fixed grid format. The user could access the level-0 but would have to calibrate the data.

Q I was surprised to see the BUFR files won't be produced. I thought this should be a priority?

A Matt Seybold: There has been discussion with the NWS to look at the products available and try to get those worked out.

Q What's the size for L0 data and L1b?

A Satya Kalluri: There is a table that lists all of the product sizes

Session 2.2 - GOES-R Sees the Earth

Tim Schmit (Satellite Research Meteorologist, NOAA/NESDIS/STAR/Advanced Satellites Products Branch (ASPB)) presented the ABI on GOES-R and how it continues the critical continuity of geostationary imagers which will have huge societal benefits given its improved temporal, spatial, spectral and radiometric attributes. Mr. Schmit said similar imagers by Europe, Japan, and Korea, etc. allow users to receive ABI-like coverage over most of the globe. Mr. Schmit said impact areas include, but are not limited to: weather, NWP, severe weather, hazards (volcanic ash plumes), aviation, environmental (fires), health (smoke), oceanographic, cryosphere, land, etc. He noted the ABI provides more bands, finer spatial resolution, faster refresh rates and on-orbit calibration of all bands. He noted that the ABI will offer 5x faster coverage, (5-minute full disk vs. 25-minute), 4x improved spatial resolution (2km IR vs. 4 km), and 3x more spectral bands (16 on ABI vs. 5 on the current imager).

Dr. Steve Goodman (Senior Program Scientist, NOAA/NESDIS/GOES-R) presented the GLM which he said will help improve forecasts and increase lead times for warning and decision makers. He discussed the GLM mission benefits including improved forecaster situational awareness and confidence, diagnosis of convective storm structure and evolution, aviation and marine convective weather hazard avoidance, and tropical cyclone intensity change. Dr. Goodman said the GLM presents new challenges and opportunities for model assimilation, data fusion, and tools. He noted key performance characteristics include Detection Efficiency (DE), stability, consistency, and accuracy. Dr. Goodman also explored the complementary value of satellite, radar, and lightning data by providing various research examples. He concluded by emphasizing user preparation is essential to taking advantage of the advanced capabilities to support a Weather Ready Nation.

Dr. Luiz Machado (Senior Scientist, National Institute for Space Research (INPE)/Weather Prediction and Climate Studies Center (CPTEC) Brazil) gave the final presentation in session 2.2 on GOES-R for the Americas. He explained the allocation by NOAA of GOES 10 and 12 to serve South America by providing images every 15 minutes. Dr. Machado said it has significantly improved satellite detection of severe weather, vegetation fire, atmospheric motion vectors, solar radiation, cloud classification and rainfall over South America. He also noted that the GOES East Routine Imager Schedule provides images to South America every 30 minutes while No Routine Operation provides images each hour. Dr. Machado said that a new era in satellite meteorology will start with GOES-R and that the region needs to be prepared to fully explore the potential. He provided examples of several products that have been created and researched to help maximize GOES-R potential such as inner cloud top dynamics, Cloud Processes of the Main Precipitation Systems (CHUVA Project) and the GLM Vale campaign, lightning and thunderstorm severity, multichannel plotting, cloud tracking, nowcasting, and assessing shortwave solar radiation. Dr. Machado concluded by emphasizing through cooperation between regional partners and NOAA regional products, validation, and high resolution sectors can be prepared to reach the needs of Region IV.

Session 2.2 concluded with a designated question and answer period summarized below:

Q Transition from current GOES to GOES-R, could panelists weigh in on how we should coordinate the two satellites and frequency of scanning and imagery.

A Steve Goodman: My perspective is to get the best information from the best instrument. Global Infrared (IR) maps or things at the same resolution could be used to make a special product to resample. It is not just GOES-R but you will be using Global Precipitation Measurement (GPM), etc. in conjunction with GOES-R. Think in terms of the global constellation and not just our own NOAA contribution.

Q What is the plan to validate all of these products together, a non-biased view of how the products are doing? Regarding the replacement of the imager by ABI, are we validating sounding products by GOES-R or is that a thing of the past?

A Steve Goodman: Regarding the validation, we are planning a post-launch field campaign as well as cross-calibration with other satellites. The European Center for Medium range Weather Forecasting (ECMWF) has offered to help validate among others. Even some commercial companies are planning to give us feedback.

A Tim Schmit: ABI will replace the legacy GOES sounder and has similar channels as the legacy sounder, especially with respect to moisture.

A Jaime Daniels: To add, there is a plan out there and every product will be validated whether it's in-situ or with other products etc. The field campaign is very dedicated and targeted especially with products that are more challenging to validate.

Q Tony Mostek: Going back to how to operate during transition, we are moving into higher capacity satellites, now with Himawari-8 and GOES-R, what is a global routine strategy with support for this?

A Tim Schmit: That's one of the reasons why Mode-6 came up, because you get a 10-minute full disk scan which is similar to the European and Japanese strategies. It will make global collaboration much easier.

Session 2.3 - JPSS Building on the Successes of Suomi NPP

Session 2.3 began with "From POES to JPSS: New Capabilities in Satellite Observations" presented by Harry Cikanek (Director, NOAA/NESDIS/JPSS). He discussed that JPSS provides critical data for numerical weather prediction to enable accurate 3-7 day forecasts and provides global coverage and unique day and night imaging capabilities for civilian and military needs. Mr. Cikanek added that JPSS supports all four of the key NOAA mission areas with its suite of instruments and numerous enhanced data products. He said both NOAA and NASA hold specific responsibilities for making JPSS a success with 3 satellites, 4 primary instruments, and a global ground system. Mr. Cikanek noted that Suomi NPP is healthy, producing a high availability of data (~99.99%). S-NPP operations transferred from NASA to NOAA in 2013, where it became the primary operational polar-orbiting satellite for NOAA. He continued that JPSS-1 is executing as planned. The spacecraft bus is built and undergoing testing, and the development and implementation of the new ground data processing system is underway. He said JPSS-2 procurement activities are also progressing well and noted JPSS-3 and JPSS-4 are in the President's FY2016 Budget Request. Mr. Cikanek finished by encouraging input from the users, such as, "What additional work needs to be done to ensure that Suomi NPP/JPSS products are/will be well-utilized and are additional enhancements needed?"

Next, Carven Scott (Environmental Scientific and Services Division (ESSD) Chief, NOAA/NWS Alaska Region) presented an overview of Visible Infrared Imaging Radiometer Suite (VIIRS) Applications. He emphasized that VIIRS is a major improvement over Advanced Very High Resolution Radiometer (AVHRR) as it provides 4x the spectral and 2x to 15x the spatial resolution. He displayed the 22 spectral bands on VIIRS, noting high radiometric accuracy and inclusion of the Day Night Band (DNB). Mr. Scott showcased many examples of the VIIRS imagery to give users an idea of what lies ahead. One example explained both direct and indirect benefits of VIIRS for mitigating volcanic related aviation hazards. He said nearly every day VIIRS identifies volcanic activity that is not unambiguously identifiable using any other meteorological satellite sensor which is a direct benefit. The indirect benefit, he said, is VIIRS

images can be used to identify subtle volcanic ash cloud features from geostationary imagery, thereby allowing the clouds to be tracked in time. Mr. Scott also noted that recently, VIIRS was the first space sensor to detect renewed activity at Sangay volcano in Ecuador (lava and ash emissions).

Dr. Mitch Goldberg (Program Scientist, NOAA/NESDIS/JPSS) continued the session with a presentation on Cross-Track Infrared Sounder (CrIS) and Advanced Technology Microwave Sounder (ATMS) Applications. He explained how a satellite observes outgoing radiation from Earth's surface and atmosphere using the infrared and microwave part for temperature soundings, and the H_2O absorption lines in both the infrared and microwave for water vapor. He noted that the infrared provides higher vertical resolution but is impacted by clouds while the microwave has poorer vertical resolution without impact from clouds except for precipitation. Dr. Goldberg emphasized that both CrIS and ATMS are critical for forecasting at all scales, particularly for the 3-7 day weather forecast. He stated that ATMS provides rain and snow rates, ice and snow cover information, and snow water equivalent; CrIS provides soundings for real-time instability assessments, and trace gases for monitoring greenhouse gases and their transport. He also noted that both sensors have low noise and excellent long-term stability that will enable more accurate climate change monitoring. Dr. Goldberg finished by mentioning that the sounding products (NOAA Unique CrIS/ATMS Processing System (NUCAPS) and Microwave Integrated Retrieval System (MIRS)) are available through the NOAA operational product generation system for global data and the Community Satellite Processing Package (CSPP) direct readout software.

The last presentation, "Atmospheric Chemistry Products from the Ozone Mapping and Profiler Suite (OMPS): Validation and Applications" came from Larry Flynn (OMPS Sensor Data Record/Environmental Data Record (SDR/EDR) Lead, NOAA/NESDIS/STAR). He reported on the performance of the instruments and the validation of the ozone products with particular attention to their ability to provide atmospheric chemistry products for use in ozone monitoring, air quality and aviation hazard applications. He said the OMPS measurements are well on the way to being fully-validated with on-board monitoring systems providing good characterizations of the time-dependent changes. Mr. Flynn referenced that the heritage Version 8 algorithm products are more than capable of continuing the climate data records and provide continuation of Solar Backscatter Ultraviolet (SBUV)/2 records. The Linear Fit SO2 algorithm provides good estimates by using the Version 8 residuals. He also said that the Limb Profiler products are progressing and achieving high-vertical resolution performance for ozone and aerosol profiles. In conclusion, Mr. Flynn emphasized that they are just beginning to explore the real-time applications for the OMPS aerosol products, with additional products in the research queue.

Session 2.3 concluded with a designated question and answer period summarized below:

Q What improvements would you like to see on VIIRS instruments for J-3, J-4?

A Mitch Goldberg: I would rather have the users provide improvements that they would like to see. (Response – Water Vapor Channel). Water vapor channel could be used for atmospheric motion vector for tracking polar winds. With the loss of the Moderate Resolution Imaging Spectroradiometer (MODIS) satellite, we will only have about half of data points for polar winds which a VIIRS water vapor channel could make up for. The NWS has requested a water vapor channel and engineering studies will be made.

Q Will there be any improvements to CrIS such as filling the spectral gap at 8.5 microns?

A Mitch Goldberg: There are on-going studies for filling spectral gaps and we are especially looking at the gap between bands 1 and 2. Filling this gap would also help with inter-calibration between VIIRS and CrIS.

Session 2.4 - Use of Suomi NPP

The final session of the day began with Fiona Smith (NWP Scientist, UK Met Office) and the international use of Suomi NPP data. She said the Met Office has shown significant improvement to the Met Office model by assimilating CrIS and ATMS. Ms. Smith explained how the Met Office processes ATMS data to replicate the Advanced Microwave Sounding Unit (AMSU) footprint. It is treated like AMSU/ Microwave Humidity Sounder (MHS) in operational assimilation, but observation errors are slightly increased because of striping. She continued by illustrating how CrIS data is processed based on the 399 NOAA channel subset to replicate Infrared Atmospheric Sounding Interferometer (IASI) noting that observation errors are lower. The Met Office assimilates channels that peak above the cloud top, while surface sensitive channels are rejected over land and all channels rejected over sea ice. She mentioned all centres reported a positive impact from assimilation of both ATMS & CrIS and are aiming for increased usage. Ms. Smith stated that correlated errors have been verified as extremely low and will help to improve modeling initiatives at the Met Office. She noted future work will include AMVs and sea surface temperature (SST) products from NOAA.

The session continued with a presentation on DOD user applications by Ralph Stoffler (Acting Air Force Director of Weather, DOD). He explained the DOD currently maintains six DMSP satellites on-orbit with one preparing for launch. Mr. Stoffler said future plans are to procure the Weather System Follow-on (WSF) in the 2021 timeframe and it may include a conical scanning microwave sensor. He stated the DOD is prepared to receive Himawari-8 rebroadcast, has completed GOES-R rebroadcast analysis, and has an agreement with NOAA to augment COSMIC-2 collection through the direct read-out capability of the US Air Force MARK-IVB Network. Mr. Stoffler mentioned that the Day-Night Band improves upon a legacy DMSP capability and remains important regarding continuity of nighttime observing. He stated that true color imagery also improves upon a legacy DMSP capability that enables monitoring of littoral environment, enhancing support to humanitarian assistance and disaster relief operations. True color imagery is also highly leveraged within the Joint Typhoon Warning Center (JTWC) in the Pacific and Indian Oceans for tropical cyclone applications such as determining tropical cyclone position and intensity fixing. Mr. Stoffler concludes noting that DOD will continue to fly DMSP spacecraft well into the next decade (archived data available from the National Geophysical Data Center (NGDC)) and sources such as JPSS will continue to be critical components of DOD's environmental monitoring mission.

Dr. Paul DiGiacomo (Division Chief, NOAA/NESDIS/STAR/Satellite Oceanography and Climatology Division) next presented, "Multi-Sensor Satellite Data and Products in Support of NOAA Ocean Research and Applications." He referenced that the STAR Oceans Division provides key products to users across NOAA, including the flagship Advanced Clear Sky Processor for Oceans (ACSPO) SST and Ocean Color/Chlorophyll (OCC) products from Suomi NPP. He explained ACSPO is an enterprise system which leverages VIIRS, MSG SEVIRI and Himawari-8 data, working to destripe and efficiently use the imagery bands for global SST products. Dr. DiGiacomo said the OCC system is being developed and will be implemented for VIIRS data and will provide enhanced monitoring capabilities. He stated the NOAA National Ocean Service (NOS), National Marine Fisheries Service (NMFS), NWS and Office of Atmospheric Research (OAR) all utilize or plan to utilize the OCC data to support Harmful Algal Bloom (HAB) operational reports, oil spill mapping, and enhanced air sea interaction characterization for numerical modeling applications. Dr. DiGiacomo also mentioned that data is provided by CoastWatch to these users. Additional products using scatterometry, synthetic aperture radar (SAR) and salinity are being developed and disseminated by the branch.

The final presentation of day two was, "Joint Center for Satellite Data Assimilation (JCSDA) Use and Continuous Optimization of the Suomi NPP Data Assimilation," given by Dr. Sid Boukabara (Deputy

Director and Senior Data Assimilation Scientist, JCSDA). He explained the JCSDA provides support to five internal efforts that leverage and exploit satellite data: a) directed research, b) external research, c) visiting scientist program, d) in-kind research, and e) operational system to research (O2R). He described how the Community Radiative Transfer Model (CRTM) is developed and maintained at JCSDA and has made a positive impact across NOAA and its national/international partners for data assimilation/retrieval of microwave, infrared and visible data, including Naval and AFWA data assimilation efforts. Dr. Boukabara added the JCSDA supports coordination and synchronization between NESDIS and the NWS modeling teams and have proven success in streamlining the data assimilation timelines for new sensor data. He said Suomi NPP assimilation optimizations have demonstrated a 10 percent increase in assimilation volumes which corresponds to a forecast improvement. Dr. Boukabara concluded that work continues in land data assimilation of green vegetation fraction and aerosol products at JCSDA.

Session 2.4 concluded with a designated question and answer period summarized below:

Q Are there any planned projects to combine JPSS and GOES-R data for decision support?

A Mitch Goldberg: JPSS pays to combine new sensor data into the legacy blended product systems as part of the level-1 requirements. Data such as SST are blended and projects for continued blended efforts continue today. The JCSDA supports Gridpoint Statistical Interpolation (GSI) system development to combine all satellite sensor data via assimilation into NWP models.

Q Which modeling centers have shown high impact of CrIS data assimilation using the UK Met Office model?

A Sid Boukabara: Currently, there is just a snapshot of users but it includes KMA, Australia, New Zealand and South Africa.

Q What is the error of the CRTM for infrared radiances and can use it as a benchmark?

A Sid Boukabara: Approximately 0.1 micron. In clear sky we are given the right weight, so in that sense we are using it as a benchmark.

Q How important is it to collocate and cross-calibrate CrIS and VIIRS?

A Paul DiGiacomo: This is useful for convective-scale modeling and radiometric classification work.

Q How does OCC affect weather models?

A Paul DiGiacomo: It improves the air-sea interaction characterization in the models that can then improve tropical cyclone forecasts dramatically.

Q OSPO works the R2O transition and works to minimize the time it takes to accomplish the transition—how long does O2R take?

A Sid Boukabara: Researchers at JCSDA work to demonstrate the worth of a data set and there are plans with JPSS to fund operational demonstrations of product assimilation.

SESSION 3 – Data Access and Use

The third day of the conference began with an Opening Keynote Address by Mr. Julian Baez (President, WMO RA III) on the WMO Regional Association III perspective related to satellites. He reported the association is composed of 13 countries in South America which contribute to the security and welfare of the population and to the economic prosperity through the production and release of reliable forecasts to the Early Warning Systems (EWS). Mr. Baez underlined the importance of frequent geostationary satellite observations to support nowcasting and short-range forecasting and recalled the valuable service provided by the United States through the operation of a relocated GOES satellite delivering 15 minute imagery over South America from December 2006 to August 2013. He said, following the termination of this GOES-South America mission, the Association welcomed the measures taken by NOAA to optimize GOES-East operations (in close consultation with experts from RA III and RA IV) with a view to ensure at least hourly coverage of most of the region during rapid scan operation over North America. In conclusion, Mr. Baez said the Association recommends a special training effort to prepare for the new generation satellites and encouraged all members to set up internal user preparation projects at the national level.

Session 3.1 JPSS Products and Dissemination: How to Access Data (Current and Future)

Dr. Lihang Zhou (Physical Scientist, NOAA/NESDIS/STAR/Satellite Meteorology and Climatology Division) began the session by discussing JPSS products and capabilities. She began with Suomi NPP and JPSS-1 instrument types and their measurements. She also listed the JPSS program data points along with their EDRs, which include ATMS (11 EDRs), CrIS (5 EDRs), CrIS /ATMS (2 EDRs), VIIRS (26 EDRs), OMPS-Nadir (2 EDRs), and AMSR2 (11 EDRs). Dr. Zhou explained how JPSS VIIRS provides significant improvement with higher resolution, wider swath, and greater accuracy. She confirmed that most operational Suomi NPP products have reached validated maturity levels and met product requirements. She added that Suomi NPP product evaluation updates are continuing with long-term monitoring and reactive maintenance and with replacement and upgrade algorithms with NOAA Enterprise Algorithms. Dr. Zhou talked about leveraging the Suomi NPP Calibration and Validation (Cal/Val) experience and improving knowledge of the pre-launch characterization of the JPSS-1 instruments. She ended by noting JSTAR teams are ready to accelerate the Cal/Val activities for JPSS-1 sensor and data products.

Next, Tom Schott (Physical Scientist, NOAA/NESDIS/OSGS/Program Engineering, and Technology Division/Product Generation, Distribution, and Archive Systems Branch), presented, "JPSS: Stored Mission Data (SMD) & Environmental Satellite Processing Center (ESPC) Products." He said the Suomi NPP SMD flows from Svalbard, Norway to the ESPC within the NOAA Satellite Operations Facility (NSOF) and is distributed to NOAA's long-term archive and to various users/consumers. Mr. Schott explained that Suomi NPP SMD data can be accessed from both archive and in near-real-time; CLASS has a delay of 6 hours or more and data is typically made available to users within 24 hours. He added the Suomi NPP Data Exploitation (NDE) provides real-time data access via ftp-s. Mr. Schott showed a list of all ESPC products and featured a few examples from Microwave Integrated Retrieval System (MIRS), Vegetation Health Suite (VHS), and the VIIRS Polar Winds (VPW). He noted that the products can be tailored to suit user-applications/needs with the following options: aggregating, reformatting, resampling, thinning data files, remapping, filtering, compressing, and applying WMO headers.

The next presentation, "JPSS: Satellite Broadcast Network (SBN) - AWIPS Products" was given by Brian Gockel (Acting Ground Readiness Project Manager, NOAA/NWS). He showed a diagram explaining the flow of Suomi NPP and JPSS products to AWIPS through the NDE and PDA Enterprise System. Mr. Gockel described how the Satellite Broadcast Network (SBN) disseminates satellite, model, radar and

other products to AWIPS and other users with a bandwidth of 60+ Mbps. He listed the current channels carrying Suomi NPP/JPSS products: National Meteorological Center/National Weather Service Telecommunications Gateway (NMC/NWSTG) (Suomi NPP Point Data), POLARSAT (Suomi NPP /JPSS VIIRS Imagery, and EXP (Test or Experimental Products). Mr. Gockel then discussed the Suomi NPP/JPSS products planned for AWIPS SBN addition: VIIRS Imagery Channels for AK Region (added in 2012), Western Hemisphere NUCAPS (added April 2014), VIIRS Near-Constant Contrast Imagery – Regional (planned for July 2015), blended products, Suomi NPP/JPSS active fires product, cloud liquid water, snow products, and sea ice characterization and/or concentration. He noted that all NWS field sites have secondary/local methods for acquiring products that are not on the SBN, but NWS field sites with a polar-satellite direct readout feed and ingest/processing systems receive more expansive product set than that which is available via the SBN.

Dr. Bob Lutz (Field Terminal Segment (FTS) Manager, JPSS Ground Project/Data Product and Engineering Services) discussed JPSS science data services for the direct readout community. He provided detailed descriptions of the various key functions of FTS providing the necessary building blocks (software, documentation, or mission support data) on a web portal. Dr. Lutz said the proposed FTS implementation plan leverages ongoing activities to support the needs of the direct broadcast (DB) community meeting all FTS requirements; it will meet NASA and NOAA standards, software requirements, IT security, and safety mission assurance. He said the JPSS Program is also supporting the development and maintenance of user-friendly software packages such as International Polar Orbiter Processing Package (IPOPP)/CSPP from Goddard Space Flight Center (GSFC) Direct Readout Laboratory (DRL) (IPOPP) and the University of Wisconsin (CSPP) to demonstrate the ability to produce ready-to-use products from the Suomi NPP /JPSS High Rate Data (HRD) link. Dr. Lutz concluded by saying FTS will leverage existing annual workshops to provide a forum for the direct broadcast community to present, discuss, learn and provide feedback to the JPSS Program.

Session 3.1 concluded with a designated question and answer period summarized below:

Q Regarding getting products into AWIPS through SBN, I'm curious about the spatial resolution of AWIPS vs AWIPS II?

A Brian Gockel: We didn't implement that in AWIPS. We implemented the NDE flow into AWIPS II.

Q With the availability of JPSS data in GEOTIFF format, are there plans for other additional geographic information system (GIS) friendly formats?

A Tom Schott: From the NPP Data Exploitation (NDE) perspective for stored mission data, GeoTIFF is going to be available around January 2016. In the NDE and PDA, we are not exploring any other GIS.

Q How do you acquire your requirements?

A Lihang Zhou: User feedback through program science can translate into requirements definition.
A Tom Schott: From NDE perspective, tailoring is a challenge for NPP data, but feedback from the user community can translate into requirements to meet user needs.
A Bob Lutz: We have L1, L2, L3 requirements for the portal and have to be careful. It doesn't mean they can't be changed later or have additional L4 requirements.

Session 3.2 GOES-R Products

Jaime Daniels (Physical Scientist, NOAA/NESDIS/STAR/SMCD/Operational Products Development Branch) gave a presentation on GOES-R products and capabilities. He discussed the GOES-R ABI and GLM instruments which will bring new and enhanced capabilities that will provide observational data and products which are expected to make a positive difference in environmental monitoring and forecasting. Mr. Daniels said a large number of level-2 products were designed and developed to take advantage of the new capabilities of the ABI and GLM instruments. He described how JMA's Himawari-8/AHI data provides an unprecedented opportunity to prepare users for GOES-R. Mr. Daniels also provided many examples of how the user community will benefit from GOES-R products.

The next presentation on "GOES-R Direct Broadcast (GRB, HRIT/EMWIN)" was given by Paul Seymour (Direct Broadcast Program Manager, NOAA/NESDIS/OSPO/SPSD/Direct Services Branch). He began with a chart showing the impact of the transition from GOES Variable (GVAR) to GRB, noting the data rate difference of 2.11 Mbps in GVAR to 31 Mbps in GRB including additional ~2 Mbps of space weather and 0.5 Mbps of lightning data. Mr. Seymour noted that direct readout users will need to upgrade all equipment for GOES-R due to new data format and a significant increase in data rate. He stated reception of the GRB data will require a fixed dish antenna equating to a 4.5 meter satellite dish with a system noise temperature of 120 K. Mr. Seymour continued that High Rate Information Transmission (HRIT)/ Emergency Managers Weather Information Network (EMWIN) will provide at least 3 channels of GOES-NOP and/or GOES-R imagery along with warnings, watches and forecast products along with a copy of the GOES-Data Collection System (DCS) observations. Mr. Seymour noted that EMWIN users will experience a new data rate, center frequency and modulation and that receive stations will require a minimum of 1 – 1.2 meter antennae with a system noise temperature of 200 K. He encouraged all users to take the time to talk to the vendors that currently are supplying Low Rate Information Transmission (LRIT) receive stations.

Graeme Martin (Space Science and Engineering Center (SSEC)/University of Wisconsin-Madison) closed the session with a presentation on CSPP GEO support. He discussed the benefits of a processing package for geostationary satellite data which provides products useful for forecasting and other applications, promotes the use of GOES-R products and science software, and distributes updated algorithms to DB users allowing users to customize and develop their own algorithms. Mr. Martin described the CSPP GEO GVAR software (V1.0 released early April 2015) that allows users to process GOES-13 and GOES-15 imager data. He noted the output is AREA files suitable for GEOCAT (not yet released), McIDAS, or other software. Mr. Martin said the JMA plans to distribute Himawari AHI data to DB users via the HimawariCast (Beta release planned for end of May) stream with reduced spatial resolution, containing 14 of 16 channels. He informed the users software is being developed to convert HimawariCast data to AREA files. Finally, Mr. Martin described GEOCAT, an algorithm testbed developed by Dr. Mike Pavolonis (NOAA/NESDIS/STAR) and Cooperative Institute for Meteorological Satellite Studies (CIMSS). He said many of the GOES-R algorithms were developed in GEOCAT and provides an easy way to distribute many product algorithms to DB users, including science updates. Mr. Martin added that it processes data from multiple instruments and recently added support for AHI data so that scientists can now adapt algorithms.

Session 3.2 concluded with a designated question and answer period summarized below:

Q Can you give us an idea on the time the GRB takes to process all 16 bands, using the minimum requirements? recovering the Level-1

A Graeme Martin: It doesn't take long at all because you have to keep up with the data rate.

Q How much might a DB station cost? Cheaper than current? With a completely new system, how much does the new antenna cost?

A Paul Seymour: In the $20k range plus or minus some amount of money. It depends on installation cost and the support you purchase. GRB stations are in the upper 200k-300k range for basic but can reach up to a million dollars. It depends on where you source the equipment and support.

Q EMWIN has been used by some countries in Central America to receive warnings from the National Hurricane Center (NHC). If GOES-R goes to the West, does that mean we can't use the data until 13 is replaced?

A Paul Seymour: Yes. The HRIT/EMWIN system is going to produce the data stream for N/O/P and R. We will not stop broadcasting on LRIT out of GOES-13, -14, & -15.

Q How will the introduction of experimental algorithms be handled?

A Graeme Martin: Precedence with Suomi NPP. Right now we have access to algorithms that haven't been updated since the operational algorithms were implemented. There is a set of users who will want access to the latest version of algorithms. We need to be clear to distinguish between the release of different algorithms e.g. GEOCAT.

Q We have heard about new products with GOES-R, is there going to be anything lost going from the current GOES to –R? Is there any channel or anything of significance not being put onto the R satellite?

A Tim Schmit: As far as imagery, there is nothing that is lost. In the spectral area where we had 2 IR windows, now we have 3 so we had to slide some over. As far as overall, current GOES has a sounder that we don't have on GOES-R. The moisture content is sort of equivalent to the current sounder.

A Jaime Daniels: There's more gained than lost. Some of those continuity products that Matt Seybold mentioned yesterday, we know what those are and are working to close the gaps.

Session 3.3 Product Distribution Systems

Donna McNamara (Distribution and Scheduling Team Lead, NOAA/NESDIS/OSPO) and Don Slater (Environmental Satellite Processing and Distribution System (ESPDS) Transition to Operations Lead, Artic Slope Research Corporation (ASRC)/ESPDS) presented the Product Distribution and Access (PDA) System. They described the NESDIS OSPO support missions, which cover command and control, ingest, product generation and distribution for the nation's 15 environmental satellites. These missions include: pre-launch and post-launch testing, operational testing, validation, and verification. They said these preparations will help user readiness and provide long-term continuity of products and services. They described the current data processing and distribution methods including: NDE, GEODIST, McIDAS, Data Distribution Server (DDS), and GOES Ingest NOAAPORT Interface (GINI). They moved on to present the near-future data processing and distribution, PDA, intended to serve as the NESDIS enterprise distribution system for near-real-time users. They said PDA services will improve user-managed subscriptions, user-managed searches, and tailoring, and offer enhanced security controls/transfer protocols, enhanced reporting and control for system optimization, and the ability to handle large data volumes. Ms. McNamara noted in the event of an outage at the primary facility at NSOF, PDA access is transferred to the Consolidated Back-up (CBU) in Fairmont, West Virginia, to support only the

JPSS/Suomi NPP missions. They stated PDA user training will be made available in the fall of 2015 in accompaniment with the PDA external user's guide. She added that training will be conducted locally in the Washington D.C. area as well as remotely via webinars. She remarked that PDA will enable OSPO to deliver large mission data to authorized users, have greater management control, and insight to distribution and enable NESDIS to more easily scale to meet future distribution demands while ensuring a secure distribution framework.

"CLASS Access," was presented by Axel Graumann (Meteorologist, NOAA's National Centers for Environmental Information (NCEI)). He contrasted the role of CLASS vs. the role of NCEI. CLASS is managed by the NESDIS Office of Satellite Ground Services (OSGS) with current responsibilities including ingest, management, archival and access to its information holdings. NCEI, in addition to providing similar services as CLASS, are responsible for data stewardship and user support of all information holdings in CLASS and in NCEI. Mr. Graumann referenced the 80 data families in CLASS, in which each may contain many data types. He said altogether there are 300 datasets in CLASS which are accessible through the web interface with the most popular being from GOES, POES, and Suomi NPP. He showed the levels of accessing services and the average time of completion. These included ad hoc specific requests which usually are completed in 12 to 24 hours, large orders (24 to 48 hours), subscriptions (average 6 to 7 hours), and block orders (more than 48 hours). He noted that CLASS is known to provide daily .tar files containing publically available Suomi NPP products (excluding the raw data records) for easy anonymous FTP download.

Closing the session was a joint effort between Walt Schleicher (Telecommunication Specialist, NOAA/NESDIS/Assistant Chief Information Office (ACIO)/Independent Scientific Advisory Board) & Mike Laufer (NOAA/NESDIS/OSGS/PETD) with focus on near real-time satellite data distribution to NOAA partners within the U.S. and internationally. They emphasized NOAA is committed to meeting the challenge of distributing large data volumes from the new generation of satellite to their partners. They explained the future superhighways include Internet2 (I2) connected to National Research and Education Networks (NRENS) as well as the Internet as the primary data distribution pathway. They noted this replaces dedicated point-to-point circuits, frame relay, Multiprotocol Label Switching (MPLS), and Internet traffic paths, especially internationally. They noted that NOAA will be utilizing Multicast and Cloud Server (option) mechanisms as the primary data delivery methodologies.

Session 3.3 concluded with a designated question and answer period summarized below:

Q You talk about the PDA, that it is open to foreign users correct?

A We don't have limitation on foreign users; they have to have a proven real-time feed which gets sent to NOAA foreign relations for approval. We serve a good majority of foreign meteorological services and modeling.

Q You have these trainings and webinars for PDA, what languages are you printing manuals in?

A They are printed in English currently; note to have users' guide translated to Spanish.

Q Can you talk more about how NOAA's partners in the weather industry can access PDA, and is that going to be an ftp push or Local Data Manager (LDM) in order to transfer that data? I am not getting a warm feeling about the PDA backup situation and wondered if we could talk more about it? Sounds like an area of concern to maintain the real-time operational data streams.

A Donna McNamara: We have many users already, all are welcome to apply. Every commercial company with a real-time need has generally been approved. The preferred protocol is ftp. Plans are to allow a higher volume. While the requirements say they will support ftp, they are outdated. Regarding push and pull, we definitely prefer pull, we will only approve pushes to very important users with a 24/7 desk.

A Linda Stathoplos: We are not in a time of expanding budgets for these activities. The taxpayers want us to reduce spending, not expand. In that context, we decide based on the program requirement, what in order to meet our program essential functions is required to meet our functions. These new systems are designed to last longer. We are aware we want to keep our customers operating in the event of a failure. We have budget requests in to strengthen and expand. What is reported today is what is funded today. It's our intention to continue to ask for that support and expand what's at the backup once those funds are available. When these technologies become easier and cheaper we hope to move more to you. We're concerned as well and we're doing what we can.

Q One point of clarification, what will be the impact if pushed to the CBU?

A Linda Stathoplos: I can tell you generally PDA is going to be fully stood up at the CBU. We may have the capacity to send stuff from both satellites, but at the CBU it will only be one. For GOES-R, it's just AWIPS and GRB.

A The GOES-R raw data will go straight through AWIPS, the products will be through PDA.

A We do not have the infrastructure to produce the L2 products at the CBU site.

Q As you look at the new forms of distribution from the new platforms, are you considering setting up a testbed where users can work with you on accessing data or ways you can leverage other distribution networks?

A Linda Stathoplos: That big data initiative is one mechanism. We are trying to get it out and get other partners able to do things. NOAA isn't going to stand up the infrastructure to convert everything to a format because someone comes up with something like Google Earth. That would be under a corporate partnership. We have through STAR and other architectures within the NOAA Satellite line offices, opportunities for leveraging more recent developments to try and develop new techniques.

Session 3.4 Product Distribution Services

Paul Seymour, began the final session of the day with a presentation on GEONETCast Americas (GNC-A). The Global GNC uses communication satellites to distribute low-cost, self-contained, stand alone, and off-the-shelf reception stations providing near-global coverage with established data exchange between regional broadcasts with EUMETSAT as the product navigator. He said GNC-A's mission is to provide a data distribution system within Global Earth Observation System of Systems (GEOSS) by which environmental data and products will be transmitted to users through regional networks over communications satellites. The objective is to provide global information as a basis for sound decision making in critical areas and support GEOSS societal benefit areas and WMO Region III/IV satellite data requirements. Since the NSC-2013 users, providers, and partners have all expressed a desire to have a EUMETCast-like service for the Americas, Mr. Seymour showed how GNC-A moved to add value to the product suite by providing tutorials, visualization tools, and revitalized GNC-A coordination groups to increase participation from users and partners. He said the El Salvador HydroMet Network began providing graphic GOES imagery and Weather Research and Forecasting (WRF) model fields in 2014 with 5 stations installed. These products covered Central America and part of the West Caribbean

deploying innovative methods of viewing the products that GNC-A would later explore as a tool. He also described the Colombia HydroMet Network that has installed 5 GNC-A stations with approximately 6 more to go which will work as a national network and aid as a disaster response tool. They are organizing training with NESDIS, USGEO, and INPE and assisting Chile with acquiring a station. Mr. Seymour then explained the INPE/Brazil SigmaCast Project which plans to develop operational software based on JAVA and GIS allowing the user to visualize, analyze and combine layers. He said this project included installation of 23 stations in Brazil in the regional center. Mr. Seymour presented the short-term initiatives for GNC-A. The main priority is to develop a user-friendly interface to facilitate the visualization of products, increase outreach to better determine user needs, and outreach to partners and users to participate as providers and governance. He mentioned GNC-A will provide an increased ability to access disaster charter products. He added that WMO Region III/IV requirements leave room to support other societal benefit areas and work toward at least one installation in each country.

Simon Elliot (Third Party Data Services, EUMETSAT) provided information regarding EUMETSAT Third Party Data Services (3PDS). He explained EUMETSAT makes use of existing infrastructure, technical expertise, and international partnerships in order to deliver data from third-party agencies by acting as a redistribution hub for multiple users. He said accessing this data via EUMETCast can be tailored according to the end-user's needs. Mr. Elliot commented that Meteor-M N2 launch and commissioning are going well. He said once the data becomes available it is intended to provide sample data to Member States to allow assessment of quality and suitability for the potential definition of a future data service. EUMETSAT has agreements with satellite data operators in several countries and has third-party data services continually being updated in response to user requirements for Japan (JMA and Japan Aerospace Exploration Agency (JAXA)), Indian Space Research Organization (ISRO), China (CMA and National Ocean Satellite Application Center (NSOAS)), Russian Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet) and the United States (NASA and NOAA) in which Mr. Elliot explained each in detail.

The next presentation focused on GOES Data Collection System (DCS) by Kay Metcalf (GOES DCS Program Manager, NOAA/NESDIS/OSPO/SPSD/Direct Services Branch). She described DCS as a national-critical system for data relay providing near-real-time data transmission through GOES satellites for surface-based systems. She also said they are used to monitor environmental events such as tsunamis, floods, fires and other synoptic observations. She discussed how they provide data communications for most emergency warning systems in the western hemisphere and deliver 6M+ observations per day into the global observing system. Ms. Metcalf stated the DCS requirements include transmission of any environmental parameter that can be measured, must be from the government or government sponsored, must apply for a GOES DCS System Use Agreement (SUA) and be approved before transmitting, must use certified transmitters, must conform to NOAA system user policies and be a "good neighbor" to all other users. She also discussed the DCS Administration and Data Distribution System (DADDS) which manages user and platform information, provides data monitoring, downloads, disseminates to other circuits, and provides tables that have fields that users must update. Ms. Metcalf highlighted the system changes that are required for version II transmitters (Certification Standard 2 (CS2)) to be newly deployed. She said any Certification Standard 1 (CS1) equipment already purchased can be deployed until May 31, 2016 but all existing CS1 equipment can be used until May 31, 2026. Ms. Metcalf also discussed the changing requirements for GOES-R such as accommodating the frequency downlink shift; there will be no change in uplink frequencies, or on the satellite side; any other changes will be occurring on the ground segment.

The final presentation of day three was given by Sergio Vega (Electronics and Informatics Engineer, National Institute for Seismology, Vulcanology, Meteorology and Hydrology (INSIVUMEH), Guatemala) on experience with data acquisition DCS and LRIT in Guatemala. Mr. Vega provided a history of DCS data acquisition in Guatemala, noting since Hurricane Mitch in 2000, Guatemala

purchased through donation several hydrometeorological stations through the U.S. Geological Survey (USGS). Unfortunately, he said, Hurricane Agatha damaged almost 75% of the stations due to flooding which couldn't be replaced due to a lack of funding. Since 2010, the monitoring network has been strengthened, he noted, by the purchase of equipment for receipt of satellite images for LRIT to create charts. He continued that in 2015, the first S-band dual polarity radar for monitoring weather will be commissioned. Currently there are 68 hydrometeorological stations that make up the automatic monitoring network for INSIVUMEH, which is used as the main system for data acquisition in its automatic stations for the reception system DCS data. Mr. Vega said that INSIVUMEH is expected to have a national forecast center with high tech equipment for monitoring and analysis of atmospheric phenomena.

Session 3.4 concluded with a designated question and answer period summarized below:

Q For GNC-A and EUMETCast, what percentage of bandwidth is taken up in C-band and what growth room is left?

A Simon Elliot: EUMETCast monitors this and will add additional bandwidth when necessary.
A Paul Seymour: For NOAA, with new products we believe we are at around 70% and have some room for growth.

Q For GNC-A, are you seeing evolution in types of formats that can be merged with other data? Are these becoming more popular?

A Simon Elliot: GEOTIFFs popular in Latin America and we now are providing those. One of the strengths is GNC is not prescriptive of what formats can be used. Lots of flexibility and scalability.

Q Possibility of sharing GOES DCS and LRIT with private sector spectrum users? What percentage is used by Domsat vs. LRIT?

A Kay Metcalf: 30% now but it's still a growing community. Also growing military component for imagery.

Q How does Africa service differ from Europe services?

A Simon Elliot: Europe uses Ku-band, Africa is C-band with a subset of data in Europe. Also agreements with other agencies only allow sharing with EUM member states.

No Host Dinner - "A Life Spent Looking Up"

The conference banquet speaker was Former American Meteorological Society (AMS) President Jonathan Malay. He retired a year ago from his position as Director of Civil Space & Environment Programs in the Washington Operations office of Lockheed Martin Corporation. His presentation entitled "A Life Spent Looking Up" began with a reminiscence of his two successful careers, first as a U.S. Naval Officer specializing in oceanography, meteorology, and space, and then in the aerospace industry representing his companies in day-to-day liaison with both NOAA and NASA for weather satellites and Earth and space science missions. He used the metaphor of "looking up" not just to describe his personal decisions in choosing a career focused on meteorology and space science, but also for his philosophy of eternal optimism and uncompromising professional integrity.

In his talk, Mr. Malay also described his anything-but-leisurely life in retirement, having embarked on a third career as a cruise ship lecturer on science and as an author, having just completed a new book. The book, for which he is currently seeking a publisher, is the story of his service on the guided missile destroyer USS BENJAMIN STODDERT (DDG-22), the last U.S. Navy warship to leave Vietnamese waters after the fall of Saigon – the very last American military presence of the Vietnam War.

He closed his presentation with a spirited discussion of the vital importance of NOAA polar-orbiting and geostationary weather satellites to the nation and the critical challenge of maintaining political support for them in Washington in the very difficult fiscal environment of today.

SESSION 4 – Thursday Sessions

Session 4.1 Education and Training

Day four began with Wendy Abshire (Senior Project Manager/Meteorologist, University Corporation for Atmospheric Research (UCAR)/Cooperative Program for Operational Meteorology, Education and Training (COMET) & Patrick Dills (Meteorologist, UCAR/COMET) providing a presentation on the COMET Program. Ms. Abshire pointed out that there are over 100 satellite-specific lessons on MetEd, and three multi-lesson courses, one of which is on GOES-R. She commented that NESDIS satellite training activities with the COMET Program attract additional funding and training development, specifically in the satellite topic area for both EUMETSAT and the Meteorological Service of Canada. She then gave a demonstration on how easy it is to access the materials/courses. Next, Mr. Dills highlighted the recent JPSS and GOES-R related lessons and courses, and where to locate them. For example, the GOES-R Orientation Course was recently made available, which includes all 3 core GOES-R lessons (Benefits of Next-Gen Environmental Monitoring, ABI Next Generation Satellite Imaging, and Intro to the GLM), available in both English and Spanish, and should be expected to take 3 - 5 hours to complete. He also said that one more optional lesson on AHI (15 – 30 minutes) was recently added in January 2015. Mr. Dills noted the distance learning courses also highlight additional online learning, data, and product resources available via the Internet.

Virtual Institute for Satellite Integration Training (VISIT) was the next discussion topic presented by Bernie Connell (Researcher, Cooperative Institute for Research in the Atmosphere (CIRA)/VISIT/Colorado State University) focusing on satellite training from the Cooperative Institutes (CI): VISIT and SHyMet (Satellite Hydrology and Meteorology) Programs. She discussed the strength of the CIs, which is due to location at a university creating a close link to the research side of R2O, as well as education, outreach, and training having close collaboration with NOAA colleagues. Ms. Connell shared the main focus of the VISIT Program is to transfer research results to operations using distance education techniques. She said the primary client is the NWS forecaster, although the program serves many others. She noted that CIMSS and CIRA collaborate on this activity. She described the initial focus on stand-alone session topics which include: satellite meteorology, severe weather, winter weather, tropics, lightning, climate, numerical weather prediction, fire weather, for both current and future satellites which includes training specifically for JPSS and GOES-R. SHyMet courses are dedicated to operational satellite meteorology. Ms. Connell listed the four courses currently available: Intern, Forecaster, Severe Weather, and Tropical. She added that a SHyMet directed towards GOES-R is under development focusing on GOES-R instruments, products and operational applications.

Brian Motta (Meteorologist, NOAA/NWS/Office of Chief Learning Officer, Forecast Decision Training Division) presented on the NWS Satellite Training Plan. He explained that NOAA's satellite education and training is continuous. Mr. Motta broke down the satellite training timeline starting with pre-requisite training in FY15 and foundational training in FY16. He said moving forward into FY17 and beyond, the flow of training will progress from application-based training, to exercise-based training, moving towards, "make it stick" and continued learning. Mr. Motta also described the learning objectives of the NOAA/NWS Satellite Training Plan. He said the first objective is to understand differences between legacy GOES and the GOES-R series, and Suomi NPP/JPSS baseline satellite data. The next objective he identified is to use GOES-R Advanced Baseline Imager (ABI) imagery and derived products for NWS forecasts and warnings. The third objective he recognized is to utilize GOES-R GLM data in forecast and warning operations. The final objective Mr. Motta said is to understand fundamental red-green-blue (RGB) satellite techniques and applications for identification of meteorological phenomena. He continued by showing how the NWS Satellite Training Plan integrates GOES-R and JPSS in NOAA's

Environmental Intelligence Operations (NWS WRN). It requires individual, office, and organizational commitments, he concluded, and provides multiple modes to access training: on-line, in-person, just-in-time, and on-the-job.

Dr. Chad Gravelle (Science Coordinator and GOES-R Satellite Liaison, NWS Operations Proving Ground, CIMSS, University of Wisconsin) continued the session with a presentation titled, "Training Within the Satellite Proving Ground: The Satellite Liaison Perspective." He said the GOES-R Series Program has been committed to providing extensive training for the operational and educational communities that will address both the end users' and developers' needs, bridging the gap between research and operations while ensuring day-1 readiness. Dr. Gravelle provided examples of multiple training resources, including e-learning training modules, seminars, weather event simulations, and special case studies. He explained the role of the satellite liaisons is to help prepare and train forecasters using data that will be available on GOES-R, which eases the transition of research to operations. He described how the satellite liaisons have become the satellite subject matter experts at their respective facilities. He noted that it is important for the training resources to include product background information, examples, product verification, and illustrate how GOES-R makes forecasters' decisions easier. Dr. Gravelle emphasized that forecaster training in-person, either individually or in small groups, is much more effective then web-based training which must be layered. He concluded with training recommendations he made to the NWS which include a web-based satellite course for all NWS forecasters, an in-residence lab for Science and Operations Officers (SOOs) and local Weather Forecast Offices (WFO) Satellite Focal Points, and layered training resources for SOOs and local Satellite Focal Points.

Margret Mooney (Education and Public Outreach Director, CIMSS/University of Wisconsin) closed the session with a presentation on the GOES-R Education Proving Ground. She said the GOES-R Education Proving Ground features the design and development of lesson plans and activities for grades 6 through 12 teachers and students in collaboration with NOAA scientists at the ASPB. She said the intended project outcomes include awareness of NOAA's contributions to satellite remote-sensing applications, increased utilization of satellite data in science classrooms, improvements in science literacy, and effective transfer of GOES-R satellite products to the educational community. Ms. Mooney referenced the lesson plans that are freely downloadable from the GOES-R Education Proving Ground website and introduced three new WebApps. She concluded by outlining the next steps for the Education Proving Ground, which include expanding the teachers from 6 to 26, planning four educational webinars, organizing a teacher workshop at the GOES-R launch along with additional workshops in 2017 and 2018 co-located with Earth Science Information Partners (ESIP) summer meetings.

Session 4.1 concluded with a designated question and answer period summarized below:

Q Is there an opportunity to broaden GOES-R outreach activities to link to Global Learning and Observation to Benefit the Environment (GLOBE) and Science, Technology, Engineering, and Mathematics (STEM)?

A Margaret Mooney: One option: CIMSS is working on picture-in-picture displays with Science on a Sphere; we should have videos ready for AMS 2016 Annual Meeting.

Q Regarding geographic specificity, how important is it for students to identify with? How do you get geographic specificity for the modules for your forecasters?

A Chad Gravelle: A great example of how this is done is for fog and low stratus (FLS) product training as it affects every office so it is crucial to have regional varied training. This is being done for other products/phenomena – i.e. severe convection initiation, volcanoes, etc.

Q Is there a way to capture ground validation imagery (pics from smart phones, webcams, etc.)?

A Wendy Abshire: Yes – MPING (free app collecting public weather reports - Meteorological Phenomena Identification Near the Ground) is available at Norman and SNAPCAM at CIMSS and new CIRA apps are in development for collection of citizen-driven weather observations.

Q Are there any Spanish speaking satellite liaisons? (As NOAA has at several National Centers and Proving Ground).

A Tony Mostek: No – but this is a great idea that is being shared with WMO VLab and will be discussed with National Centers for Environmental Prediction (NCEP) International Desk and at monthly Regional Focus Group briefings and other venues.

Q Reminder that WMO has over 190 members that can all benefit from satellite training efforts to enhance utilization of these observations. There are no boundaries for satellites and training also must have no boundaries. Expanding access to training can be done using WMO Regional Training Centers and VLab.

A Stephen Bojinski: The training activities from NESDIS have been essential, COMET has almost 400,000 users and most are international. We are working to make more training available in more language and look forward to more collaboration.

Q What about training for emergency managers (for fire weather and other phenomena) on use of satellite data/products (on existing satellites is needed and then for new satellites). These users have some experience with radar but very limited with satellite. What is best training process to help this audience (can be pretty large and is more than NOAA users)?

A Margaret Mooney: That community could access the resources we have all presented.

Session 4.2 International Perspectives on Training and User Access to Imagery and Products

Jeff Wilson (Director, WMO Education and Training Office (ETO)), Patrick Parrish (Chief of Training Activities Division, WMO ETO), and Aileen Semple (Senior Program Manager, Seconded from the UK Met Office to WMO ETO) presented, "Education and Training to Support WMO Members in 2020–How will we get there and what will it look like?" They defined the WMO as the UN system's authoritative voice on the state and behavior of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources. They described the WMO's mission to facilitate cooperation, promote provision of meteorological services and rapid exchange, promote standardization, further the applications of meteorology, promote activities in operational hydrology to further close cooperation, and encourage research and training to assist in coordinating the international aspects of research and training. Showing the global staffing profiles, they noted the total number of staff involved in weather forecasting for more than 140 countries is less than 3,000 people. They explained the WMO global campus contains 27 WMO regional training centers and many WMO affiliated institutions that provide good examples of the collaboration and networking. They discussed the recognition of gaps

within the supply and demand of training. They explained the challenges of changes in workforce numbers and roles (some countries being unable to train their staff) expanding and new services, increasing focus on competency, new training developments and delivery methods, and static or reducing budget. They showed that the global campus is a way of enhancing how WMO regional training centers and WMO affiliated institutions work, coordinate, and collaborates to meet WMO members' training needs. They concluded that the global campus is not a physical building or campus however it is not just online training. It encompasses different needs, styles and methods.

Kathy-Ann Caesar (Chief Meteorologist, Caribbean Institute for Meteorology and Hydrology, Barbados) & Luiz Machado (Senior Scientist, INPE/CPTEC, Brazil) continued the session with a presentation on the WMO Virtual Laboratory (VLab) and RA III/IV Coordination Group on Satellite Data Requirements. Ms. Caesar defined the VLab as a worldwide collaborative network of training Centres of Excellence (CoEs) and satellite operators. She noted that it was established in 2000 by the WMO and the Coordination Group for Meteorological Satellites (CGMS) and is used to improve and use data and products from meteorological and environmental satellites. Ms. Caesar described the VLab objectives are to achieve better exploitation of data from the space based GOS for services that are increasingly reliant on satellite data and to globally share knowledge, experience, methods, and tools related to satellite data, especially in support of WMO members that have limited resources. She also described many of the main achievements of 2014, which included conceptual models for the Southern Hemisphere and satellite direct readout events.

Cynthia Matsudo (Researcher, Research & Development Department, National Meteorological Service (SMN), Argentina) closed the session with a presentation on training in Argentina. She discussed the new challenges to conduct training in recent years have resulted in strong collaborations between operational and academics institutions in Argentina. Ms. Matsudo referenced a workshop in August 2013, on nowcasting techniques, which identified significant weakness in the short-term forecasting/nowcasting process at the National Meteorological Service of Argentina (NMS) and in neighboring countries. In response, she said the ALERT.AR Project was created and aimed at producing better warnings and watches for high impact weather (HIW) events. She described another collaborative project between the NMS and the Department of Atmospheric and Oceanic Sciences of the University of Buenos Aires, to build Conceptual Models (CMs) for the Southern Hemisphere. Ms. Matsudo noted the extensive research results from the South American Low Level Jet (SALLJ) Experiment held in 2002-2003 were the basis for the first CM developed. The final example she provided was another international multi-agency field campaign, called RELAMPAGO (Remote sensing of Electrification, Lightning, And Meso-scale/micro-scale Processes with Adaptive Ground Observations), which is being organized for spring-summer 2017. Ms. Matsudo stated the main purpose of RELAMPAGO is to study the multi-scale aspects of convective storms with extreme characteristics and impacts, producing HIW events.

Session 4.2 concluded with a designated question and answer period summarized below:

Q What are the limitations to international training and how can they be overcome?

A Kathy-Ann Caesar: That program has been one of the successes of the int'l desk at NCEP. From day 1 they work as operational forecasters to integrate satellite data into forecasts. Then they return home and can implement that. Sometimes there are technical/data limitations when they return. GOES-R data will be an issue. We worked with NOAA on GEONETCAST program to use this as a backup to our receiving stations. Many of the gaps have been technology.

A Bernie Connell: when the participants come to the international desk, there are 4 of them and they come for 4 months, they are looking at the models and integrating imagery, they are introduced to focus groups and continue to participate intermittently.
A Cynthia Matsudo: One of the limitations is personnel. I presented at one of the nowcasting workshops and we had trainers train us. We don't have training personnel in many areas. Forecasters are busy and few so it's a challenge to get them into training apart from their operational duties.
A Kathy-Ann Caesar: A vast majority of the forecast agencies are made up of very few staff. Here in the U.S. there are specific forecasters for specific areas; in other countries there are fewer forecasters doing all of the forecasting.

Q I thought it was interesting that you are folding field campaigns into your training program. Are you able to take some of the resources and keep them?

A Cynthia Matsudo: that would be great, we are preparing everything, that's how we realize we need training, and we need more observations, NWP, data assimilation.
A I do a lot of field campaigns and turn models on for them and one thing I've learned is not to turn off that model when you leave.
A Cynthia Matsudo: CHUVA helped in 2012 and we are trying to build from that experience.
A Kathy-Ann Caesar: We've done that many times which has helped with IDV, McIDAS, etc. And I always thank colleagues for not turning off data when they leave.

Q How do I coordinate with a region to get data others might be interested in?

A Luiz Machado: These coordination groups can exchange information. Countries are also providers to distribute to the region. You need to address requirement directly to the region, country's requirement group.

Session 4.3 Other NOAA Space Programs: 2015 to 2020+

Pete Wilczynski (U.S. COSMIC-2 Program Manager, NOAA) presented on the COSMIC-2/Global Navigation Satellite System (GNSS) Radio Occultation (RO) Ground System, which is designed to deliver next-generation data to users around the world. He noted this program is the follow-on to the COSMIC mission, which was a joint U.S.-Taiwan 6-satellite constellation demonstration mission launched in April 2006. He stated the GPS-RO data from COSMIC has been extremely valuable to the climate, meteorology, and space weather communities, including real-time forecasting users as well as U.S. and international research communities. Mr. Wilczynski said COSMIC-2's mission objectives are to continue from the current COSMIC satellite constellation and for the design concept to meet Level 1 Requirement Documents (L1RD) requirements. He added that the system will provide 10,000+ worldwide soundings per day and uniform coverage of all weather over the oceans and land with approximately 30-minute average latency. Mr. Wilcynski added that another objective is to have 12 satellite constellations with two launches in different inclinations; six of the satellites will orbit at 24 degrees and the other six will be at 72 degrees. He explained the first launch instruments will have TriG GNSS-RO receiver (TGRS), Ion Velocity Meter (IVM), and a Radio Frequency (RF) beacon and the second launch will have TGRS and Taiwan-procedures for scientific payloads. Mr. Wilczynski said the first launch is planned to occur May 15, 2016, and the orbit will be placed at a 24-degree inclination. He also said the second launch is planned to occur in FY19, vehicle is still to be determined, but will be placed on a 72-degree inclination. He noted these satellites are planned to have a design and mission life of 5 years.

Mike Simpson (Deep Space Climate Observatory satellite (DSCOVR) Program Manager, NOAA/NESDIS/Office of Projects, Planning & Analysis) continued the session with a presentation on the DSCOVR satellite. He explained DSCOVR is administered under a joint agreement between NOAA and NASA. He noted additional partners include the United States Air Force (USAF) and their space launch vendor, SpaceX from Hawthorne, California. He provided a status update that DSCOVR was launched on February 11, 2015, and is currently undergoing spacecraft and instrument commissioning on its way to orbital insertion in June into a Lagrange Point (L1) orbit. Mr. Simpson discussed DSCOVR's primary mission to provide space weather solar wind observations at L1, measuring magnetic field and positively charged particles. He said the secondary mission focuses on Earth science (take visible, UV, and near-IR images of the sunlit side of Earth and measure irradiance of the sunlit face of the Earth), space science (measure electrons), and engineering (monitor high energy particles that can affect spacecraft electronics). Mr. Simpson emphasized impacts from geomagnetic storms are wide-ranging with potentially significant consequences. He described how coronal mass ejections impact Earth's magnetic field as fluctuations generate electric fields on Earth; these geomagnetically induced currents can flow into power lines and transformers leading to transformer saturation and over-heating, voltage drops, transformer damage, and grid collapse which could impact a population of more than 130 million. Mr. Simpson noted that the L1 monitor provides 15-60 minutes of warning time of these space weather events.

Walid Bannoura (Jason-3 Project Manager, NOAA/NESDIS/Office of Projects, Planning & Analysis) provided the Jason-3 information briefing. He presented Jason-3, a joint US/European satellite mission, now scheduled for launch from Vandenberg, California, in July of 2015. Mr. Bannoura commented the spacecraft is in storage and all ground systems developments and tests are complete. He also mentioned the first launch rehearsal was completed successfully in March and launch vehicle development and certification continue to be on the critical path. Mr. Bannoura said the primary objective of Jason-3, as with its predecessors, is to use sea level observations to better understand ocean circulation variability (ocean weather) and climate change. He discussed how Jason-3 observations will be used by NCEP for a number of short to medium time scale weather-related applications including high wave warnings to mariners, hurricane intensity forecasting, ocean circulation models, and nowcasting El Niño/La Niña events. He added for climate studies, NOAA's Laboratory for Satellite Altimetry will use Jason-3 data to monitor the global and regional rates of sea level rise as well as the contributions to sea level rise coming from ice melt and ocean warming. Mr. Bannoura said the complete data set, including all delayed mode products, will be archived at NOAA's NGDC.

Dan Mamula (Solar Irradiance, Data and Rescue (SIDAR) Program Manager, NOAA/NESDIS/Office of Projects, Planning & Analysis) continued the session with a presentation on NOAA Solar Irradiance Data and Rescue (SIDAR) Program. He began by explaining the SIDAR Program is 3 different projects: to continue measurement of the sun's direct and indirect effects on climate, continue the operation of the Argos Data Collection System obtaining a wide variety of data from platforms used for both environmental study and non-environmental uses, and continue the operation of the SAR instruments as part of the international Cosmicheskaya Sistyema Poiska Avariynich Sudov (COSPAS) - Search and Rescue Satellite-Aided Tracking (SARSAT) system designed to detect and locate Emergency Locator Transmitters (ELTs), Emergency Position-Indicating Radio Beacons (EPIRBs) and Personal Locator Beacons (PLBs). He provided details for SIDARs instruments, which include: Total & Spectral Solar Irradiance Sensor (TSIS), Advanced DCS (A-DCS) Search and Rescue Processor (SARP), and Search and Rescue Repeater (SARR). Mr. Mamula noted SIDAR became a program with the FY15 appropriation and already the FY16 President's Budget transfers TSIS to NASA. He said the SIDAR program will also supports accommodation and launch of two international partnership missions: environmental data collection and relay via the Argos Data Collection System (DCS) and satellite-assisted search and rescue via SARSAT. He noted that both the Argos DCS and SARSAT instruments are being provided by French and Canadian partners.

Michel Sarthou (Argos & SARSAT Project Manager, Centre National d'Etudes Spatiales) continued the session by describing the transition from Argos-3 to Argos-4 including improvements and new capabilities. He said the Argos satellite-based location and data collection system has been operational since 1978. Mr. Sarthou described how Argos measures temperature, pressure, humidity and sea levels, and that Argos takes the pulse of the planet and its atmosphere. He highlighted that Argos-3 service has been fully operational since April 2013. However, he noted, Argos-4 will present a new challenge. Mr. Sarthou stated that Argos-4 will need to fulfill science user requirements for the 2018-2035 timeframe. He also said it needs to reinforce Argos' unique capabilities for very small transmitters (up to 50,000 platforms to be processed with 40 processing units instead of 12). He added that Argos-4 needs to support more governmental applications due to dedicated "non-environmental" bands.

The final presentation in this session came from Chris O'Connors (Chief, Direct Services Branch and SARSAT Program Manager, NOAA/NESDIS/OSPO/SPSD) on the SARSAT system which relays distress signals from emergency beacons carried by aviators, mariners and land-based users to SAR services. He noted the mission of NOAA's SARSAT program is to, "Protect life and property by providing timely, accurate and reliable distress alerts to search and rescue services worldwide in an effective and efficient manner." Mr. O'Connors explained the COSPAS-SARSAT (C-S) program consists of three segments: user segment, ground segment, and space segment. He said the user segment is the emergency beacon transmitters, which include marine, aviation, and land. The ground segment refers to the Local User Terminals (LUTs), he added, and the space segment includes: Low-Earth Orbit SAR (LEOSAR), Geosynchronous Orbit SAR (GEOSAR), and under development is Mid-Earth Orbit SAR (MEOSAR). Mr. O'Connors described MEOSAR as the next generation of satellite-aided SAR. He said it is based on the use of SAR repeaters carried on board GNSS satellites which will provide: near-instantaneous beacon detection and location, globally, at all times; advanced location process to triangulate location and mitigate terrain blockage due to multiple look angles from 24 or more MEO satellites; and a robust space segment, with a simple space segment repeater allowing for development of higher performance beacon signal. Mr. O'Connors noted there are 43 countries and organizations that are C-S participants and cooperates with the International Maritime Organization (IMO), International Civil Aviation Organization (ICAO) and the International Telecommunications Union (ITU).

Session 4.3 concluded with a designated question and answer period summarized below:

Q Can you comment on the status of COSMIC-2B, noting COSMIC-1 degradation?

A We definitely need it. COSMIC-1 in the last two weeks has suffered some degradation and has been recognized in the community. The President's FY16 budget has included purchase of a 2nd set of instruments through the polar budget. It is not complete yet but still encouraging.

Q COSMIC-2 not radiance, but it is a reference space temperature. It has become vital to STAR that we have temperature measurements. We're anchoring our temperatures to COSMIC, but COSMIC-1 is degrading. As you bring in COSMIC-2, you will also have COSMIC-1 and Global Navigation Satellite System (GNIS) Receiver for Atmospheric Sounding (GRAS). Is there an effort to inter-compare the measurement uncertainty between COSMIC-1, COSMIC-2, and GRAS?

A There is a lot of discussion at the WMO International Radio Occultation Working Group (IROWG). Post launch precession will allow us an opportunity to validate and cross-calibrate. We now have a NWS scientist to assist with this effort. Bill Shriner is lead at UCAR.

Q Will there be Cal/Val between Advanced Composition Explorer (ACE) and DSCOVR? What's the difference between the instrumentation on each satellite?

A Instruments on DSCOVR are similar to ACE. We hope they will be on orbit together. Regarding follow on plans for next generation, we will need to coordinate further on requirements. A requirements committee will review.

Q Who are Earth Polychromatic Imaging Camera (EPIC) customers?

A The DSCOVR mission operations center is at NASA Goddard. Langley Distributed Active Archive Center will provide data access. Collaborators will be selected through a Research Opportunities in Space and Earth Sciences (ROSES) announcement.

Q Will EPIC imagery be useful for television?

A Less of a cadence than planned for EPIC. 4 hours versus historical requirement of 10 minutes. Brought down at a lower rate at ground stations.

Q Will Jason-3 be useful for sea level rise?

A All scientists agree, both sides of ocean, are rising at 3mm per year. 2mm of those are due to the melting of the ice on the ground in various locations. It has been monitored since the early 90s and our satellites have been going to the same spots over those 20 years. The advantage of the Jason series is it will keep them at the same location following the same orbit at the same exacts spots with 0.2 mm accuracy.

Session 4.4 Frequency Matters

Mark Mulholland (Director, NOAA/NESDIS/OSAAP/Policies, Procedures, and System Assurance Division) opened the session with a "Frequency Matters" presentation including an L-band and auction update. He began with the President's Broadband Initiative document in 2010 calling on federal government agencies to make at least 500 Megahertz (MHz) of radio frequency spectrum available to the wireless broadband industry. He said the portion of spectrum allocated for use by NOAA's and EUMETSAT's polar-orbiting weather satellites was recently auctioned to be shared with broadband companies. Mr. Mullholland noted the first of the spectrum auctions was recently completed. He said NOAA understands the steps necessary to share spectrum, but there are resulting risks of interference to polar satellite direct broadcasts and to some geostationary rebroadcast data in adjacent bands.

Beau Backus (Systems Director, The Aerospace Corporation) gave a report of recent intergovernmental frequency working groups. He said NOAA spectrum managers routinely meet with other space-focused international spectrum managers as well as other federal agencies to discuss the changing and challenging spectrum environment and means towards most efficiently utilizing commonly used spectrum bands needed in meeting each organization's mission needs. Mr. Backus said they typically touch on topics in two major groups: advance notice of new systems requiring spectrum coordination, and spectrum issues facing the organizations in general that may be of concern to the others. He emphasized how coordination is a vital aspect of spectrum management and this is one of the means by which it occurs.

Alfredo Mistichelli (Spectrum Manager, NOAA/NESDIS/CID) provided an overview of NOAA/NESDIS Radio Frequency (RF) spectrum management related to the recent spectrum-sharing auction. He

discussed recent national developments related to sharing government spectrum with commercial broadband devices (i.e. 4G Cellular). Mr. Mistichelli said that spectrum sharing will require NOAA satellite networks, operating in the 1695 MHz to 1710 MHz band, to enable sharing while protecting current operations. He described the primary means to enable this sharing, which involves: protection zones for satellite ground stations; spectrum monitoring system to detect and eliminate harmful interference; and relocation of satellite operations to alternate frequency bands.

David Lubar (Radio Spectrum Management Specialist, NOAA/NESDIS/GOES-R, The Aerospace Corporation) presented on future GOES-R concerns. He discussed spectrum sharing considerations from the users' view providing possible Radio Frequency Interference (RFI) from commercial users to weather satellite L-band broadcast receive stations. He described the non-federal users' categories as: private sector weather enterprise, state, tribal, local and private water managers, emergency managers, public agencies, in-house meteorological services, and non-federal space weather end users. He also noted candidate spectrums for future federal spectrum auctions are under evaluation by U.S. federal regulations. Regarding potential impact, he said, users are encouraged to file comment with the Federal Communications Commission (FCC). Meanwhile, he mentioned, coordination and monitoring for protected federal sites in the recently auctioned POES/MetOp band will begin later this year.

Dr. Esteban Valles (Associate Director, Digital Communication Implementation Department, The Aerospace Corporation) discussed future EMWIN implications. He said The Aerospace Corporation has developed prototype user equipment for receiving HRIT/LRIT/EMWIN signals. Dr. Valles introduced results on the impact of frequency-adjacent signals on our emergency weather receivers. He said a frequency band immediately adjacent to HRIT/EMWIN has been auctioned for use by mobile data. Although it is very hard to predict how many mobile users will be present in this band and how physically close they will operate to an HRIT/EMWIN receiver, he showed that the reliability of the receiver will be compromised.

Laura Delgado Lopez (Project Manager, Secure World Foundation) provided a survey of Latin American users. She said spectrum management is one of the many issues that must be examined in the context of the long-term sustainability of space activities. She said Secure World Foundation held an event in March 2015 that brought together an expert panel to consider challenges in sharing the weather satellite spectrum with terrestrial networks. In discussing the implications of potential interference in the bands historically reserved for broadcasting meteorological satellite data, Ms. Delgado Lopez said panelists highlighted the implications to users worldwide, many of whom are unaware of how this interference may degrade the data on which they rely to develop critical products and services. Her presentation offered some considerations with respect to users in Latin America. Ms. Delgado Lopez highlighted examples of how specific partner agencies in the region use NOAA satellite weather data. She also focused on emerging space nations with limited sources of redundant data, while highlighting the importance of expanded engagement between the spectrum, satellite, and user communities to address challenges.

Session 4.4 concluded with a designated question and answer period summarized below:

Q There are different ways to approach this issue of frequency. You can spend a lot of money to get an exquisite filter, but that is not going to work for users in the field. You can buy digital TV dongals for $10, is there some way we can leverage that? Short of taking our antennae and putting it in a large tunnel, we are not going to be able to prevent that interference from getting in. If there are things we can do in a low cost manner, I challenge industry to start doing that. We need to get really creative if we are going to keep the ability to block interference so that users in the field are able to use it.

A Esteban Valles: Every device has a sweet spot and we need to get creative. There will be trade-offs but we need to try. The spectrum is sold.

Q In the past, we assigned protection zones based on federal sites, is there any investigating on how NOAA's operational requirements are being spread through different sites like academia? Second, given the log nature of these signals, why don't we just turn up the signal from the satellite?

A David Lubar: That is against international law. We tried with respect to investigating outside of federal sites. It depends on what you are trying to do and what type of reliability you are willing to live with.
A Beau Backus: In the U.S., we have 2 regulatory bodies. One is for the federal government and the other is the FCC that handles the non-federal users. The responsibility for protecting the non-federal users falls under the FCC. We did request support from them when told we couldn't protect site like academic partners.
A Mark Mulholland: mentioned early on that we are setting up interference reporting system. It is helpful in building a case to bring to the forefront.

Q What is the threat to the C-band frequencies in the future since we share that with television stations etc. (GEONETCAST and NOAAPort are through C-band)?

A David Lubar: there is an international process through UN representatives. It has been asked to use C-bands for various commercial broadband requests and there are very similar concerns. The users have to talk to their government regulators. It is not completely safe but it is a work in progress.
A Beau Backus: C-band itself is a service that is commercially provided. You could see the number of providers decreasing too. We saw that when looking at C-band as a way of dissemination and being available in the future.

Q We spend a lot of time and effort talking about the value of satellites, saving lives and property, it seems like we are in a fight between providing a service to save lives and property or money coming in, is there a story we can tell that will show the loss of resilience because of this happening?

A Mark Mullholland: We've encouraged groups and made the point that one of the exercises that's been useful out of the defense community is called "day without." Like a day without GPS or SATCOM and to be able to do that in our community like a day without EMWIN and just study how we would do our jobs and get the warnings out. What Esteban Valles talked about in a closed loop sense is just one of our direct broadband systems. These exercises also include policy and decision makers.
A David Lubar: Examples: the emergency managers, one gentleman most affected by Tuscaloosa tornadoes, discussed that without EMWIN there would have been over 1,000 casualties. DCS, if you look at the billion dollar disasters, most losses occurred in floods, most flood products come through DCS and there are many users that use GRB to receive data to build useful products. The data is timely and needs to be available in the direct broadcast. The data is needed for guidance in decision-making. If you move to a higher frequency and have interference, it will act as dish TV when it storms, it will disappear.
A Beau Backus: The key thing is reliability. We need to have reliable data coming in to all of the users. We need to be looking at sharing the spectrum in new and challenging ways. How do we maintain reliability in this changing environment?

Q EMWIN tries to keep prices down as much as possible. Now there are speed challenges with cell phones, I never would have considered that 20 years ago. If they really want to share, could they let us blank their spectrum and be a glitch in their data long enough for our warnings to go out, has anyone considered that?

A We do want to open discussions between federal and non-federal users. We are looking at an impossible task if we ignore coordinating with them. They have the ability to do sector blanking, to move phone frequency. I agree a discussion between EMWIN and the Long-Term Evolution (LTE) user as to the means on using EMWIN in emergency situations.

A Mark Mullholland: One of my takeaways is that the broadband companies have already figured out how to not interfere with each other, so we need to leverage on what they have learned.

A Esteban Valles: It's not just a 1 second burst; you need to see data continuously.

SESSION 5 – Meeting our Nation's Challenges

Session 5.1 Socio-Economic Benefits of Environmental Satellites

The final day of the conference began with a panel featuring users of satellite data, products and services and leading federal and industry representatives on "Meeting Our Nation's Challenges: Socio-Economic Benefits of Environmental Satellites." The panel was moderated by Dave McCarren (Acting Federal Coordinator for Meteorology, Office of the Federal Coordinator for Meteorology) who provided a broad view of the critical importance of environmental satellites to our national economy, security, well-being and public safety. Panelists represented the diverse user community served by the NWS, DOD, Department of Homeland Security (DHS-US Coast Guard), Department of Transportation (Federal Highway Administration, Federal Aviation Administration (FAA)), Department of Agriculture and industry. The panel discussion and question and answer session addressed the often-asked questions, "Why do we need to invest in expensive environmental satellites, and what is the range of benefits that users get?" The goal was to provide insight into the socio-economics benefits of the environmental satellites as well as the impact of interruptions or gaps in their coverage. The panel provided brief introductory comments by Dave McCarren and each of the panelists, followed by a moderated discussion that will be provided at the end of this section.

Dave McCarren said that to improve cooperation and collaboration of the federal agencies regarding environmental satellites, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) manages an interagency group called the Committee for Operational Environmental Satellites (COES). He said, together with similar groups at the White House and international groups under the WMO, COES works to identify and resolve environmental satellite issues to improve the effective utilization of these high-value national investments for the a myriad of socio-economic and national security purposes.

Hendrik Tolman (Director, Environmental Modeling Center, NOAA/NWS/NCEP) provided a NWS perspective to the panel. He said the NWS uses satellite data in its NWP models to develop short and long-term forecasts. He also said data from the Suomi NPP satellite is providing significant enhancements to NWP models. Mr. Tolman mentioned that NESDIS also provides data to support operational space weather warnings and forecasts. He added that GOES satellites provide instantaneous images of weather that are routinely used by NWS, commercial weather entities, and the media.

Erika Sauer (US Navy Liaison to NOAA) provided insight on naval benefits and impacts. She stated the mission of the United States Navy is to protect and defend the right of the United States and its allies to move freely on the oceans and to protect the nation against all enemies. She noted a key element leading to mission success for naval operations across the globe is the thorough understanding of the environment wherever the forces operate, which is above, on, and below the ocean surface as well as from the sea to the shore and beyond. Capt. Sauer said that in order to operate NWP models, the U.S. Navy has been a longtime beneficiary of operational environmental satellites systems through federal agency partnerships. She added with the advent of naval operations being conducted in the Arctic, the criticality of remote sensing will only increase. She summarized that mission success for the U.S. Navy relies on environmental predictions, and the Navy's presence on the world's oceans provides security and stability that promotes economic development and commerce for the nation.

Aaron Ortenzio (SARSAT Liaison Officer, Office of Search and Rescue, DHS/USCG) spoke about the DHS-US Coast Guard benefits and impacts. He explained NOAA's satellite support of the U.S. SARSAT program and how critical that information is for alerting the Coast Guard when a person is in distress at

sea. Lt. Commander Ortenzio emphasized that the use of NOAA's weather satellite data is an integral component in the Coast Guard's Search and Rescue Optimal Planning System (SAROPS), which is used in determining drift information to conduct search operations planning.

Randall Bass (Program Manager, Convective Weather Research Program, Department of Transportation/FAA) discussed the use of weather satellite data for FAA operations. He said weather satellite data provides a relevant and important contribution in support of the Federal Aviation Administration mission to provide the safest, most efficient aerospace system in the world. Mr. Bass commented that timely weather satellite data is vital in aviation operations, as well as in research to improve weather support to those operations and to mitigate impacts from hazardous weather conditions. He explained how aviation weather analyses and forecasts, primarily provided by NOAA, support all aspects of flight from planning, takeoff and departure, en route, and through arrival and landing. He said both polar and geostationary satellite data and imagery is used to detect phenomena such as thunderstorms and convection, turbulence, icing, cloud ceilings and visibility, space weather, and volcanic activity that adversely impact the National Airspace System. Just as important, Mr. Bass added, is satellite imagery, leveraged by aviation meteorologists, air traffic managers, air carriers and general aviation pilots, to determine the most suitable areas for effective routing and safe travel. He noted that the data is critical not only for aviation purposes in the United States, including Alaska and Hawaii, but also for offshore areas far into the Atlantic and Pacific Oceans.

The final panelist Dave Jones (President, StormCenter Communications, Inc.) discussed commercial applications of environmental satellite data to address critical socio-economic challenges. He said in today's information age, data is the key to making informed decisions from creating more resilient communities to collecting and disseminating environmental intelligence to serve global market supply chains, transportation and national security. He noted that the private sector plays a very important role in providing value-added products and services to decision makers. Today, there are a variety of tools for visualizing and analyzing data, including geospatial tools, which provide powerful windows into complex natural and human systems, Mr. Jones said, as data is being collected and delivered at greater speeds and at higher resolutions. He mentioned that more platforms are being designed, built and launched to increase the amount and frequency of Earth observations, and not just in the United States. Mr. Jones said all of this activity is to benefit the public, and decision makers, scientists and researchers so we can have a better handle on the state of our planet and how our vulnerability to extreme events is changing. He showed that approximately one hundred million Americans live along the nation's coasts at high risk from natural disasters due to hurricanes, erosion, flooding and inundation associated with sea level rise. Mr. Jones also mentioned the critical evolution of interoperability between disparate systems, data producers, subject matter experts and decision makers to access and combine data sources; when used together they provide a force multiplier to the decision maker. He stated the age of advanced environmental satellites is upon us, the question is, "Are we ready to take full advantage?"

The Session 5.1 panel discussion is summarized below:

A Dave Lubar: One of the topics that came up last night in the frequency session was the topic of interference. If the current band gets volunteered in the future, it sounds like the Navy and industry users really need broadcast data. It seems like that issue would be important to those users. Are the agencies looking at future issues with spectrum for direct broadcast access to impact data?

A I know DOD is getting some exclusion zones in areas we need. But there are questions whether those ships will have those instruments on them due to cost cuts.

A Erika Sauer: Navy Oceanography is not responsible for managing that but we are aware and working with other agencies in the Navy to address that. Everyone is aware of financial constraints, beyond discussion I do not know what is being done.
A Dave McCarren: OFCM does have a committee on environmental satellites and we will put this on our agenda.
A Dave Jones: An education day on the hill might be in order.

Q Discussing weather in the cockpit, preparing to fly and also getting DirecTV, what initiatives are being taken to be able to access these satellite products that might aid in the decisions being made?

A Randy Bass: I can't speak on the frequency spectrum issue, but I want to mention weather technology in the cockpit. Not all weather is created equal. We are not looking to see what kind of weather; we are looking at the standards to look at the best weather to get into the cockpit. One specific example is Hawaiian airlines has the ability to take in CloudSat data to assist in operations. We want to open up to as many as we can but bandwidth is an issue. There are a lot of good technological advances just not as fast as we want, but the FAA is a very risk-adverse agency and we do things with safety in mind first.
A Erika Sauer: From the Navy, we are looking at how to automate things.

Q Hendrick Tolman: All of us have a tendency to live in ivory towers, we are spending taxpayer money and we need to be able to give back to those we are taking money from. Communicating properly to the public is a must. It is one thing to predict and to actually see.

A We used to focus on getting that data to the decision maker, but now the decision maker is the public and individual households.
A Dave Jones: Many times I hear, "That's not my area." I would encourage everyone who works in the satellite industry and the NWS, it doesn't hurt to understand the whole flow of the segment and discuss that.

Q Scott Rogerson: Could you briefly touch on in-situ atmospheric pressure, sea surface temperature as data fed into global telecommunication system?

A Hendrick Tolman: Unfortunately every piece of satellite data is inferred and 99% of the data that goes into the models, it's a no brainer we cannot throw away the in-situ observations as they are the 1% of data that impacts the model output.
A Aaron Ortenzio: Using the data we get from the buoys real-time, provides a valuable tool to let us know what's going on in that particular moment. The buoy lasts about 5-7 days.
A Erika Sauer: Navy modeling we require the in-situ data in modeling as well.

Q I'm very happy you put an economic stance on aviation. Have you tried to educate both the forecasters and the hierarchy on this issue since cost benefit to a flight not taking off in bad weather can make a huge difference?

A Randy Bass: For congressional budget purposes, you almost have to make the economic benefit basis, we try to educate the higher ups on the benefits and they are pushing down on us at the same time. It is difficult to come up with accurate cost benefits on things like this, if you prevent things from happening, it makes it tough to determine hazard avoidance.

A We are blessed here with great technology, when you go to other countries there are very few standards, most of the products we put out for aviation purposes are guidance. To mandate, it becomes harder for those who cannot afford it.

Q Satellite has economic benefits. We are missing the link of social science and educating the people. When you teach a teacher, the knowledge multiplies. Can we do this with satellite?

A Dave Jones: I would say yes, I think efforts like that are happening. The GOES-R program is educating teachers. There is a COMET program; and no reason that teachers couldn't access the modules. Teacher workshops exist to learn about earth science and get it back into the curriculum. When budgets are cut, education is usually the first that goes. There are strange strategies in play but from the education standpoint we need to encourage teachers as much as we can.

Session 5.2 Closing Session

Vanessa Griffin (Acting Director, NOAA/NESDIS Office of System Architecture & Advanced Planning (OSAAP); Director, NESDIS/OSPO) provided the conference summary and action items. She began with a summary of the pre-conference activities. She noted that there was a Satellite Telemetry Interagency Working Group (STIWG) meeting and a GOES DCS United States User's Technical Working Group (TWG) meeting that included 50 attendees collaborating on strategies and future planning for the use of GOES DCS. She mentioned that there was also a GOES DCS international training session with about 20 participants using hands-on training from NOAA on the use of systems and best practices for installing, operating, and maintaining equipment. Ms. Griffin also noted that there was WMO VLab training with focus on "Aspects of GEONETCast Americas for the provider, user, and trainer." She lastly mentioned there was an additional Monday morning media event on GOES-R and JPSS "101." Ms. Griffin then provided a short summary of the topics presented on each individual day of the conference. She continued by highlighting the action items that had been collected during the week. A full list of the NSC-2015 action items can be found in Appendix D. She concluded her presentation by opening the floor for audience comments, summarized below:

Q What I think we might be missing and want to think about for 2017, is the beat 'em versus join 'em issue in the spectrum management conversation. We need to get a specialist to tell us how to use the information in the same way so we are no longer fighting. If our strategy is to compete, we just can't. I am not sure where the expertise lies, but someone should be exploring that.

A Vanessa Griffin: we had several questions along the same lines, it's not beat 'em or join 'em, we need to communicate with the industries, they do things on their own to not compete with each other, we just need to talk to them.

Q Dave Jones said in this morning's session that we are moving and providing info for everyone, not just the people we support and in 2 years from now that will be truer. Maybe we ask ourselves, "Are we taking action with that in mind?" Maybe we need a session next time on that.

A Vanessa Griffin: We will take that as a possible topic and explore for next time.

Q This morning the FAA talked about challenges with data. It would be interesting to find out from a commercial world, those who have their own weather forecasters, what data they use.

A Vanessa: Maybe we need to make that session longer next time.

Finally, Dr. Steve Volz (Assistant Administrator, NOAA/NESDIS) provided the closing remarks for the conference. He noted the upcoming opportunities for collaboration. He said that there are more capabilities coming online from traditional partners and more countries are joining the remote sensing community. He explained the Big Data/Cooperative Research and Development Agreement (CRADA) which is the Department of Commerce's (DOC's) big data project with Amazon Web Services, Google Cloud Platform, IBM, Microsoft Corp. and the Open Cloud Consortium and how it will explore ways of bringing the DOC closer to its goal of unleashing its vast resources of environmental data. He said it will transform DOC data capabilities and support a data-driven economy. Dr. Volz mentioned that increasing complexity with sharing of frequency/spectrum will pose a challenge to cooperation. He said most of our products fuse different data sets, so we need to do that fusion efficiently and reflexively, regardless of the data source, and with confidence that the fusion will produce reliable information. Dr. Volz concluded with thoughts on what will be seen in the NOAA Satellite Conference 2017. He noted that as a community we will be working to bring new capabilities into the integrated observing system of satellites. From NOAA: Jason-3 will be operating in constellation with Jason-2, GOES-R will be coming out of check-out phase into operations, COSMIC-2A constellation will be in orbit, and JPSS-1 will have just launched. He added that SMAP will be operational, CYGNSS constellation will be in orbit, and Sentinel 1B, 2A, and 3A will all be on orbit with data flowing. Dr. Volz said that many questions discussed this week will be answered as many more will come forward to challenge us. In closing he said, "Our futures are intertwined and NOAA intends to engage with all our partners and users as we move forward to collect, share, and manage environmental data."

CONCLUSION

The NSC-2015 was deemed a success with over 600 attendees, 180 posters, more than 60 presentations, 37 exhibits, 4 demonstrations, and over 50 registered remote attendees. There were 5 different pre-conference activities including various working groups, training workshops, and a media event. Every session concluded with dedicated question and answer periods allowing for ample user feedback.

This conference brought attention to the many opportunities for collaboration as more capabilities continue to come online from traditional partners along with additional countries joining the remote sensing community. Many updates were provided for new generation of geostationary and polar-orbiting satellites which included details regarding significant changes in data rates, volumes, acquisition, and information content. There were discussions concerning the need to enhance or replace current receiving equipment and basic processing software for users. There were many questions throughout the week regarding frequency/spectrum sharing. Some of the challenges NOAA will face to enable this sharing are: protection zones for satellite ground stations; spectrum monitoring system to detect and eliminate harmful interference; and relocation of satellite operations to alternate frequency bands. The NSC also highlighted what types of training and education are currently available, as well as future planned activities. The Friday panel discussion helped conference attendees fully appreciate how many federal agencies depend on timely and uninterrupted NESDIS satellite data and information services in order to fulfill their missions. It also demonstrated the diversity of federal agency customers and users of environmental satellite data and information services.

All presentations and posters can be found on the NSC website:

http://www.satelliteconferences.noaa.gov/2015/.

In closing, we would like to thank all who attended the conference and those who helped to make it a success:

Conference hotel and catering: Greenbelt Marriott, Nana Sarpong (Director of Event Planning and Operations) and Dotty Beverly (Account Executive).

Interpreters: Multilingual experts

Sponsors and exhibitors

Volunteers

Organizing committee (listed in Appendix E)

APPENDIX A 2015 NOAA Satellite Conference Agenda

Greenbelt Marriott Hotel

Greenbelt, Maryland

April 27 - May 1, 2015

Monday April 27, 2015					
	Time (EDT)	**Session**	**Registration / Pre-Meetings**	**Speaker**	**Session Moderator(s)**
	7:00 AM - 2:00 PM		Put up posters for Poster Sessions 1 (Annapolis Room)		
	7:30 AM - 5:30 PM		Registration		
	10:00 AM - 1:00 PM		Pay for pre-selected daily lunches and/or Wednesday No-Host Dinner (near Registration Desk)		
	11:15 PM - 12:45 PM		Lunch (on your own)		
	1:00 PM - 3:00 PM		Set up Exhibits (exhibit/vendor booth personnel only)		
	3:00 PM - 8:00 PM		Exhibits Open (Chesapeake, Potomac & Montpelier Rooms)		
			Demos (GRB Simulator, CLASS, DRO Registration Database) are ad hoc and by appointment (Patuxent Room)		
			All plenary sessions will be held in the Grand Ballroom		

	1:00 PM		**Opening Session (Grand Ballroom)**		Eric Madsen (NSC Co-Chair, NOAA/NESDIS/ International and Interagency Affairs Division); Natalia Donoho (NSC Co-Chair, NOAA/NESDIS/OSPO/ Satellite Products and Services Division)
	1:00 PM	1.0	Welcoming Remarks	Natalia Donoho (NSC Co-Chair) & Eric Madsen (NSC Co-Chair)	
	1:20 PM	1.1	Highlights Since the 2013 NOAA Satellite Conference for Direct Readout, GOES/POES, and GOES-R/JPSS Users	Mike Condray (Deputy Director, NOAA/NESDIS/Office of Satellite and Product Operations (OSPO))	
	1:40 PM	1.2	Special Guest Speaker (Opening Keynote) - NOAA	Manson K. Brown, P.E. (Assistant Secretary for Environmental Observation and Prediction and NOAA Deputy Administrator)	
	2:00 PM	1.3	Special Guest Speaker - NESDIS	Steve Volz (Assistant Administrator, National Environmental Satellite, Data & Information Service (NESDIS), NOAA)	
	2:20 PM	1.4	Special Guest Speaker - NWS	John Murphy (Chief Operating Officer, National Weather Service (NWS), NOAA)	
	2:40 PM		**Break**		
	3:10 PM	1.5	Special Guest Speaker - EUMETSAT	Sean Burns (Head of the Real-time Services and System Operations Division, EUMETSAT)	
	3:30 PM	1.6	Special Guest Speaker - JMA (Japan) Introduction to Himawari-8/9 and User Readiness	Toshiyuki Kurino, Director, Satellite Program Division, Japan Meteorological Agency (JMA)	
	3:50 PM	1.7	Special Guest Speaker - INPE (Brazil)	Jose Aravequia (Head, Center for Weather Forecasting and Climate Studies (CPTEC), National Institute for Space Reserach (INPE)	
	4:10 PM	1.8	Special Guest Speaker - CMA (China) Updates on Chinese Meteorological Satellite Programs	Caiying Wei (Deputy Director General, National Satellite Meteorological Center, China Meteorological Administration (CMA))	
	4:30 PM	1.9	Special Guest Speaker - KMA (Korea)	Sang-Jin Lyu (Director, Satellite Analysis Division, Korea Meteorological Administration (KMA))	
	4:50 PM	1.10	Keynote Address - Space-based Component of WMO Integrated Global Observing System (WIGOS)	Wenjian Zhang (WMO Director of Observing and Information Systems)	
	5:10 PM	1.11	Wrap-up	Mike Kalb (Deputy Director, NOAA/NESDIS/Center for Satellite Applications and Research (STAR))	
	5:20 PM		**End of Day 1**		
	6:00 PM		**Icebreaker (Grand Ballroom)**		

Tuesday April 28, 2015					
		2.0	**Logistics and Opening Keynote Address (Grand Ballroom)**		Eric Madsen (NSC Co-Chair, NOAA/NESDIS/ International and Interagency Affairs Division); Natalia Donoho (NSC Co-Chair, NOAA/NESDIS/OSPO/ Satellite Products and Services Division)
	7:30 AM - 5:30 PM		Registration		
	8:50 AM	2.0a	Logistics Update	Natalia Donoho (NSC Co-Chair) & Eric Madsen (NSC Co-Chair)	
	9:00 AM	2.0b	Opening Keynote Address - WMO RA IV	Albert Martis (Vice President, WMO Region IV)	
		2.1	**Current and Future GOES - Are You Ready?**		Heather Kilcoyne (GOES-R Product Readiness & Operations) & Steve Goodman (Senior Program Scientist, NOAA/NESDIS/GOES-R)
	9:20 AM	2.1a	Current GOES	Mark Danehy (Branch Chief, NOAA/NESDIS/OSPO/MOD/ Engineering Branch)	
	9:35 AM	2.1b	Future GOES-R	Greg Mandt (System Program Director, NOAA/NESDIS/GOES-R)	
	9:50 AM	2.1c	GOES and GOES-R Joint Operations	Matt Seybold (GOES-R Data Operations Manager, NOAA/NESDIS/OSPO/Satellite Products and Services Division)	
	10:05 AM	2.1d	Q&A with Session 1 speakers		
	10:30 AM		**Break / Exhibits / Poster Viewing Session 1**		
	11:30 AM	**2.2**	**GOES-R sees the Earth**		Jaime Daniels (Physical Scientist, NOAA/NESDIS/STAR/ SMCD/Operational Products Development Branch) & Wayne MacKenzie (GOES-R Product Area Lead, NOAA/NESDIS/OSPO/ Satellite Products and Services Division)
	11:30 AM	2.2a	ABI	Tim Schmit (Satellite Research Meteorologist, NOAA/NESDIS/STAR/Advanced Satellites Products Branch)	
	11:45 AM	2.2b	GLM	Steve Goodman (Senior Program Scientist, NOAA/NESDIS/GOES-R)	
	12:00 PM	2.2c	GOES-R for the Americas	Luiz Machado (Senior Scientist, Instituto de Nacional de Pesquisas Espaciais (INPE)/Centro de Previsão de Tempo e Estudos Climáticos (CPTEC), Brazil)	

	12:15 PM	2.2d	Q&A with Session 2.2 speakers		
	12:30 PM		**Lunch / Exhibits / Posters**		
	1:45 PM	**2.3**	**JPSS - Building on the Success of S-NPP**		John Furgerson (Physical Scientist, NOAA/NESDIS/Joint Polar Satellite System) & Arron Layns (Proving Ground Project Scientist, NOAA/NESDIS/Joint Polar Satellite System)
	1:45 PM	2.3a	Status of POES/S-NPP and JPSS	Harry Cikanek (Director, NOAA/NESDIS/Joint Polar Satellite System)	
	2:00 PM	2.3b	VIIRS Applications	Carven Scott (Chief, NOAA/NWS/Environmental Scientific and Services Division, National Weather Service Alaska Region)	
	2:15 PM	2.3c	CrIS and ATMS Applications	Mitch Goldberg (JPSS Program Scientist, NOAA/NESDIS/Joint Polar Satellite System)	
	2:30 PM	2.3d	Atmospheric Chemistry Products from OMPS: Validation and Applications	Larry Flynn (OMPS SDR/EDR Lead, NOAA/NESDIS/Center for Satellite Applications and Research)	
	2:45 PM	2.3e	Q&A with Session 2.3 speakers		
	3:00 PM		**Break / Exhibits / Poster Viewing Session 1**		
	4:15 PM	**2.4**	**Use of S-NPP**		Mitch Goldberg (JPSS Program Scientist, NOAA/NESDIS/Joint Polar Satellite System) & AK Sharma (Physical Scientist, NOAA/NESDIS/OSPO/ Satellite Products and Services Division)
	4:15 PM	2.4a	International Use of S-NPP	Fiona Hilton (NWP Scientist, UKMET)	
	4:30 PM	2.4b	DoD User Applications	Ralph Stoffler (Acting Air Force Director of Weather)	
	4:45 PM	2.4c	Multi-Sensor Satellite Data and Products in Support of NOAA Ocean Research and Applications	Paul Digiacomo (Division Chief, NOAA/NESDIS/STAR/Satellite Oceanography and Climatology Division)	
	5:00 PM	2.4d	JCSDA Use and Continuous Optimization of the S-NPP data assimilation	Sid Boukabara (Deputy Director and Senior Data Assimilation Scientist, Joint Center for Satellite Data Assimilation (JCSDA))	
	5:15 PM	2.4e	Q&A with Session 2.4 speakers		
	5:30 PM		**End of Day 2**		
	End of Day		Take Down posters from Poster Session 1		

Wednesday April 29, 2015					
		3.0	**Logistics and Opening Keynote Address (Grand Ballroom)**		Eric Madsen (NSC Co-Chair, NOAA/NESDIS/ International and Interagency Affairs Division); Natalia Donoho (NSC Co-Chair, NOAA/NESDIS/OSPO/ Satellite Products and Services Division)
	7:00 AM - 8:30 AM		Put up posters for Poster Sessions 2 (Annapolis Room)		
	7:30 AM - 6:00 PM		Registration		
	8:50 AM	3.0a	Logistics Update	Natalia Donoho (NSC Co-Chair) & Eric Madsen (NSC Co-Chair)	
	9:00 AM	3.0b	Opening Keynote Address - WMO RA III	Juilan Baez (President, WMO Region III)	
		3.1	**JPSS Products and Dissemination: How to Access Data (current and future satellites)**		Wanda Harding (Technical Director, NOAA/NESDIS/Joint Polar Satellite System) & Eric Gottshall (General Engineer, JPSS Algorithm Management Project)
	9:20 AM	3.1a	JPSS Products and Capabilities	Lihang Zhou (Physical Scientist, NOAA/NESDIS/STAR/Satellite Meteorology and Climatology Division)	
	9:35 AM	3.1b	JPSS: Stored Mission Data (SMD) & ESPC Products	Tom Schott (Physical Scientist, NOAA/NESDIS/OSGS/Programs, Engineering, and Techniology Division/Product Generation, Distribution, and Archive Systems Branch)	
	9:50 AM	3.1c	JPSS: SBN (AWIPS Products)	Brian Gockel (Acting Ground Readiness Project Manager, NOAA/NWS)	
	10:05 AM	3.1d	JPSS Science Data Services for the Direct Readout Community	Bob Lutz (FTS Manager, JPSS Ground Project/Data Product and Engineering Services)	
	10:20 AM	3.1e	Q&A with Session 3.1 speakers		
	10:30 AM		**Break / Exhibits / Poster Viewing Session 2**		
	11:30 AM	**3.2**	**GOES-R Products**		Steve Goodman (Senior Program Scientist, NOAA/NESDIS/GOES-R) & Tim Schmit (Satellite Research Meteorologist, NOAA/NESDIS/STAR/ Advanced Satellites Products Branch)
	11:30 AM	3.2a	GOES-R Products and Capabilities	Jaime Daniels (Physical Scientist, NOAA/NESDIS/STAR/SMCD/ Operational Products Development Branch)	

	11:45 AM	3.2b	GOES-R Direct Broadcast (GRB, HRIT/EMWIN)	Paul Seymour (Direct Broadcast Program Manager, NOAA/NESDIS/OSPO/SPSD/Direct Services Branch)	
	12:00 PM	3.2c	CSPP GEO (Community Satellite Processing Package for GOES-R)	Graeme Martin (SSEC/University of Wisconsin-Madison)	
	12:15 PM	3.2d	Q&A with Session 3.2 speakers		
	12:30 PM		**Lunch / Exhibits / Posters**		
	1:45 PM	**3.3**	**Product Distribution Systems**		John Paquette (Physical Scientist, NOAA/NESDIS/OSPO/ Satellite Products and Services Division) & Linda Stathoplos (Deputy Manager, NOAA/NESDIS/OSPO/ Mission Operations Division)
	1:45 PM	3.3a	Product Distribution and Access (PDA) System	Donna McNamara (Distribution and Scheduling Team Lead, NOAA/NESDIS/OSPO) & Don Slater (ESPDS Transition to Operations Lead, ASRC/ESPDS)	
	2:15 PM	3.3b	CLASS Access	Axel Graumann (Meteorologist, NOAA/National Centers for Environmental Information)	
	2:30 PM	3.3c	Future NESDIS Network Data Distribution	Walt Schleicher (Telecommunication Specialist, NOAA/NESDIS/ACIO/Independent Scientific Advisory Board) & Mike Laufer (NOAA/NESDIS/OSGS/PETD)	
	2:45 PM	3.3d	Q&A with Session 3.3 speakers		
	3:00 PM		**Break / Exhibits / PDA Breakout /Poster Viewing Session 2**		
	4:00 PM	**3.4**	**Product Distribution Services**		Chris O'Connors (Direct Services Branch Chief, NOAA/NESDIS/OSPO/ Satellite Products and Services Division) & Chuck Wooldridge (Deputy Director, NOAA/NESDIS/ International and Interagency Affairs)
	4:00 PM	3.4a	GEONETCast Americas (GNC-A)	Paul Seymour (Direct Broadcast Program Manager, NOAA/NESDIS/OSPO/SPSD/Direct Services Branch)	
	4:15 PM	3.4b	Eumetsat Third Party Data Services	Simon Elliott (Third Party Data Services, EUMETSAT)	

	4:30 PM	3.4c	GOES DCS	Kay Metcalf (GOES DCS Program Manager, NOAA/NESDIS/OSPO/SPSD/Direct Services Branch)	
	4:45 PM	3.4d	Experience with Data Acquisition DCS and LRIT in Guatemala	Sergio Vega, Guatemala (Electronics and Informatics Engineer, INSIVUMEH)	
	5:00 PM	3.4e	Q&A with Session 3.4 speakers		
	5:15 PM		**End of Day 3**		
	6:00 PM		**No Host Dinner (Grand Ballroom)**	Jon Malay (President, Sea & Sky Science Company (S3C))	
Thursday April 30, 2015	End of Day		Take Down posters from Poster Session 2		
		4.0	**Logistics Update (Grand Ballroom)**		Eric Madsen (NSC Co-Chair, NOAA/NESDIS/ International and Interagency Affairs Division); Natalia Donoho (NSC Co-Chair, NOAA/NESDIS/OSPO/ Satellite Products and Services Division)
	7:00 AM - 8:30 AM		Put up posters for Poster Sessions 3 (Annapolis Room)		
	7:30 AM - 5:30 PM		Registration		
	8:50 AM	4.0	Logistics Update	Natalia Donoho (NSC Co-Chair) & Eric Madsen (NSC Co-Chair)	
		4.1	**Education and Training (what's out there today and planned for the future)**		Tony Mostek (Division Chief, NOAA/NWS/Office of the Chief Learning Officer, Forecast Decision Training Division) & Margaret Mooney (EPO Director, CIMSS/University of Wisconsin-Madison)
	9:00 AM	4.1a	COMET	Wendy Abshire (Senior Project Manager/Meteorologist, UCAR/COMET) & Patrick Dills (Meteorologist, UCAR/COMET)	
	9:15 AM	4.1b	VISIT	Bernie Connell (Researcher, Cooperative Institute for Research in the Atmosphere (CIRA)/VISIT/Colorado State University)	
	9:30 AM	4.1c	NWS Satellite Training Plan	Brian Motta (Meteorologist, NOAA/NWS/Office of Chief Learning Officer, Forecast Decision Training Division)	
	9:45 AM	4.1d	NOAA Satellite Proving Ground training	Chad Gravelle (Science Coordinator and GOES-R Satellite Liaison, NWS Operations Proving Ground, Cooperative Institute for Meteorological Satellite Studies	

				(CIMSS), University of Wisconsin)	
	10:00 AM	4.1e	Education talk (K-12)	John Moore (American Council of STEM Educators) & Margaret Mooney (EPO Director, CIMSS/University of Wisconsin-Madison)	
	10:15 AM		Q&A with Session 4.1 speakers		
	10:30 AM		**Break / Exhibits / Poster Viewing Session 3**		
	11:30 AM	**4.2**	**International Perspectives on Training and User Access to Imagery and Products**		Bernie Connell (Researcher, Cooperative Institute for Research in the Atmosphere (CIRA)/VISIT/Colorado State University) & Kathy Ann Caesar (Chief Meteorologist, Caribbean Institute for Meteorology and Hydrology, Barbados)
	11:30 AM	4.2a	Education and Training to Support WMO Members in 2020 - How will we get there and what will it look like?	Jeff Wilson (Director, WMO Education and Training Office (ETO)), Patrick Parrish (Chief of Training Activities Division, WMO ETO), Aileen Semple (Senior Program Manager, Seconded from the UK Met Office to WMO ETO) (VIDEO)	
	11:45 AM	4.2b	WMO VLab and RA III/IV Coordination Group on Satellite Data Requirements	Kathy-Ann Caesar (Chief Meteorologist, Caribbean Institute for Meteorology and Hydrology, Barbados) & Luiz Machado (Senior Scientist, Instituto de Nacional de Pesquisas Espaciais (INPE)/Centro de Previsão de Tempo e Estudos Climáticos CPTEC), Brazil)	
	12:00 PM	4.2c	Training in Argentina	Cynthia Matsudo (Researcher, R&D Department, National Meteorological Service (SMN), Argentina)	
	12:15 PM		Q&A with Session 4.2 speakers		
	12:30 PM		**Lunch / Exhibits / Posters**		
	1:45 PM	**4.3**	**Other NOAA Space Programs: 2015 to 2020+**		John Pereira (NOAA/NESDIS/Office of Projects, Planning & Analysis) & Scott Rogerson (NOAA/NESDIS/OSPO/SPSD/Direct Services Branch)
	1:45 PM	4.3a	COSMIC-2 / GNSS RO Ground System	Pete Wilczynski (Chief, Requirements, Planning & Integration Division, NOAA/NESDIS/Office of Projects, Planning & Analysis)	
	1:57 PM	4.3b	DSCOVR	Mike Simpson (DSCOVR Program Manager,	

				NOAA/NESDIS/Office of Projects, Planning & Analysis)	
	2:09 PM	4.3c	Jason-3	Walid Bannoura (Jason-3 Project Manager, NOAA/NESDIS/Office of Projects, Planning & Analysis)	
	2:21 PM	4.3d	SIDAR: TSIS, Argos (A-DCS), and SARSAT	Dan Mamula (SIDAR Program Manager, NOAA/NESDIS/Office of Projects, Planning & Analysis)	
	2:33 PM	4.3e	Argos-3 to Argos-4	Michel Sarthou (Argos & SARSAT Project Manager, Centre National d'Etudes Spatiales)	
	2:45 PM	4.3f	SARSAT: LEO to MEO	Chris O'Connors (Chief, Direct Services Branch and SARSAT Program Manager, NOAA/NESDIS/OSPO/Satellite Products and Services Division)	
	2:57 PM		Q&A with Session 4.3 speakers		
	3:15 PM		**Break / Exhibits / Poster Viewing Session 3**		
	4:15 PM	**4.4**	**Frequency Matters**		Mark Mulholland (Director, NOAA/NESDIS/OSAAP/Policies, Procedures, and System Assurance Division) & Beau Backus (Systems Director, The Aerospace Corporation)
	4:15 PM	4.4a	Frequency Session (L-band and Auction Update)	Mark Mulholland (Director, NOAA/NESDIS/OSAAP/Policies, Procedures, and System Assurance Division)	
	4:25 PM	4.4b	Report of Recent Intergovernmental Frequency Working Groups	Beau Backus (Systems Director, The Aerospace Corporation)	
	4:35 PM	4.4c	Current POES/MetOp Sharing Status	Alfredo Mistichelli (Spectrum Manager, NOAA/NESDIS/CID)	
	4:45 PM	4.4d	Future GOES-R Concerns	David Lubar (Radio Spectrum Management Specialist, NOAA/NESDIS/GOES-R, The Aerospace Corporation)	
	4:55 PM	4.4e	Future EMWIN Implications	Dr. Esteban Valles (Associate Director, Digital Communication Implementation Department, The Aerospace Corporation)	
	5:05 PM	4.4f	Survey of Latin American Users	Laura Delgado Lopez (Project Manager, Secure World Foundation)	
	5:15 PM	4.4g	Q&A with Session 4.4 speakers		
	5:30 PM		**End of Day 4**		
Friday May 1, 2015	End of Day		Take Down posters from Poster Session 3		

		5.0	**Logistics Update (Grand Ballroom)**		Eric Madsen (NSC Co-Chair, NOAA/NESDIS/ International and Interagency Affairs Division); Natalia Donoho (NSC Co-Chair, NOAA/NESDIS/OSPO/ Satellite Products and Services Division)
	7:30 AM - 12:00 PM		Registration		
	8:50 AM	5.0	Logistics Update	Natalia Donoho (NSC Co-Chair) & Eric Madsen (NSC Co-Chair)	
		5.1	**Meeting our Nation's Challenges: Socio-Economic Benefits of Environmental Satellites**		Mike Bonadonna (Office of the Federal Coordinator for Meteorology) & Ken Carey (Vice President, Earth Resources Technology (ERT), Inc.)
	9:00 AM	5.1a	Session Overview and Introduction	Dave McCarren (Acting Federal Coordinator for Meteorology, Office of the Federal Coordinator for Meteorology)	
	9:10 AM	5.1b	NWS Perspective	Hendrik Tolman (Director, Environmental Modeling Center, NOAA/NWS/National Centers for Environmental Prediction)	
	9:20 AM	5.1c	Naval Benefits/Impacts	CAPT Erika Sauer (US Navy Liaison to NOAA)	
	9:30 AM	5.1d	DHS-US Coast Guard Benefits/Impacts	LCDR Aaron Ortenzio (SARSAT Liaison Officer, Office of Search and Rescue, DHS/USCG)	
	9:40 AM	5.1e	Use of Weather Satellite Data for Federal Aviation Administration Operations	Randy Bass (Program Manager, Convective Weather Research Program, DOT/FAA)	
	9:50 AM	5.1f	Commercial Applications of Environmental Satellite Data to Address Critical Socio-economic Challenges	Dave Jones (President, StormCenter Communications, Inc.)	
	10:00 AM	5.1g	Panel Discussion and Audience Q&A	All	
	10:30 AM		**Break / Exhibits / Posters**		
		5.2	**Closing Session (Grand Ballroom)**		
	11:00 AM	5.2a	Conference Summary/Action Items	Vanessa Griffin (Acting Director, NOAA/NESDIS Office of System Architecture & Advanced Planning (OSAAP); Director, NESDIS/Office of Satellite and Product Operations (OSPO))	
	11:45 AM	5.2b	Closing Remarks	Steve Volz (Assistant Administrator, National Environmental Satellite, Data & Information Service (NESDIS), NOAA)	
	12:00 PM		**End Of Conference**		

APPENDIX B List of Posters

Poster Session 1 Tuesday April 28, 201510:30 am & 3:00 pm

Poster #	Title	Author(s)
1-1	Enhance Climate Services from Space	Dr. Mitchell Goldberg, Wei Guo & Felix Kogan
1-2	NOAA Operational Oceanic Heat Content Product Suite	David Donahue, Eileen Maturi, Nick Shay, Jodi Brewster & Jerry Guo
1-3	Influence of Terrain Characteristics on Surface Radio Refractivity Variations over North Central, Nigeria	Ajileye O. O., Kolawole I. S. & Alaga A. T.
1-4	Use Of Satellite Derived Data to Study the Characteristics of Thunderstorm Clouds in Kenya	Elisha Chanzu
1-5	Total Operational Weather Readiness - Satellites (TOWR-S) Project	Eric M. Guillot, Michael W. Johnson, Joesph K. Zajic, R. Bradley Pierce, & Brian S. Gockel
1-6	Overview of the GOES-R HRIT/EMWIN System and Impacts to the User Community	John Stephen Britton, Andrew Krepps and Jonathan Terrell
1-7	Comparison of CloudSat and TRMM radar reflectivities	K. D. Sindhu, G. S. Bhat
1-8	R2-Whoa: Challenges and solutions for executing best practices in transferring NOAA's research to NWS operations	Dr. Jordan Gerth
1-9	NOAA's JPSS's Proving Ground and Risk Reduction Program – Bringing New Capabilities to Operations	Dr. Mitchell Goldberg & William Sjoberg
1-10	An analysis of the Dependence of Global Temperature Anomaly on Solar Activity and Carbon Dioxide Concentration	Kingsley Orisekeh
1-11	Operational implementation of the Linear Fit SO2 algorithm for use with Suomi NPP OMPS	Jianguo Niu, Zhihua Zhang, C. Trevor Beck, Lawrence Flynn & Kai Yang
1-12	New Metsat Display for NWS Satellite Imagery	Robert Gillespie, Bill Bergen & Sterling Weems
1-13	The Argos Data Collection and Location System	Scott Rogerson
1-14	Assessment of GOES-R Product Potential Benefits using the NOAA Observing System Integrated Analysis II (NOSIA-II)	Louis Cantrell, David Helms, Robert Reining & Aaron Pratt
1-15	Recalibration and merging of SSU observations for stratospheric temperature trend studies	Cheng-Zhi Zou, Haifeng Qian & Likun Wang

1-16	Characterization of the Difference between Aerosol Retrievals from Multi-Sensors and AERONET	Jingfeng Huang, Hongqing Liu, Istvan Laszlo, Shobha Kondragunta, Lorraine A. Remer, Ho-Chun Huang, Hai Zhang, Stephen Superczynski, Maksym Petrenko, Brent N Holben, Robert C Levy, Ralph A Kahn & Charles M Ichoku
1-17	Algorithm to Detect Dust and Smoke in Suomi NPP VIIRS Imagery	Shobha Kondragunta & Pubu Ciren
1-18	Inter-Cal Val of observations from modern satellite microwave humidity and temperature sounders	Isaac Moradi & Ralph Ferraro
1-19	Implementation of a network of ground stations via GOES purposes of early warnings of extreme hydroclimatic events in the Valle del Cauca -Colombia	Oscar Ramirez
1-20	Jpss-1 Science Data Product Verification And Validation: Pre-Launch To Post-Launch Plans	Murty G. Divakarla, Lihang Zhou, Xingpin Liu, Walter Wolf, Eric Gottshall, Janna Feeley, Tom Atkins, Robert Steadley & Ray Godin
1-21	Subtropical and Tropical Frontal Passages: A Hawaii Perspective	Eric Lau & Dr. Jordan Gerth
1-22	Facilitating JPSS-1 algorithm development using EPL review process	Valerie Mikles, Kristina Sprietzer, Bigyani Das, Walter Wolf, Marina Tsidulko & Weizhong Chen
1-23	STAR Central Data Repository (SCDR): An Integrated and Effective Framework for Satellite Data Acquisition and Dissemination	Weiguo Han & Joseph Brust
1-24	Preparing for imagery from the next generation of geostationary imagers	Mathew M. Gunshor, Timothy J. Schmit, Kaba Bah, Joleen Feltz & Tom Rink
1-25	DB Software: CSPP and IMAPP Support for Operational Environmental Applications	Kathleen Strabala, Liam Gumley, Allen Huang, Graeme Martin, Scott Mindock, Ray Garcia, Nick Bearson, James Davies, Rebecca Cintineo, Elisabeth Weisz, Nadia Smith, Bill Smith Sr. & Brad Pierce
1-26	Advancement of Satellite-Imager Based Overshooting Top (OT) Decision Support Products	Kristopher Bedka, Konstantin Khlopenkov, Sarah Griffin & Christopher Velden
1-27	Adaptive Trending and Limit Monitoring Algorithm for GOES-R ABI Radiometric Parameters	Zhenping Li, David Pogorzala, Ken Mitchell & J.P. Douglas
1-28	Evaluating VIIRS Land Surface Albedo: Validation and Intercomparison	Dongdong Wang, Shunlin Liang, Yuan Zhou & Yunyue Yu
1-29	Assured Weather Satellite Information Delivery	Kerry Grant, Shawn Miller, Michael Jamilkowski & Shawn Cochran
1-30	Maintaining JPSS Product Quality	Kerry Grant, Wael Ibrahim, Kurt Brueske & Paula Smith

1-31	Rapid Algorithm Integration in the JPSS CGS	Kerry Grant, Shawn Miller & Michael Jamilkowski
1-32	Validation of JPSS S-NPP VIIRS Surface Type Environmental Data Record	Rui Zhang, Chengquan Huang & Xiwu Zhan
1-33	Innovating Accelerated Use of NOAA Satellite Data The Development of Accelerator-based Models and Applications	Allen Huang, Bormin Huang, Jarno Mielikainen & Melin Huang
1-34	Comparison of Different Calibration Approaches in S-NPP CrIS Full Spectral Resolution Processing	Yong Chen, Yong Han, Likun Wang, Denis Tremblay, Xiaozhen Xiong, Xin Jin & Fuzhong Weng
1-35	Feasibility of FENGYUN-3B VIRR and METOP-B AVHRR to Detect Large Fires Based on TERRA & AQUA MODIS and S-NPP VIIRS Measurements	Molina, V., Sanz, J., Salvador, P., García, M. & Casanova, J.L.
1-36	Research to Operations of New and Enhanced NESDIS Satellite Products	Stacy Bunin, Tom Schott & Bonnie Reed
1-37	NOAA's Operational Surface Temperature Products and their Applications	Eileen Maturi, John Sapper, Andy Harris, Jonathan Mittaz, Prabhat Koner, Alex Ignatov, Ziaofang Zhu, Daniel Comarazomy & Jeehye Han
1-38	Improving Noah LSM Performance using Near Real Time Surface Albedo and GVF	Jifu Yin, Xiwu Zhan, Christopher R. Hain, Li Fang & Jicheng Liu
1-39	Evaluating the inter-FOV radiance difference of S-NPPCrIS Full Spectral Resolution Data Product	Xin Jin, Yong Han, Likun Wang, Denis Tremblay, Xiaozhen Xiong & Fuzhong Weng
1-40	Physical retrieval of ocean surface wind speed and its application to Typhoon analysis using passive microwave satellite remote sensing	Sungwook Hong, Hwa-Jeong Seo & Dr. Sang-Jin Lyu
1-41	RGB product for convective clouds using COMS satellite	Sungwook Hong, Yuha Kim & Dr. Sang-Jin Lyu
1-42	Vertical structure of radar reflectivity in deep intense convective clouds over the tropics	Shailendra Kumar & Dr. G.S. Bhat
1-43	NOAA/STAR S-NPP CrIS Full Spectral Resolution SDR Processing	Xiaozhen Xiong, Yong Han, Yong Chen, Likun Wang, Denis Tremblay, Xin Jin & Lihang Zhou
1-44	Applications of GOES data in Brazil	Nelson J. Ferreira
1-45	JPSS Common Ground System (CGS) Multimission Support	Shawn W. Miller, Kerry D. Grant & Michael Jamilkowski
1-46	Improvements to Ensemble Tropical Rainfall Potential (eTRaP)	Robert J. Kuligowski, Stan Kidder, Liqun Ma, Robert Glassberg, Clay Davenport, Rachel Hatteberg, Mike Turk, Sheldon Kusselson & Beth Ebert

1-47	Evaluation of Lightning Detection Networks and Implications for GOES-R GLM	Scott D. Rudlosky & Douglas Kahn
1-48	Microwave sounder cloud detection using collocated high resolution imager and its impact on radiance assimilation in tropical cyclone forecast	Hyojin Han, Jun Li, Mitch Goldberg, Pei Wang, Jinlong Li, and Zhenglong Li
1-49	A Systematic Approach to Building and Maintaining NOAA's Climate Data Records (CDRs)	Daniel Wunder, C. Hutchins, X. Zhao & W. J. Glance
1-50	Adding a Mission to the JPSS Common Ground System (CGS)	Shawn W. Miller, Kerry D. Grant, & Michael L. Jamilkowski
1-51	Level-2 Products in the CSPP-GEO DB Package	Geoff Cureton, Scott Mindock, Graeme Martin & Liam Gumley
1-52	Soumi NPP CrIS Radiometric Calibration Stability Assessment: A Perspective from Two Years' Inter-Comparison with AIRS and IASI	Likun Wang, Yong Han, Xin Jin, Yong Chen, Denis Tremblay, Xiaozheng Xiao & Mitch Goldberg
1-53	Characteristics of Detected Salt Storms by AVHRR Sensor on NOAA Satellites From 2006 to 2014 in Argentina	Diana Rodriguez, Silvana Carina Bolzi & Inés Velasco
1-54	Impact of the satellite-derived inner core data on HWRF hurricane intensity forecasts	Qingfu Liu, Banglin Zhang, Xiaolin Xu, Fuzhong Weng & Vijay Tallapragada
1-55	The impact of the high temporal resolution GOES/GOES-R moisture information on severe weather systems in regional NWP model	Pei Wang, Jun Li, Yong-Keun Lee, Zhenglong Li, Jinlong Li, Zhiquan Liu, Tim Schmit & Steve Ackerman
1-56	NOAA/NESDIS Sounding Data Products from the Next Generation Of Satellites	Awdhesh Sharma
1-57	Precipitation Validation to support NOAA operational Products	J.J. Wang, S. D. Rudlosky & R. R. Ferraro
1-58	Extending the long-term data records of SO2 and NO2 with the SNPP OMPS Nadir Mapper	Kai Yang, Simon A. Carn, Cui Ge & Jun Wang
1-59	Using hyper-spectral sounding products to improve short-range forecasts in the Alaska Region	Ralph A. Petersen, Lee Cronce, William Line & Robert Aune
1-60	Infrared and Microwave Data Addition Observing System Experiment Impacts using the NCEP Global Forecast System	James A. Jung & Dr. Mitch Goldberg

Poster Session 2 Wednesday April 29, 2015 10:30 am & 3:00 pm

Session	Title	Author(s)
2-1	Assessment of J1 VIIRS Polarization Sensitivity Impacts on Sensor Data Records	Wenhui Wang, Changyong Cao & Aaron Pearlman
2-2	Rapid updates of NOx emissions to support NOAA ozone forecasting	Daniel Tong, Li Pan, Lok Lamsal, Pius Lee, Youhua Tang, Hyuncheol Kim, Min Huang, Ivanka Stajner, Lawrence Flynn, Shobha Kondragunta & Kenneth Pickering
2-3	DB and SMD Behavior in Relation to CrIS Full Spectrum	Kevin Gross & Sean Lyons
2-4	Value-added Impact of Geostationary Hyperspectral Infrared Sounder on Storm forecasts – A quick regional OSSE demonstration	Zhenglong Li, Jun Li, Feng Zhu, Pei Wang, Timothy Schmit, Agnes Lim, Robert Atlas & Ross Hoffman
2-5	Evaluation of the VIIRS Risk Reduction Aerosol Optical Thickness Algorithm	Hongqing Liu & Istvan Laszlo
2-6	A near real time satellite data assimilation system at CIMSS for research and applications on using JPSS and GOES-R	Jun Li, Jinlong Li, Pei Wang, Hyojin Han & Tim Schmit
2-7	Verifying NWP model analyses and forecasts using simulated satellite imagery	Thomas Blackmore, Roger Saunders & Simon Keogh
2-8	vacant	
2-9	Vicarious validation of straylight correction for VIIRS Day/Night Band using Dome-C	Shi Qiu, Xi Shao, Changyong Cao & Wenhui Wang
2-10	GOES-R AWG Collocation Project Status	Greg Quinn, Bob Holz, Fred Nagle & Ralph Kuehn
2-11	Facilitation of OMPS Dark Table Production Transition to GRAVITE by STAR Algorithm Integration Team (AIT)	Bigyani Das, Weizhong Chen, Kristina Sprietzer & Walter Wolf
2-12	Suomi NPP VIIRS Imagery Update	Don Hillger, Curtis Seaman, Dr. Steven Miller, Thomas Kopp, Ryan Williams & Gary Mineart
2-13	Investigating and monitoring the hurricane inner core structure with retrieved temperatures from NPP ATMS	Banglin Zhang, Qingfu Liu, Vijay Tallapragada & Fuzhong Weng
2-14	Modeling Suomi-NPP VIIRS Solar Diffuser Degradation due to Space Radiation	Xi Shao & Changyong Cao
2-15	Latest developments related to the improvement of the operational NOAA VIIRS active fire product	Ivan Csiszar, Louis Giglio, Wilfrid Schroeder & Evan Ellicott

2-16	vacant	
2-17	Towards Improving our Understanding on the Retrievals of Key Bio-physical Parameters from Space: the work done within the PREMIER-EO Project	Prashant K. Srivastava, George P. Petropoulos, Gareth Ireland, Matthew R. North & Crona Huges
2-18	Neural Network Technique for Gap-Filling of Satellite Ocean Color Observations for use in Numerical Modeling	Sudhir Nadiga, Vladimir Krasnopolsky, Avichal Mehra, Eric Bayler & David Behringer
2-19	Integrating Changes to VIIRS Vegetation Index Algorithm using Algorithm Development Library (ADL)	Qiang Zhao, Biganyi Das, Weizhong Chen, Marina Tsidulko, Valerie Mikles & Walter Wolf
2-20	Automated JPSS Products Processing of the Algorithm Development Library (ADL) by using Chain Run Scripts	Weizhong Chen, Bigyani Das, Kristina Sprietzer, Valerie Mikles, Marina Tsidulko, Yunhui Zhao, Qiang Zhao, Vipuli Dharmawardane & Walter Wolf
2-21	Accurate Data Flow Management Tool Facilitates Operational Stability and Risk Management in a Complex and Dynamic Science Processing Environment	Laura Ellen Dafoe & Jeffrey Hayden
2-22	Real-time Monitoring Land Surface Vegetation Phenology from VIIRS Observations	Xiaoyang Zhang, Lingling Liu & Yunyue Yu
2-23	The development of the GOES Early Fire Detection (GOES-EFD) system to reduce disaster vulnerability in America	Alexander Koltunov, Brad Quayle, Susan Ustin, Elaine Prins, Vince Ambrosia & Carlos Ramirez
2-24	vacant	
2-25	Evaluate and constrain modeled ozone and its source contributions in the US using satellite trace gas observations	Min Huang, Kevin Bowman, Greg Carmichael, Meemong Lee, Dejian Fu, Tianfeng Chai, Daniel Tong, Pius Lee & Youhua Tang
2-26	VIIRS Boats, Lights, Fires and Flares	Chris Elvidge, Kimberly Baugh, Feng-Chi Hsu, Mikhail Zhizhin, Tilottama Ghosh
2-27	Development of the Visible Detector Assembly for the Flexible Combined Imager on MTG	James Endicott, J. Pratlong, A. Pike, W. Hubbard, P. Jerram, A. Walker & D. Davies
2-28	Impact of AMSU Derived Hydrological Products on Merged Precipitation Products	Thomas M. Smith, Ralph R. Ferraro, Huan Meng & Wenze Yang
2-29	Developing VIIRS Ocean Color Products for Coral Reef Ecosystem Managers	Alan E. Strong, Menghua Wang, C. Mark Eakin, Eric Geiger, William Hernandez, & Maria Cardona
2-30	A Prototype Precipitation Retrieval Algorithm for Advanced Technology Microwave Sounder (ATMS)	Yalei You, Nai-Yu Wang & Ralph Ferraro
2-31	2-31 Survey of OSPO Efforts to Improve Operational GOES Imagery	S. Hadesty, K. Ludlum, N. Sanders & C. Thomas

2-32	Production of Satellite Land Surface temperature dataset at STAR	Yunyue Yu, Yuling Liu, Peng Yu, Yuhan Rao & Ivan Csiszar
2-33	Quality Assessment of Suomi NPP VIIRS Land Surface Temperature Product	Yuling Liu, Yunyue Yu, Peng Yu & Zhuo Wang
2-34	vacant	
2-35	Addressing User Demands: Enhancing NOAA Coral Reef Watch's Satellite Decision Support System for Coral Reef Managers	Erick F. Geiger, C. Mark Eakin, Gang Liu, Jacqueline L. De La Cour, Scott F. Heron, William J. Skirving, Alan E. Strong
2-36	Updates on the NESDIS Operational Blended TPW Products	Limin Zhao, Stanley Kidder, Sheldon Kusselson, John Forsythe, Andrew Jones , Ralph Ferraro, Clay Davenport, Vicky Lin & Stephen Quinn
2-37	GOES-R GRB direct readout at NWS National Centers	Harlan Yates, Liz Nielsen & Allan Weiner
2-38	Comparison of Atmospheric Rivers depicted from satellite and NWP reanalysis	Wenze Yang & Ralph Ferarro
2-39	Use of Weather Satellite Data for FAA Operations	Randall Bass & Steve Abelman
2-40	Testing of Emissivity Explicit Retrieval Algorithms for VIIRS Land Surface Temperature	Peng Yu, Yunyue Yu, Yuling Liu & Zhuo Wang
2-41	GOES-R Impact on NCEP Computing	James Gundy, Gregg Kowalski, Bradley Brown-Bergtold & Allan Weiner
2-42	Monitoring and forecasting Dust Haze over West Africa using satellite imageries and Numerical Weather Prediction output	Abdou Adam Abdoul-Aziz Abebe, Abdelkrim Ben Mohamed, Ilboudo Goama & Saley Diori
2-43	Suomi NPP VIIRS Reflective Solar Band On-orbit Radiometric Performance Assessment	Sirish Uprety & Changyong Cao
2-44	Improved Ground-Based Polarization Sensitivity Measurement Capability for Next-Generation Environmental Remote Sensing Systems	Aaron J. Pearlman, Frank Padula, Changyong Cao & Xiangqian Wu
2-45	Evaluation of Near Surface UAV Capabilities for the GOES-R Field Campaign	Francis Padula, Changyong Cao, Istvan Laszlo, Yunyue Yu & Steve Goodman
2-46	The Algorithm Workbench: Data-Driven Software for Ground Processing System Development, Test, and	Alexander Werbos, David B. Hogan, Daniel Hunt, Erik Steinfelt & T. Scott Zaccheo
2-47	Volcanic Cloud Detection, Characterization, Alerting, and Modeling Applications for GOES-R	Dr. Mike Pavolonis, Justin Sieglaff & John Cintineo

2-48	Improved Engineering Analysis for GOES-R	Bruce Twambly
2-49	Integrating Changes to JPSS CrIS SDR Algorithm using the Algorithm Development Library (ADL)	Vipuli Dharmawardane, Bigyani Das, Valerie Mikles & Walter Wolf
2-50	Preparing for GOES-R and JPSS at the Satellite Proving Ground for Marine, Precipitation and Satellite Analysis	Dr. Michael J. Folmer, Joseph Sienkiewicz, James Clark, Hugh Cobb, Nelsie Ramos, David Novak, Andrew Orrison, Jamie Kibler, Scott Rudlosky, Dr. Steve Goodman & Dr. Mitch Goldberg
2-51	Use of JPSS ATMS and VIIRS data to Improve Tropical Cyclone Track and Intensity Forecasting	Galina Chirokova, Mark DeMaria, Robert DeMaria, John Knaff, Jack Dostalek & John L. Beven
2-52	Processing Himawari-8 Geostationary Satellite Data Using GOES-R Algorithms for Algorithm Continuity in Operations	Jonathan Wrotny, A. Li, H. Xie, M. Fan, R. Chen, T. Yu, S. Sampson, W Wolf, W. Straka, A. Heidinger & J. Daniels
2-53	Impact Analysis of LEO Hyperspectral Sensor IFOV size on the next generation NWP model forecast performance	Agnes Lim, Zhenglong Li, James Jung, Allen Huang, Jack Woollen, Greg Quinn, FW Nagle, Jason Otkin & Dr. Mitch Goldberg
2-54	Using GOES Imagery as Pointing Truth for TEMPO Image Navigation and Registration	Kerrie Allen, James L. Carr, Brad Pierce, Joseph Fox-Rabinovitz, Norman Lo & David Zakar
2-55	On the Use of 1-Minute Satellite Imagery in the Storm Prediction Center	Bill Line
2-56	Improve volcanic ash simulation with Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) dispersion model by assimilating satellite observations	Tianfeng Chai, Alice Crawford, Barbara Stunder, Roland Draxler, Dr. Michael J. Pavolonis, and Ariel Stein
2-57	An Initial Comparison of NASA GPM Precipitation Products to NOAA operational Products	Ralph Ferraro, Nai-Yu Wang, Yalei You, Patrick Meyers & Huan Meng
2-58	The VIIRS Active Fire Data for Fire Management: A review of the Proving Ground and Risk Reduction (PGRR) Project efforts	Evan Ellicott, Ivan Csiszar, Wilfrid Schroeder, Louis Giglio & Chris Justice
2-59	High-resolution Atmospheric Motion Vectors (AMVs) for application in high-impact weather events in the GOES-R era	Christopher Velden, Jaime Daniels, David Stettner, Steve Wanzong & Wayne Bresky
2-60	Evaluation of the impact of satellite radiance data within the hourly Rapid Refresh data assimilation system	Haidao Lin, Steve Weygandt, Ming Hu, Curtis Alexander & Stan Benjamin

Poster Session 3 Thursday April 30, 2015 10:30 am & 3:15 pm

Session	Title	Author(s)
3-1	3D Printing with CLASS: Making Models for Education and Outreach Using Satellite Weather Imagery	Francis Reddy
3-2	Mapping Floods due to snowmelt and ice jam in Alaska Area using S-NPP VIIRS data	Donglian Sun, Sanmei Li, Bill Sjoberg & Dr. Mitch Goldberg
3-3	Analysis of sea surface sound speed near the Changjiang River mouth using passive microwave remote sensing	Bumjun Kil
3-4	Synthetic Satellite Imagery: A New Tool for GOES-R User Readiness and Cloud Forecast Visualization	Dan Lindsey, Louie Grasso & Dan Bikos
3-5	Improvements to SCaMPR Rainfall Rate Algorithm	Yan Hao, Robert J. Kuligowski & Yaping Li
3-6	Green Vegetation fraction derived from the VIISR sensor onboard the S-NPP satellite	Zhangyan Jiang, Marco Vargas, Junchang Ju & Ivan Csiszar
3-7	Two New Multi-Spectral Composite Satellite Products and their Use by NWS Alaska Region in Identifying Low Clouds and Fog	Eric Stevens, Kevin Fuell, Lori Schultz & Matt Smith
3-8	The Unique Radiometric Calibration Trending Behavior of the GOES Imagers and Sounders	Kenneth Mitchell, Merrisa Griffin & J. Paul Douglas
3-9	3-9 Stereo Cloud Top Height Products for the GOES-R Era	Houria Madani & James L. Carr
3-10	Overview of the Limb Imaging Spectrometer	Xiaohu Yang, Yu Huang & Shurong Wang
3-11	NOAA / NESDIS Operational Air Quality Satellite Products	Liqun Ma, Hanjun Ding & Zhaohui Cheng
3-12	Use of NOAA Satellite Date by the Bahamian Meteorological Service	Gregory Gibson
3-13	Using the NOAA Unique CrIS/ATMS processing System (NUCAPS) to explore hyper-spectral sounding capabilities during extreme events: lessons learned from the CalWater 2015 campaign.	Antonia Gambacorta, Christopher Barnet & Dr. Mitchell Goldberg
3-14	Access to GOES-R Satellite Data and Products with McIDAS and Mobile Apps	D. Santek, R. Dengel, S. Batzli, D. Parker & N. Bearson
3-15	Python Access to Real-time and Archive Satellite Data	Jerrold Robaidek, Ray Garcia, Eva Schiffer, Dave Santek, Tommy Jasmin, Kevin Hallock & David Stettner

3-16	A CERES-Consistent Cloud Property Climate Data Record Using AVHRR Data	Patrick Minnis, Kristopher Bedka, David Doelling, Seiji Kato, Qing Trepte, Sarah Bedka, Benjamin Scarino, Chris Yost, Konstantin Khlopenkov, Gang Hong, Mandana Khaiyer, Rabindra Palikonda, Arun Opalan, Rajendra Bhatt, Conor Haney, Alok Shrestha & Patrick Heck
3-17	A Land Product Characterization System for analysis and validation of ABI and VIIRS land data and products	Kevin Gallo, Calli Jenkerson, Steve Foga, Greg Stensaas & John Dwyer
3-18	NOAA Okeanos Ocean Color Operational Product System: A Newly Developed Web-based QA Monitoring Tool for Ocean Color Operational Products	Banghua Yan, Ian Simpson, Edmond Rodriguez, Derek Van Pelt & Antonio Irving
3-19	Operational Wind Products at NOAA/NESDIS	Hongming Qi, Jaime Daniels, Paul Chang, William Pennoyer, Andrew Bailey, Jeffrey Augenbaum & Yufeng Zhu
3-20	Ingest and Analysis of S-NPP VIIRs data from the NOAA CLASS system: Radiometric Calibration, Bow Tie Correction and Derived Dataset support in the ENVI COTS Software	Greg Terrie, Patrick Collins, Robert Schafer & Amanda O'Connor
3-21	Using VIIRS DNB and OMI NO2 retrievals for constraining NOx Emissions	Brad Pierce
3-22	3-22 CrIS CO2 Information Content and Retrieval Sensitivity Study	Cong Zhou, Nadia Smith, Hung-Lung & Allen Huang
3-23	NOAA Soil Moisture Operational Product System (SMOPS): Version 2	Jicheng Liu, Christopher Hain, Zhengpeng Li, Li Fang, Jifu Yin, Xiwu Zhan & Limin Zhao
3-24	Development of surface reflectance ratios database for VIIRS AOT retrieval over land	Hai Zhang, Hongqing Liu, Shobha Kondragunta, Istvan Laszlo, Lorraine Remer, Jingfeng Huang & Stephen Superczynski
3-25	CSPP GEO GVAR data conversion for use in GOES-R algorithms	Scott Mindock, Jessica Braun & Graeme Martin
3-26	Comparison of the NOAA NDE VIIRS and the NASA C6 MODIS Cloud Masks Over the Entire EOS AQUA Record.	Andrew K. Heidinger, Steven A. Ackerman, Denis Botambekov & Richard Frey
3-27	Better Weather Forecast using NOAA Satellite Data by National Meteorological Institute (INMET)	Alaor Moacyr Dall'Antonia Jr, Wagner de Aragão Bezerra & Kleber Renato da Paixão Ataide
3-28	Recent additions to the CSPP from algorithm developers at NOAA	James E. Davies, Aronne Merrelli, Kathy Strabala, Liam Gumley, Allen Huang, Christopher Grassotti, Xiwu Zhan, Christopher Barnet, Thomas King, John D. Stroup & Yury Kihai.
3-29	Night Light Pollution in Large Coastal Urban Areas Through Nighttime DMSP Satellite Images	Carlos Cotlier, Cristina Pacino, Benito Vicioso, Laura Barparda, Gabriel Cotlier, Diego López & Dardo Delorenzi

3-30	El Salvador Natural Phenomena Monitoring Stations with Satellite Communication	Edwin Escobar
3-31	ATMS/AMSU Snowfall Rates during the 2014-15 Winter Season & Bradley Zavodsky	Huan Meng, Cezar Kongoli, Jun Dong, Ralph Ferraro
3-32	Improvement of cloud detection with COMS in the day-night transition area	Byung-il Lee, Hyungmin Park & Sung-Rae Chung
3-33	Selenographic Coordinate Mapping of Lunar Observations by GOES Imager	Xi Shao, Xiangqian Wu & Fangfang Yu
3-34	Profiling Deep Cloud Systems with Satellite Imager Data and Potential Applications	William L. Smith Jr., Cecilia Fleeger, Douglas Spangenberg, Patrick Minnis & Mandana Khaiyer
3-35	Use of VIIRS RSBAutoCal in Calibration Monitoring and Direct Readout Support	Slawomir Blonski & Changyong Cao
3-36	The S-NPP OMPS instrument performance monitoring via the Integrated Calibration/Validation System (ICVS)	Michael Grotenhuis, Chunhui Pan, Larry Flynn, Ninghai Sun, Fuzhong Weng, Eric Beach, Jianguo Niu & Wei Yu
3-37	GOES-R Atmospheric Motion Vectors Future Use in NCEP GFS	Sharon Nebuda, Jim Jung, Dave Santek, Jaime Daniels & Wayne Bresky
3-38	GOES-East satellite images processing in Uruguay and future perspectives	Rodrigo Alonso Suárez, Ricardo Siri, Nicolás Wainstein & Gonzalo Abal
3-39	S-NPP Operational Products at NOAA/NESDIS/OSPO	Shuang Qiu & Antonio Irving
3-40	JPSS SMD Data Capture and Processing & Distribution Hub Systems	Harek Gamst & Kenneth Pettersen
3-41	Integrated Satellite Network of the Direccion Meteorologica de Chile (DMC): Description,	Juan Pizarro
3-42	Status and future plan of development of meteorological products through Korean Geo-KOMPSAT-2A satellite	Sung-Rae Chung, Byung-il Lee, Tae-Myung Kim, Eun-Bin Park & Jae-Gwang Won
3-43	Not-So Silent Night: Suomi NPP's Day/Night Band Makes Waves as a Disruptive Technology to Characterization of the Nocturnal Environment	Dr. Steven Miller, William Straka III, Cindy Combs, Curtis Seaman & Jia Yue
3-44	Early Inter-sensor comparison result of Himawari-8 Advanced Baseline Imager with the Visible Infrared	Mike Chu, Xiangqian Wu & Fangfang Yu
3-45	Monitoring of Forest Fire Hotspots	Jesús Romero
3-46	GEONETCast Américas, Costa Rica	Rodolfo Sánchez

3-47	3-47 Verification of Soil moisture Estimations from AMSR-E and AMSR-2	Gloria Cristina Pujol
3-48	VIIRS Active Fires algorithm integration in NPP Data Exploitation (NDE) environment: research to operations	Marina Tsidulko, Walter Wolf, Ivan Csiszar, Louis Giglio & Wilfrid Schroeder
3-49	Quality Control of Requirement Documentation Using SASQUATCH (Simplified And Streamlined QUality Assurance Through Coding Help) Perl Script	Kay Kristina Sprietzer, Valerie Mikles, Bigyani Das, Weizhong Chen, Marina Tsidulko, Yunhui Zhao, Vipuli Dharmawardane & Qiang Zhao
3-50	Using Satellite Information in Energy Applications in Costa Rica	Evelyn Quiros & N. Alvarado
3-51	Validation of Suomi NPP-VIIRS IST using IceBridge Measurements	Mark Tschudi, Richard Dworak, Yinghui Liu & Jeffrey Key
3-52	Alaska DB	Gwendolyn Bryson , Jay Cable, Jeremiah Dabney, Carl Dierking, Tom Heinrichs, Scott Macfarlane, Eric Stevens & Greg Wirth
3-53	Arctic Weather Every 10 Minutes: Design and Operation of ABI for PCW	Paul Griffith & Susan Wirth
3-54	Monitoring Meteorological Data	Jorge Chira
3-55	Satellite Images: Tools for an Efficient and Timely Early Alert System	Francisco Argeñal
3-56	Investments and Preparations for GOES-R Rica	Eladio Solano
3-57	OMPS Limb Profiler Aerosol Extinction Algorithm Development	Robert Loughman, Ernest Nyaku, P.K. Bhartia & Nick Gorkavyi
3-58	Use of GNC-A by the Belize Meteorological Service	Dwayne Scott
3-59	Low Cost NOAA Satellite Signal Receiver for the Characterization of Astronomical Sites	Gary Flores, Ericson Lopez, Luis Tituaña, Edwin Mena, Daniel Vera & Enrique Lascano
3-60	Suomi NPP CrIS and Metop IASI Sounding Validation	William L. Smith Sr., Allen Larar, Henry Revercomb, Elisabeth Weisz & Joseph Taylor

APPENDIX C List of Exhibitors

- AIS Engineering, Inc.
- ASRC Federal
- Atmospheric and Environmental Research
- Ball Aerospace & Technologies Corp.
- CLS America
- Cooperative Institute for Meteorological Satellite Studies
- Enterprise Electronics Corporation (EEC)
- ERT, Inc.
- FTS
- GEONETCAST/GNC-A
- Global Imaging
- Harris Corporation
- HRIT/EMWIN
- Kongsberg Spacetec
- Kratos
- Lockheed Martin Space Systems Company
- Microcom Design, Inc.
- Morcom International, Inc.
- NOAA SARSAT
- Noblis
- Orbital Systems, Ltd
- Quantum
- Quorum Communications, Inc.
- RANET
- Raytheon Company
- Red Hat
- Riverside Technology
- Sentinel Satellite Inc.
- SkylarkInternationalAerospace
- SOLERS, Inc.
- Stevens Water Monitoring
- Sutron Corporation
- Systems Integration & Development, Inc.
- Tempus Global Data
- Unearth
- University of Alaska Fairbanks - GINA
- University of Wisconsin-Madison, CIMSS/SSEC
- Vaisala Oyj

CLASS DEMO

- GRB Simulator/GOES-R
- NOAA Direct Readout Registration Database
- PDA Demo (Limited)

APPENDIX D NSC-2015 Actions/Recommendations

NSC-2015 #	Recommendation / Question / Suggestion	Initial Response	Pertains to NSC-2015 Session
1	Report final position of GOES-R	The GOES-R launch is currently planned for fall of 2016. The current plan is for six months of post-launch testing at 89.5 W by which time the cloud and moisture imagery will be declared provisionally validated and fit for use. The Level 2 products will undergo a period of extended validation also at 89.5 W with the plan for GOES-R to be declared operational in 2017. The NESDIS GOES flyout chart, which focuses on mission continuity assuming expected life spans, shows the current plan is for GOES-14 to follow GOES-13 in the GOES-East position and for GOES-R to follow GOES-15 in the GOES-West position: http://www.nesdis.noaa.gov/flyout_schedules.html. The flyout chart shows configuration changes occurring in these fiscal years FY15: GOES-15 still in West, GOES-14 in East; FY17: GOES-R in West, GOES-14 still in East; FY20: GOES-R still in West, GOES-S in East. The final decision will be based on the health/safety/performance of the GOES constellation, so users should also prepare for contingency scenarios as well. If users wish to plan for all possible orbit position scenarios, then plan for GOES-R series operations as soon as FY16-17 with the GOES-R satellite or as late as FY17-20 with the GOES-S satellite. Operational users should prepare for the earliest case scenario, but also plan for the latest case scenario. NOAA will update the fly-out charts as soon as any changes occur to the planned orbit locations, but until further notice the posted charts are still accurate. Additional Notes: The GOES-R series satellites in the West position will be at 137W, not 135W (as today's GOES-West). GRB users will want to check out their systems with data from the PLPT (Post Launch Product Test), when GOES-R is at 89.9W. This should also be a consideration for GRB receiver acquisition and deployment. Being prepared for PLPT requires a pointable receiving system is ready even sooner than the dates in the flyout chart. See the downlink document for additional information: http://www.goesr.gov/users/docs/GRB_downlink.pdf.	2.1
2	Post table of data product sizes for L0, L1b, and L2 data on the GOES-R website.	None	2.1

NSC-2015 #	Recommendation / Question / Suggestion	Initial Response	Pertains to NSC-2015 Session
3	Generate a Spanish language version of the PDA user's manual	None	3.3
4	Is it feasible to stage additional data at the CBU?	NESDIS has undertaken a preliminary analysis to determine the level of effort and cost to provide additional products (GOES-R and the other supported missions) from the CBU facility. This effort is ongoing.	3.3
5	Can NOAA allow access to the PDA test bed for user feedback?	The current PDA I&T (test environment) is intended to support critical integration and test activities, then formal verification and validation. It is fully utilized for planned activities and won't be configured as a test bed for user feedback, to ensure requirements for support of GOES-R and JPSS products are met.	3.3
6	NOAA in collaboration with WMO dedicate special attention for training in the region both in English and Spanish, in three areas: a) Virtual training to improve access to existing training materials. b) Training for trainers, specifically on the characteristics and use of GOES-R and JPSS data and imagery. c) Face to face training in 2016 will also be needed after the launch of GOES-R.	NESDIS will discuss with UCAR/COMET, WMO Space Program and VLab partners.	4.2
7	GEONETCast (GNC) was identified as a satellite distribution system that could reduce service interruption in the transition from current GOES to GOES-R.	NESDIS/OSPO will review possible options as part of normal planning and budget processes.	4.2
8	Many of the RA III / RA IV countries would use GNC-A if the data requirements were more closely aligned with operational usage.	While the service is not operationally monitored on a 24/7 basis, but on a working day basis, performance is close to 100% due to the high reliability of the system. NOAA will continue to engage with members of RA III/ RA IV in the WMO Coordination Group on Satellite Data Requirements on such matters. NESDIS/OSPO will review possible options as part of normal planning and budget processes.	4.2

NSC-2015 #	Recommendation / Question / Suggestion	Initial Response	Pertains to NSC-2015 Session
9	Consider establishing a satellite spectrum working group for Western Hemisphere space agencies.	None	4.4
10	NESDIS to develop an interference reporting protocol for polar & geostationary users.	None	4.4
11	Can NOAA employ known & tested frequency management (interference detection and prevention) techniques and equipment already used by industry?	None	5.2
12	Further investigation into the HRIT/EMWIN interference issues from commercial cell phones (following spectrum auction); actions to stop the auction of GOES-R frequency band in the future; and engaging the US Government to investigate and review these interference issues.	None	Post-Conference Survey

APPENDIX E Organizing Committee

Co-Chairs: Natalia Donoho (Lead), Eric Madsen, Dr. Steven Goodman, Dr. Mitch Goldberg, John Furgerson
OSPO: Paul Seymour, Kay Metcalf, Letecia Reeves, Scott Rogerson, Jason Dong
GOES/GOES-R: Michelle Smith, Janel Thomas, Chris Daughtrey, Kathryn Miretzky, Richard Reynolds
JPSS: Arron Layns, Bill Sjoberg, Gary McWilliams
STAR: Christopher Brown, Jaime Daniels, Lihang Zhou, Don Hillger, Tim Schmit, Ken Carey
OSGS: Michelle Detommaso
NESDIS COS: Nina Jackson, Leesha Saunders, Marc Pulliam
NCEI: Axel Graumann
OSD: Chandra Kondragunta
OFCM: Michael Bonadonna
NWS: Susan West, Tony Mostek, Mike W. Johnson, James Yoe

International: Kathy-Ann Caesar

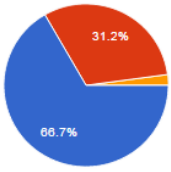
APPENDIX F Pre-Conference Survey Summary

The purpose of the pre-conference survey was to gather feedback from invited 2015 NSC attendees on potential agenda components and areas of emphasis. The survey was organized in two main sections: logistics information and interest in the specific threads/sessions. There were 141 total responses to the survey.

The pre-conference survey indicated that the vast majority of respondents were planning to attend the conference in person, and didn't need an interpreter (Chart F-1).

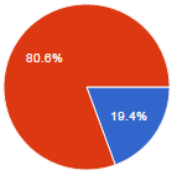
Chart F-1. Conference Logistics

Are you planning to attend the 2015 NOAA Satellite Conference on April 27 - May 1, 2015?



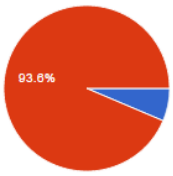
Yes	94	66.7%
Uncertain at this time	44	31.2%
No	3	2.1%

Are you interested in attending this conference remotely?



Yes	26	19.4%
No	108	80.6%

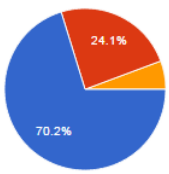
The official language of the conference is English. Will you need English to Spanish translation?



Yes	9	6.4%
No	132	93.6%

Over 70% of individuals also noted that they would be interested in special sessions such as GOES DCS, HRIT/EMWIN/LRIT and GNC-A (Chart F-2).

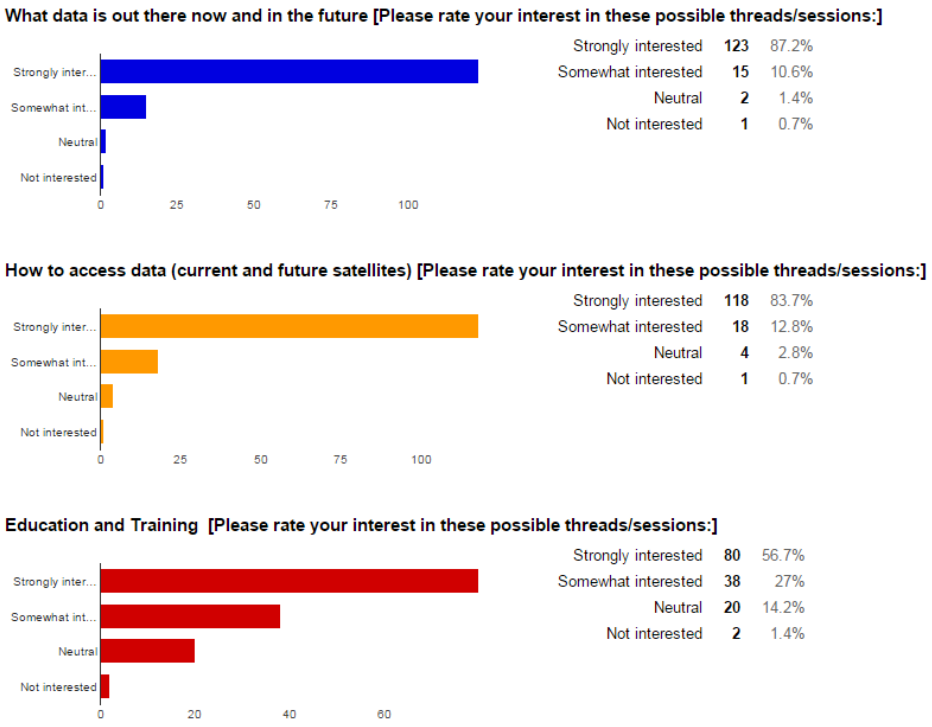
Chart F-2. Interest in special briefings:



Yes	99	70.2%
No	34	24.1%
Other	8	5.7%

Over 87% of the respondents indicated a strong interest in what data is out there now and in the future (Chart F-3).

Chart F-3. Interest in specific threads/sessions



Specific questions and suggestions for the conference agenda (provided verbatim in the table below) were addressed before the conference (Table F-1).

Table F-1: Response to specific suggestions for the conference agenda

The original text format from the survey was maintained throughout content analysis, including original grammar, typos, and punctuation.

Date Received	Name	Specific suggestions for the conference agenda	Response
07/22/14	V.A	Hands-On Workshop for DCS and LRIT.	NSC 2015 Planning Committee has replied to this inquiry directly, informing them of DCS workshop (which will include some LRIT).
07/22/14	M.C	I would like to see a session on breaking down and understanding the Transmission Headers and how to identify problems within transmissions. A troubleshooter's Guide type course and then best ways to resolve issues in transmissions and who to talk to at NOAA.	NSC 2015 Planning Committee replied to this inquiry directly, and confirmed that this question was concerned DCS only.
07/23/14	S. W.	AVHRR (NOAA and MetOp) time series; calibration issues.	This comment was forwarded to Agenda Sub-Committee for consideration.
09/08/14	M. R.	Time series from AVHRR (including data processing, calibration etc.)	This comment was forwarded to Agenda Sub-Committee for consideration.

Date Received	Name	Specific suggestions for the conference agenda	Response
07/24/14	S. P.	Merging of data from various platforms / providers. i.e.: Benefits of joint GEO/LEO.	This comment was forwarded to Agenda Sub-Committee for consideration.
07/24/14	B. H	GOES-R and JPSS represent a data challenge for future users. We would be interested in presenting or on a panel to discuss big data and analytics, and solutions for getting future satellite data and products in the hands of stakeholders.	With the exception of some invited presentations, our technical sessions are intended to be non-commercial. Speakers should not promote the services or products of their companies as part of their presentation.
07/25/14	K. D.	We would very much like to exhibit at this conference. Please add my e-mail address to any updates regarding exhibitor registration.	NSC 2015 Planning Committee has replied to this inquiry directly, informing them about Exhibitor registration.
07/29/14	A. H.	How Suomi NPP data provides new and improved information over previously available satellite data and how that information is used operationally.	This comment was forwarded to Agenda Sub-Committee for consideration. Please see also Tuesday (April 28, 2015) afternoon Session 2.3.
10/04/14	D. C.	VIIRS Higher Level Products - status of these.	This comment was forwarded to Agenda Sub-Committee for consideration. Please see also Tuesday (April 28, 2015) afternoon Session 2.3.
08/12/14	J. V.	Suggesting a topic for a workshop: Polar satellite status and agreements with ESA. Current status of NOAA's International agreements to obtain ESA, JMA, KMA, and Indian foreign data.	The comments were forwarded to the International & Interagency Affairs Office. We are expecting updates from EUMETSAT, KMA, JMA, CMA and WMO at the conference.
08/18/14	A. B.	Embedding GEONETCast in everyday African applications.	This comment was forwarded to our GEONETCast specialist.
08/22/14	P. A.	Research to operations for emerging applications, effective communication of satellite-derived information to the public and decision-makers	This comment was forwarded to Agenda Sub-Committee for consideration.
08/28/14	D. L.	This year we need the spectrum management team to have several opportunities to raise awareness to the risk to additional weather satellite downlink frequencies - which will likely impact non-Federal access to products and images	Please see Thursday (April 30, 2015) afternoon Session 4.4.
09/02/14	D. K.	Sea and Lake Ice	This comment was forwarded to Agenda Sub-Committee for consideration.
09/04/14	O. A.	…There is a strong passion from the academic community in West Africa to access more data for extensive research activities…	Your comment is appreciated.
09/10/14	M. J.	Ground Systems Consolidation	This comment was forwarded to Agenda Sub-Committee for consideration.
09/22/14	E. C.	Kindly include young scientists who graduated recently and are interested.	Unfortunately, travel grants are not available for this conference. We do not have funding to support attendee's travel to participate in the conference in person. We hope that you will be able to find the means to do so.
10/29/14	E. C.	As previously noted please include early career scientists in the conference attendees. Also do sponsor them to attend the conference	Please see above.
09/22/14	B. K.	Please give a chance to early career researchers to participate in this conference. Thank you	Please see above.
09/26/14	J. M	Applications of Satellites and Remote Sensing in Precollege Education. Opportunities for inclusion in Next Generation Science Standards and STEM	Please see Thursday (April 30, 2015) morning Session 4.1.

Date Received	Name	Specific suggestions for the conference agenda	Response
10/03/14	S. K.	International satellite data exchange. Space weather	This comment was forwarded to Agenda Sub-Committee for consideration.
10/06/14	J. F.	Presentations on the current state of development on various satellite programs, as well as planned enhancements/needs for them.	This comment was forwarded to Agenda Sub-Committee for consideration.
10/06/14	J. C.	Final position of new GOES-R. East or West? GVAR equipment and DCS Ground Stations, transitions to new GOES-R satellite. Must users change their antennas?	This comment was forwarded to GOES-R Series Program Office. Please see Question and Answer #21 at this link: http://www.goes-r.gov/resources/docs/GRB-SimFAQs.pdf
10/07/14	L. B	Timeline for when GOES-R and JPSS data sets and products are predicted to be available and the NOAA plan for replacing current legacy products with this next generation of products. Also, sample GOES-R imagery products would be interesting.	This comment was forwarded to GOES-R Series Program Office and JPSS Offices. Please see Tuesday (April 28, 2015) sessions.
10/08/14	J. S.	Exploitation/applications of GOES-R and JPSS satellite imagery to take advantage of dramatic resolution improvements.	This comment was forwarded to GOES-R Series Program Office and JPSS Offices. Please see Tuesday (April 28, 2015) sessions.
10/17/14	K. S.	Always most interested in how people are using US satellite data - especially global direct broadcast applications. I would much prefer more user, less NOAA/NASA administrators presentations	This comment was forwarded to Agenda Sub-Committee for consideration. Please see Friday (May 1, 2015) Session.
11/03/14	T.F	Session on the advantages that a Hyperspectral Atmospheric Sounder and Imager would provide NWS forecasters to assist with convective weather events.	This comment was forwarded to Agenda Sub-Committee for consideration.

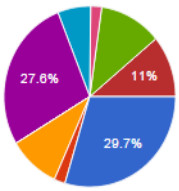
APPENDIX G Post-Conference Survey Summary

The post-conference evaluation survey was divided into three main sections: questions aimed at rating conference logistics and organization; questions aimed at eliciting qualitative assessments related to conference goals and objectives; and a section with conference specific feedback (respondents provided extended answers). There were 145 total responses to the survey.

The evaluation survey (Chart G-1) indicated that participants generally represented a broad spectrum of organizations, including, for example, international interests and academia, but with a significant number of attendees representing NOAA (~28%) and business/industry, including NOAA contractors (~30%).

Chart G-1. Participants' affiliation:

2. What is your affiliation?

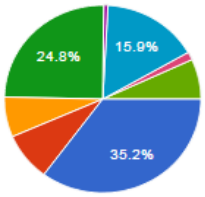


Business/industry/commercial organization (including NOAA Contractors)	43	29.7%
Individual	3	2.1%
International organization	14	9.7%
News media	0	0%
NOAA (Federal employee)	40	27.6%
Other U.S. Government Agency (Federal employee)	9	6.2%
Military	3	2.1%
University faculty/staff/student	17	11.7%
Other	16	11%

Responses were split in terms of how participants heard about the conference. The breakdown below demonstrates that most of the conference attendees received an e-mail message (35%), were previous attendees (~25%) or heard information from other people by word of mouth (16%).

Chart G-2. How participants heard about the conference:

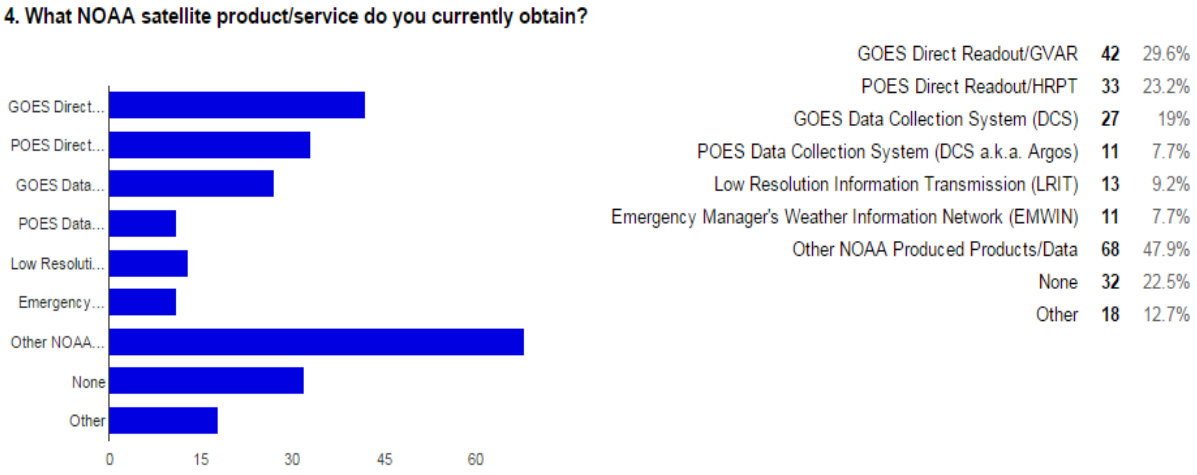
3. How did you hear about this Conference?



E-mail message	51	35.2%
NOAA Satellite Conference 2015 website	12	8.3%
NOAA/NESDIS newsletter	10	6.9%
Previous attendee	36	24.8%
Social media (NOAA/NESDIS Facebook or Twitter)	1	0.7%
Word of Mouth	23	15.9%
Announcement at the event (poster, slide or handout)	2	1.4%
Other	10	6.9%

The post-conference survey indicated that the nearly half of respondents (~48%) are using other NOAA products and data (Chart G-3).

Chart G-3.

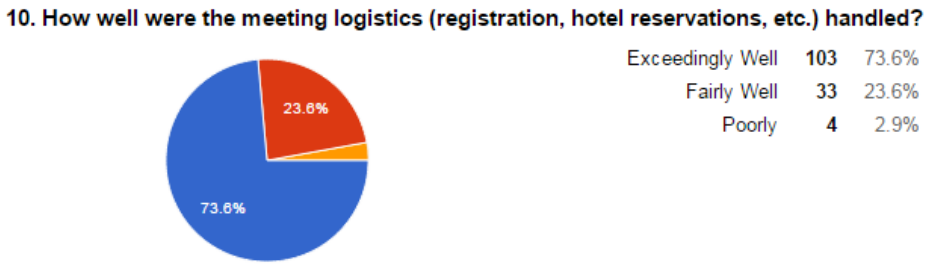


And nearly 39% of participants (Chart G-4) are currently utilizing archive products from NCEI.

Chart G-4. Meeting logistics evaluation:

In general, participants indicated an agreement (Chart G-5) that meeting logistics (registration, hotel reservations, etc.) was handled “Exceedingly Well” (~74%).

Chart G-5. Meeting logistics evaluation:



Participants were also asked to rate overall conference organization (Chart G-6). Most of the ratings indicate that attendees generally were "Extremely Satisfied" and "Satisfied" with overall logistics, including conference dates, location, website, guest speakers, special sessions/training, and assistance on site. A few illustrative comments are shown below (all participants' responses can be found in APPENDIX H Post-Conference Survey: Extended Responses).

"Well done, all!"

"…it was a very good conference and NOAA should be congratulated on the mammoth organization it achieved"

"Overall this conference was exceptionally great!"

"Excellent conference!" "…an excellently run meeting"

"It was a great conference!" "…A great, informative conference. Excellent poster sessions!"

"Great job planning committee!!!" "I thought it was fabulous. Every topic was enthralling."

"GREAT JOB BY PLANNING COMMITTEE!"

"Thank you for organizing it and see you in two years!"

"It was an excellent Conference. This brings new knowledge to my country."

"Excellent means to obtain an overall picture of the current status and nearer future plans for US environmental satellites. Useful information on non-US satellite programs as well. Also the conference had very good poster sessions"

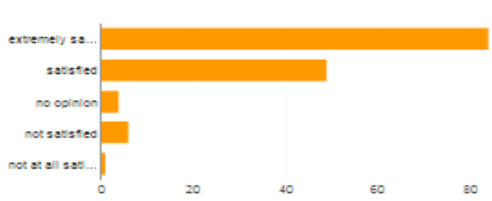
"This was my first NSC conference and it provided me a great opportunity to learn more about satellites and meet personnel working in the field."

"It was excellent and very informative."

"So much of this meeting went really well, and I am very glad I had the opportunity to participate. Thank you for making it happen, and I look forward to the next conference."

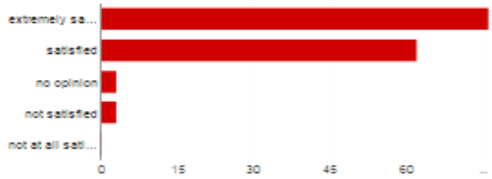
Chart G-6. Evaluation of conference organization:

Overall organization [7. Please rate each of the following aspects of the conference organization:]



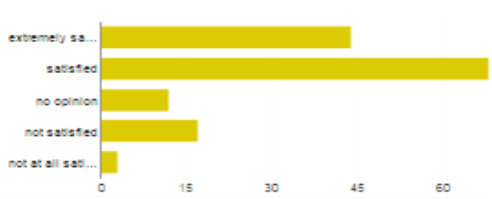
extremely satisfied	84	58.3%
satisfied	49	34%
no opinion	4	2.8%
not satisfied	6	4.2%
not at all satisfied	1	0.7%

Conference dates [7. Please rate each of the following aspects of the conference organization:]



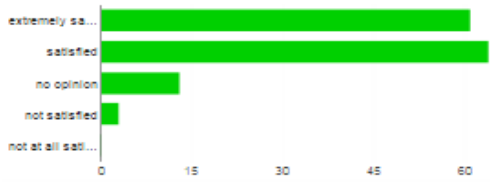
extremely satisfied	76	52.8%
satisfied	62	43.1%
no opinion	3	2.1%
not satisfied	3	2.1%
not at all satisfied	0	0%

Conference location [7. Please rate each of the following aspects of the conference organization:]



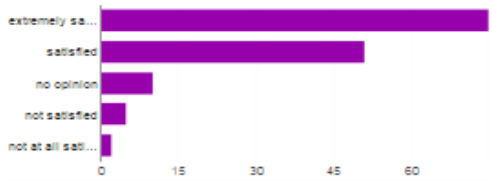
extremely satisfied	44	30.6%
satisfied	68	47.2%
no opinion	12	8.3%
not satisfied	17	11.8%
not at all satisfied	3	2.1%

Website [7. Please rate each of the following aspects of the conference organization:]



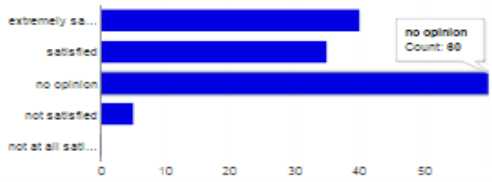
extremely satisfied	61	43.3%
satisfied	64	45.4%
no opinion	13	9.2%
not satisfied	3	2.1%
not at all satisfied	0	0%

Guest Speakers [7. Please rate each of the following aspects of the conference organization:]



extremely satisfied	75	52.4%
satisfied	51	35.7%
no opinion	10	7%
not satisfied	5	3.5%
not at all satisfied	2	1.4%

Special Sessions/Training [7. Please rate each of the following aspects of the conference organization:]



extremely satisfied	40	28.6%
satisfied	35	25%
no opinion	60	42.9%
not satisfied	5	3.6%
not at all satisfied	0	0%

Participants were also asked in a variety of ways to assess specific goals (outcomes) and overall effectiveness in terms of their personal experience at the conference (Chart G-7).

Nearly every participant identified that this conference improved their knowledge about user access, reception and readiness for data, technology and applications from current and future environmental satellite constellations (~56% Strongly Agree, ~35 % Agree).

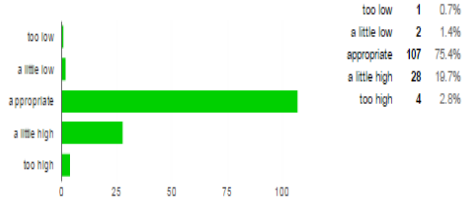
With respect to networking, participants expressed significant appreciation for the opportunity to "share expertise with others" and "discovered new ideas or people related to their work with environmental satellite products and/or services".

Chart G-7. Conference outcomes:

Participants were clear that the overall length of the conference (5 days), the amount of time available for poster and other sessions were appropriate (Chart G-8).

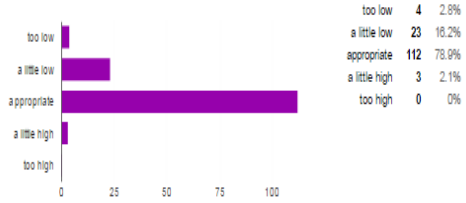
Chart G-8. Assessment of the amount of time dedicated

The overall length of the conference (5 days) was: [9. Please provide your assessment of the amount of time dedicated to each of the following agenda items relative to the goals and objectives of the conference.]



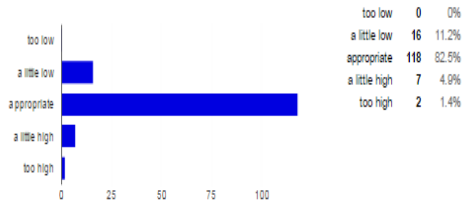
too low	1	0.7%
a little low	2	1.4%
appropriate	107	75.4%
a little high	28	19.7%
too high	4	2.8%

The amount of time available for Poster Sessions and networking was: [9. Please provide your assessment of the amount of time dedicated to each of the following agenda items relative to the goals and objectives of the conference.]



too low	4	2.8%
a little low	23	16.2%
appropriate	112	78.9%
a little high	3	2.1%
too high	0	0%

The amount of time allotted for the Exhibits was: [9. Please provide your assessment of the amount of time dedicated to each of the following agenda items relative to the goals and objectives of the conference.]



too low	0	0%
a little low	16	11.2%
appropriate	118	82.5%
a little high	7	4.9%
too high	2	1.4%

APPENDIX H Post-Conference Survey: Extended Responses

The original text format from the survey was maintained throughout content analysis, including original grammar, typos, and punctuation.

Question: What are the most important follow-up items/actions you hope will take place following the conference?

Publish the presentation material at your website, so that we can check on what we missed and what we want to know more in details. **[Available at http://satelliteconferences.noaa.gov/2015]**	**Presentations and posters**
Recommendation: NOAA should state their plans for GOES-R position, even if it's subject to change. This will help many users plan their hardware purchases, etc.	**GOES-R topics**
The new generation of GOES satellites, orbital positioning especially after its launch.	
NOAA report to users about the final position of GOES-R satellite.	
More information (training) to users in how to get and process new GOES-R data.	
To prepare Brazilian users for receiving and use GOES-R data.	
GOES-R transition information.	
What will the GOES-R position be?	
Training workshops with hands-on exercises on GOES-R and JPSS.	
Update news about the products and launching of GOES R.	
Users will get the new required GOES-R readout and processing systems in time for data receipt and product testing beginning as early as 3 months after launch.	
The stage of development of the facilities to receive the data of the GOES-R.	
Increased dialog among the users on preparations for imagery and products from the new satellites in particular GOES-R.	
Further discussion among the enterprise on back up capability for satellite data is of key concern to all. There was a lot of good discussion regarding data dissemination and the distribution network. There are obvious challenges with redundancy but this should be a key area of focus. With such vital data soon to be coming from GOES-R and other satellites and resultant high-reliance by decision makers, warning meteorologists, and others, it will be imperative to ensure the data flow is maintained for all products including the Global Lightning Mapper for all users especially NWS field offices.	
There may be opportunities to enhance data exchange between EUMETSAT and NOAA.	**International Topics**
Continued effective teamwork between national and international satellite programs.	
That region III and IV satellite working group will follow up on steps that were laid out at both meetings.	

To take advantage of the overall data distribution system of NOAA, mainly data in real time.	**Data access**
Heartfelt review of inordinate investment of time/resources to plan & execute an NSC, lessons learned, and return on investment(s) - and apply lessons learned for next event.	**Conference Logistics**
Planning for future sat users conferences begins earlier; the conference becomes annual (given how much is going on over the next few years, annual is appropriate)	
The main drawback to this conference was the early closing of registration and poster submission. There were plenty of seats in the conference facility, but many individuals tried to register and were not allowed to, since the maximum # was reached. In reality, many people register and only attend part of the conference, so the max # allowed should have been much larger.	
More science sessions to extract the participants from Europe and Asia.	
Geonetcast, transition from old to new generation, partnership in product development and validation	**Direct Readout**
DCS, its applications and management of hydrometeorological network.	
More talks from users, perhaps some more science content in the talks.	**Other topics**
Scheduling and giving follow-on satellite ground system capability demonstrations to US Government members as a result of the demonstrations we gave at the NSC.	
Actions to provide more NOAA satellite data in GIS friendly formats, this is critical to expand the user base. Expansion beyond input into NWP models as metrics will ensure broad NOAA satellite data awareness both on the hill and across the nation. Would also like to see how blended products cutting across multiple agencies build great value for the users. It is also very useful to hear from NOAA and other speakers various applications of satellite data for situational awareness and decision making.	
Interested in hearing feedback from NESDIS Workshop on Consideration of Commercial Data - held during Conference - would like to learn more about what was discussed and info shared. Suggest a distribution list when Congress asks for input on satellite related topics (such as frequency spectrum), more users can participate.	

Question: Were there any topics you did not feel were discussed in enough detail or should have been included in the agenda at the conference? If so, what were they?

Next time have forecast offices from other industry talk about how they use satellite data and make forecast: - International shipping - EXXON or other natural resource company - How do the large data partners store use and provide access to weather data. Example how does Google use weather and climate data
Disruptive technologies - low cost launches, cell phones spectrum for data transmission from satellites, commercial/gov't partnership successes and failures.
"Users" for this conference were all about the operational users, not all the users. Need to expand in this area for the next conferences.
Details on the science and new products being developed with NOAA instruments.
Direct reception of GOES-R and NPP should have their own oral or poster sessions.
I'm personally more interested in details of how the data is being (and will be) used, i.e., new algorithm and product development. I realize this is not the primary focus of this particular conference.
Techniques for developing RGB/HSB displays, including color theory for visualizations.
We need to hear from more users and less managers. It would have been nice to hear from NWS Pacific Region.
Potential geostationary data gap over the Indian Ocean.
Observing the reaction of the audience, I think you could schedule more time for the education session.
Excellent time allotted for poster sessions. Needed more time for some presentations, especially on Thursday (only 12-15 minutes) and Friday (only 10 minutes), and maybe a little less on Monday and/or Tuesday.
The military and NWS satellite applications was well received by all. I would have liked a little more on the use satellite data by private industry, and state and local govt.
Data fusion and applications regarding Suomi NPP, JPSS, and GOES.
In general, I think there were not enough science talks.
More talks from users, perhaps some more science content in the talks.
More science/algorithm working group discussions.
I'd like to thank you for a great conference. The user component on Friday was the most interesting/useful. There should be more focus here.
The user portion of the conference on Friday was especially enlightening and was a great way to wrap up the conference! In future years, expansion upon this idea might be beneficial to provide more key insight into how private sector, commercial companies, uses satellite data and the challenges they face.
There were a lot of presentations that did not present new information. Throughout the community there is a high awareness of GOES-R and NPP missions. What's missing is detailed status of individual algorithm teams.
The conference should focus less on presentations from government and more on presentations from other users. Particularly from academics, conversations on how NOAA satellite data is used would have been very interesting.
I would like to have seen more user presentations. The presentations were almost entirely from providers. I suggest a mix for each session of something like one user and three providers.
I don't think so. Remarkable agenda!
Would have appreciated a speaker from JAXA to talk about GCOM-C and -W missions.
Incorporation of nanosatellites.

Weather apps for smartphones - compile a list.
Best websites for obtaining satellite data - create a list.
Other NASA missions: ICESat-2, SMAP, Aqua, Terra, SWOT.
It would be interesting to know more experiences of Latin American countries regarding the acquisition of data and images and expectations of future changes in technology. It would also be interesting to have more technical training.
No speakers from Russia? Meteor M-N2 is a new polar orbiter transmitting LRPT on 137Mhz and perfectly receivable by Private Individual Users on a very small budget, but it was not mentioned at all?
Would like a little more detail in how products are used in numerical models, etc.
The presentations generally were pretty technical. It would be good, especially for the international attendees to have presentations that provide examples of how NOAA satellite data can address international needs/requirements. Perhaps an international users' session that calls upon the international attendees to provide input prior to the conference indicating their concerns, requirements, and questions about using satellite data so this session can address them directly. In general, NSC did not have sessions for in-depth science exchange. It was run like a user workshop. In this aspect, STAR scientists prefer to attend the EUMETSAT and Asia satellite conferences since they can get more opportunity to talk to their peers
Needed more viewpoints from the operational users, i.e. meteorologists. Information on how to get data/images via websites or google map type sites would be beneficial. Not everyone has the equipment, budget, computing power, or expertise to get the raw data.
Maybe, specific workshops will be very useful, for instance, for scientific algorithm aspects (winds, precipitation, classification, lightning,.....) and technical issues, as pre-processing, hardware, reception, etc.
Needed capacity for more participants.
Multi-source data exploitation.
It will be interesting to see the explosion of visualizations and data mining activities associated with GOES-R and Himawari.

Questions: Additional thoughts

Having a commercial data meeting during the conference was very useful in telling industry and academia what the senior NESDIS management was thinking about for the future.	**General comments**
This was a convenient and very nice venue.	**Venue**
Certainly NSC has reached a large attendance scale and I STRONGLY RECOMMEND A LARGER VENUE next year!	
Increase the venue size based on this excellent response.	
The Marriott Greenbelt was not an ideal location for the conference. Need to book the convention center with food available on-site.	
Hotel conference layout was not the best. Ideal would be conference venue and exhibit/poster sessions sharing a larger reception area. Don't know how easy it is to find the "ideal".	
I didn't like the location - there were no restaurants within a reasonable walking distance, and hotel food is overpriced and mediocre at best. Next time please find a facility that's closer to restaurant options. Recall that fed travelers were strongly discouraged from renting cars, so we had no transportation options other than by foot.	

The hotel was slightly outside the heart of the city but I didn't come for a vacation so that should not be a factor where the conference should be located, but it would've been nice to just step out and walk about DC.	**Venue (cont.)**
If the meeting is going to be held solely in a hotel (which is fine), the hotel should be closer to more things in walking distance, perhaps even in the District.	
Hotel was too isolated from sufficient off site meal choices.	
..We have outgrown Marriott, although they did a very good job.	
If you are going to hold this meeting in a hotel, it should be held within walking distance of numerous restaurants. The conference room was very cool on a number of days, and the slamming of doors was annoying. It would have been nice to have a larger room where people could have used their computers.	
Move the conference to the NOAA College Park Auditorium. Move social events outdoors if possible.	
I noticed there were few people from South America. Miami, FL was a much better venue, cheaper international flights, way better hotel, a shuttle bust to and from the airport, a shuttle bus to the local shopping mall, and it's Miami an incentive to go!	
Move the Conference back to Miami, FL!	
It would be pretty well to come back to Miami!!!	
Our international attendees were down in numbers due to the fact of the online conference option and location in Maryland. The conferences seemed much better attended in Miami.	
The hotel was very accommodating and the staff was friendly. Physically though the hotel is not a great location because it is fairly far from airports and the space is really poor for posters and exhibits. It is also too far from anything such as other options for food. It is very convenient though to stay in the hotel where the conference is held.	
Marriott did a great job is running a shuttle service to the Metro-rail station throughout the day.	
A better venue could be chosen. Perhaps NOAA could work with a Foundation to perform the logistics and organization aspect of the meeting which would allow for outside sponsorship to provide food/drinks during breaks and for (minimal) registration fees to be charged.	
For us DC-area residents, the conference location is convenient on one hand, but on the other it allows us to be distracted by issues back in our home offices too often -- suggest holding future conferences in other US locations.	
Why not put a third party face on the conference to overcome limitations?	**Logistics**
Consider using a third party to manage the conference -- then perhaps you can have other organizations sponsor special parts (e.g., coffee breaks, Ice Breaker, Dinner features, conference mementoes...)	
I think it would be a good idea to rotate this conference between CI as hosts (even if it's still in the DC area) so that you can charge a nominal fee and have refreshments and a hosted reception. Having a registration fee would give you some idea of how many people are actually coming so you can better anticipate the need for space.	
Facility was better this time, and should be even better next time. Need more room for posters & exhibits, all in one open space ideally (for each). Also, we HAVE to charge a registration fee to eliminate no-shows (and thus, turning	

people away when 600+ sign up for free) and provide SOME coffee/breaks.	**Logistics (cont.)**
The attendance was limited so people who wanted to attend couldn't but then the conference room was half full or less. Where was disconnect?	
Given the current status for gov't attendance at conferences, not charging a registration fee was an excellent idea	
The Icebreaker should be held in the exhibit hall so that people can mingle through the exhibits while enjoying the drinks and refreshments. It would enhance the two-way conversations.	
Registration and forms. I found the lack of availability of paper versions of the forms to be a stumbling block. I had to register, etc. from my home PC because my organization computer wouldn't' let anything (e.g., links to the next registration page) get through the firewall."	
It would be good to have a place to sit outside. Just a couple of chairs and a table, maybe. Also, it would be much nicer if the accommodation was not in the same place as the meeting as it would be rather oppressive to be in one building for five days (with no seats outside!).	
Exhibitors did not have enough time to set up on Monday prior to Attendees visiting before the booths were completely set up.	**Exhibits**
Exhibitor set up should be all day on Monday, with exhibits opening on Tuesday and running through Thursday; dismantle on Thursday afternoon and/or Friday.	
Exhibit rooms were uncomfortable to visit (too small).	
Exhibitor rooms were small and uncomfortably hot with the air conditioning turned extremely warm.	
Perhaps more space for the vendors and displays as it was a little tight at times.	
For a five day Conference, Exhibits should close on Thursday at 12:00pm and should be open only during the breaks of the conference.	
The exhibitor space was much too small. It would be better to have a hotel that has a larger area dedicated to the exhibit hall.	
Booths were in small rooms with insufficient area to browse.	
We need to have a better location for exhibitors. In the past, there have been refreshment tables set up in the exhibit area to help encourage attendees to visit each exhibitor.	
The exhibits were broken into small rooms that looked cramped for the vendors.	
The exhibit hall was not very well located. Previously the exhibitor hall was outside the doors of the conference and attendees had to pass by exhibitors. This time they would have to go out of their way to visit us. Additionally some the exhibits had to be in smaller rooms that I understand were not frequented as much.	
The Exhibits area was more generous this time, but still was rather cramped space for ~36 exhibits -- have more exhibit space next time.	
Needed more space for the poster sessions. I would also recommend locating every other conference outside of the D.C. area.	**Poster Session**
Poster area was very cramped and not suited for discussions.	
If the number of science talks remains limited, then the space available to posters should be increased.	
The conference had very good poster sessions.	

And regarding the agenda: I know this is difficult, but it would be great to hear from the folks who actually do the work/research, as opposed to their managers' managers' manager. The high level talks are simply uninteresting and far too vague, and often the managers just don't know what they're talking about.	**Agenda**
Would like to see more panel discussions and open panel dialog. Could have panel discussions to close out each session (have 1 less presentation per session). Maybe a couple of breakout sessions for discussions would be good for next time.	
A full week every other year is very intense -- Think about doing this annually with a less-intense agenda.	
A non pdf electronic version (i.e. webpage) should have been an agenda option.	
There needs to be a lot more talks from users and fewer talks from administrators and system-level overview talks.	
Send out basic information about missions etc. prior to the meeting - that way, less time can be devoted to covering common knowledge.	
Have one day for Project Managers/high level management to provide an overview of their program, but also have a panel discussion after that to show how the programs interact.	
Excellent means to obtain an overall picture of the current status and nearer future plans for US environmental satellites. Useful information on non-US satellite programs as well.	
Maybe less speakers and more detail. Everything was high level.	
The sessions on the training/educational tools and resources available for satellite interpretation was absolutely excellent.	
The Wi-Fi access was horrible. Overall food options were limited, but I can't complain about the price!	**IT services**
Needed much better Wi-Fi in conference room.	
Wi-Fi was not acceptable, often dropping below dial-up speeds at 0.01 mbs (10K)	
Need more capable and reliable Wi-Fi access at the conference facility, regardless whether or not it is a commercial or government facility.	
Problems with Internet.	
The Wi-Fi at this meeting was too feeble to be of much good. The Wi-Fi frustrated me, and I eventually gave up on it. Also, in an ideal world, each member of the audience could sit at a table where they could set up a laptop (with access to power). Using a laptop on your lap is certainly doable, but not ideal for an entire week. Again, these are comparatively minor points.	
Bandwidth in a hotel is CRITICAL and must handle two connections per attendee (computer/tablet and phone). Having slow or non-existent bandwidth significantly impacts attendee's willingness to attend the entire week because they can't get work done during the conference.	

APPENDIX I Acronyms and Abbreviations

Acronym/Abbreviation	Definition
3PDS	Third Party Services
ABI	Advanced Baseline Imager
ACE	Advanced Composition Explorer
ACIO	Assistant Chief Information Officer
ACSPO	Advanced Clear Sky Processor for Oceans
A-DCS	Advanced Data Collection System (aka, Argos DCS)
AFWA	Air Force Weather Agency
AHI	Advanced Himawari Imager
AMR	Advanced Microwave Radiometer
AMV	Atmospheric Motion Vector
ASPB	Advanced Satellite Products Branch
ASRC	Arctic Slope Regional Corporation
ATMS	Advanced Technology Microwave Sounder
AVHRR	Advanced Very High Resolution Radiometer
AWG	Algorithm Working Group
AWIPS	Advanced Weather Interactive Processing System
Cal/Val	Calibration and Validation
CBU	Consolidated Back-up
CCSDS	Consultative Committee for Space Data Systems
CHUVA	Cloud Processes of the Main Precipitation Systems
CERES	Clouds and the Earth's Radiant Energy System
CI	Cooperative Institutes
CIRA	Cooperative Institute for Research in the Atmosphere
CG	Cloud-to-Ground
CGMS	Coordination Group for Meteorological Satellites
CIMSS	Cooperative Institute for Meteorological Satellite Studies
CLASS	Comprehensive Large Array-data Stewardship System
CMA	China Meteorological Administration
CNES	Centre National d'Etudes Spatiales
CO	Carbon Monoxide
CoE	Centres of Excellence
COMET	Cooperative Program for Operational Meteorology, Education and Training
COMS	Communication, Ocean and Meteorological Satellite
COSMIC	Constellation Observing System for Meteorology, Ionosphere & Climate
COSPAS	Cosmicheskaya Sistyema Poiska Avariynich Sudov
CPTEC	Weather Prediction and Climate Studies Center (Brazil)
CRADA	Cooperative Research and Development Agreement
CrIS	Cross-track Infrared Sounder
CS	Certification Standard
CSPP	Community Satellite Processing Package
CRTM	Community Radiative Transfer Model
DADDS	DCS Administration and Data Distribution System

DAR	Data Access Request
DB	Direct Broadcast
DCS	Data Collection System
DDS	Data Distribution Service
DE	Detection Efficiency
DMSP	Defense Meteorological Satellite Program
DNB	Day Night Band
DOD	Department of Defense
DOE	Data Operations Exercises
DRL	Direct Readout Laboratory
DSCOVR	Deep Space Climate Observatory
DSS	Decision Support Service
DORIS	Precise Orbit Determination System
ECMWF	European Center for Medium range Weather Forecasting
EDR	Environmental Data Record
ELT	Emergency Locator Transmitters
EMWIN	Emergency Managers Weather Information Network
EPIC	Earth Polychromatic Imaging Camera
EPIRB	Emergency Position-Indicating Radio Beacon
EPS-SG	EUMETSAT Polar System-Second Generation
ESPC	Environmental Satellite Processing Center
ESPDS	Environmental Satellite Processing and Distribution System
ESSD	Environmental Scientific and Services Division
ETO	Education and Training Office
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
EWS	Early Warning Systems
EXIS	X-Ray Irradiance Sensor
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FSO	Forecast Sensitivity to Observations
GEO	Geosynchronous Earth Orbit
GEOSS	Global Earth Observation System of Systems
GINI	GOES Ingest and NOAAPORT Interface
GLM	Geostationary Lightning Mapper
GNC-A	GEONETCast Americas
GNSS	Global Navigation Satellite System
GOES	Geostationary Operational Environmental Satellite
GOES-R	GOES-R Series
GOS	Global Observing System
GPM	Global Precipitation Measurement
GPS	Global Positioning System
GPSP	GPS Payload
GRB	GOES-R Rebroadcast
GSI	Gridpoint Statistical Interpolation
GVAR	GOES Variable Data Transmission format
HAB	Harmful Algal Bloom
HRD	High Rate Data

HRIT	High Rate Information Transmission
I2	Internet2
IASI	Infrared Atmospheric Sounding Interferometer
IC	Intra-Cloud
INPE	National Institute for Space Research (Brazil)
INSIVUMEH	National Institute for Seismology, Vulcanology, Meteorology and Hydrology
IPOPP	International Polar Orbiter Processing Package
IROWG	International Radio Occultation Working Group
IRS	Indian Remote Sensiing
ISRO	Indian Space Research Organization
JASON	Joint Altimetry Satellite Oceanography Network
JAXA	Japan Aerospace Exploration Agency
JCSDA	Joint Center for Satellite Data Assimilation
JMA	Japan Meteorological Agency
JPSS	Joint Polar Satellite System
JRE	Joint Radiation Experiment
JTWC	Joint Typhoon Warning Center
KMA	Korea Meteorological Administration
L1b	Level 1b
LDM	Local Data Manager
LEO	Low Earth Orbit
LRA	Laser Retro-reflector Array
LRIT	Low Rate Information Transmission
LUT	Local User Terminal
McIDAS	Man Computer Interactive Data Access System
METOP	Meteorological Operational Satellite
MIRS	Microwave Integrated Retrieval System
MOD	Membership Outreach Database
MODIS	Moderate Resolution Imaging Spectroradiometer
MPLS	Multiprotocol Label Switching
MSG	Meteosat Second Generation
MTG	Meteosat Third Generation
NASA	National Aeronautics and Space Administration
NCEI	National Centers for Environmental information
NCEP	National Centers for Environmental Prediction
NDE	NPP Data Exploitation
NESDIS	National Environmental Satellite, Data, & information Service
NGDC	National Geophysical Data Center
NHC	National Hurricane Center
NISTAR	National Institutes of Standards and Technology Advanced Radiometer
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and atmospheric administration
NOS	National Ocean Service
NPP	National Polar Orbiting Partnership
NRENS	National Research and Education Networks
NSC	NOAA Satellite Conference
NUCAPS	NOAA Unique CrIS/ATMS Processing System

NWP	Numerical Weather Prediction
NWS	National Weather Service
NWSTG	National Weather Service Telecommunications Gateway
O2R	Operational System to Research
OAR	Office of Atmospheric Research
OCC	Ocean Color/Chlorophyll
OFCM	Office of the Federal Coordinator for Meteorology
OMPS	Ozone Mapping and Profiler Suite
OSAAP	Office of system Architecture and Advanced Planning
OSE	Observing System Experiment
OSGS	Office of Satellite Ground Services
OSPO	Office of Satellite and product Operations
PDA	Product Distribution and Access
PFO	Polar Follow On
PHA	Pulse Height Analyzer
POES	Polar Orbiting Environmental Satellite
RA	Regional Association
RBI	Radiation Budget Instrument
RFI	Radio Frequency Interference
RO	Radio-Occultation
ROSES	Research Opportunities in Space and Earth Sciences
RTSWnet	Real Time Solar Wind Network
SAR	Search and Rescue
SAR	Synthetic Aperture Radar
SARP	Search and Rescue Processor
SARR	Search and Rescue Repeater
SARSAT	Search and Rescue Satellite-Aided Tracking
SBN	Satellite Broadcast Network
SBUV	Solar Backscatter Ultraviolet
SDR	Sensor Data Record
SEISS	Space Environment in Situ-Suite
SFTP	Secure File Transfer Protocol
SHyMet	Satellite Hydrology and Meteorology
SIDAR	Solar Irradiance, Data and Rescue
SMD	Stored Mission Data
SMN	National Meteorological Service (Argentina)
SO2	Sulfur Dioxide
SOO	Science and Operations Officer
SPSD	Satellite Products and Services Division
SRSOR	Super Rapid Scan Operations for GOES-R
SSEC	Space Science and Engineering Center
SST	Sea Surface Temperature
STAR	Satellite Applications and Research
SUA	System Use Agreement
SUVI	Solar UV Imager
TGRS	TriG GNSS-RO System
TSIS	Total & Spectral Solar Irradiance Sensor

UKMO	UK Meteorological Office
UV	Ultraviolet
VADM	Vice Admiral
VHS	Vegetation Health Suite
VIIRS	Visible Infrared Imaging Radiometer Suite
VISIT	Virtual Institute for Satellite Integration Training
VPW	VIIRS Polar Winds
WFO	Weather Forecast Office
WIGOS	World Meteorological Organization Integrated Global Observing System
WMO	World Meteorological Organization
WRN	Weather-Ready Nation
WSF	Weather System Flow-on

APPENDIX J VLab Summary/Pre-Conference Workshop

The WMO/CGMS Virtual Laboratory (VLab) and the WMO Space Programme organized, supported by NOAA as hosts, the WMO/NOAA Train the Trainer (TtT) Workshop on Satellite Data Access, Application, and GEONETCast Americas for WMO RA III/IV members. The 2-day workshop preceded the 2015 NOAA Satellite Conference (27 April – 1 May, 2015) in the same venue and covered the following topics:

- Introduction, general overview, and progress over the past 2 years of the GEONETCast - Americas (GNC-A) Data Dissemination System;
- GNC-A for emergency response and disaster management;
- Overview of training activities of the VLab and the Americas and Caribbean Regional Focus Group;
- User accomplishments and contributions;
- Update on Coordination Group on Satellite Data Requirements for Region III and IV;
- Training and data dissemination plans from the GOES-R and JPSS programs;
- Hands-on sessions displaying geotiff imagery with ILWIS and McIDAS-V software.

Introduction

Kathy-Ann Caesar, Paul Seymour, and Bernie Connell introduced motivation for the training event as a positive response to the efforts and resulting progress of GEONETCast Americas (GNC-A) system over the past two years and collaborative efforts between the WMO Coordination Group on Satellite Data Requirements (SDR), the NOAA GNC-A Coordination Group and the WMO-CGMS VLab training efforts. One of the recent successes highlighted was putting imagery in geotiff format on the GNC-A system. The agenda of the workshop has started to address the questions that have been brought forward by the SDR and the user community on data display and training. They include:

- What free or low cost software are available to view the imagery being broadcast over GNC-A?"
- Is there training on how to use the software?
- How can we prepare for the next generation of geostationary and polar-orbiting satellites?
- How can we use GNC-A for emergency response and disaster management?

All these questions relate to activities that help build capacity for users in RA III and IV.

WMO VLab

Kathy-Ann Caesar provided the status and new strategy of the WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab). She highlighted the success of VLab training events organized in 2014: 53 classroom events reaching 1000 participants, 13 online events reaching 1300 participants, and 41 regional focus group sessions reaching 1000 participants. Overall, there was participation from all WMO regions. While there have been welcomed increases in training and participants, there have continued to be challenges to delivering training due to low budgets, low number of personnel, and limited time dedicated to training. There are also ongoing challenges of internet

connectivity and technology. Despite these challenges, VLab remains committed to delivery of training and education events in satellite meteorology. In the immediate future the focus will be on the introduction of the new generation of satellite.

The GEONETCast –Americas data dissemination system – Introduction, general view, and progress over the past 2 years

Paul Seymour gave an overview of the GNC-A which included broadcast information; governance through the NOAA led GNC-A Coordination group, and enhancements to GNC-A since the NOAA Satellite Conference in 2013. After much preparatory work, enhancements realized on the system in March 2015 include adding the GOES-East sector imagery in geotiff format and in April of 2015, the addition of the US NWS International Services and Communications Systems (ISCS) and 3 hourly data from EUMETSAT which includes SEVIRI, ASCAT, and MPEF. El Salvador (MARN) has also been creating products within the country, and uploading to GNC-A so that it can be distributed to remote parts of El Salvador through GNC-A. They are also planning to start transmission of GFS model tiled grib data for two sectors: 1) coverage for the Caribbean, Mexico and Central America and 2) coverage for South America.

Diego Souza briefed on the Brazil SigmaCast Project which includes operational software based on JAVA and GIS that allows the user to view and perform simple analysis on imagery and products and combine them into layers. They have received funding for an ambitious project to install 23 stations in regional centres throughout Brazil. Training has already been developed to aid in the installation of the stations and interpretation of the data content.
There is a small but growing list of "National GNC-A Networks": El Salvador, Colombia, Costa Rica, Mexico, and Brazil. They promote data from the region that is for the region. Discussion centered on how we can continue to build these networks to better determine and address user needs.

GEONETCast from a GEO perspective

Angelica Gutierrez described activities of the Group on Earth Observations (GEO) and how GNC-A can benefit member countries by making available Earth observations across multiple societal benefit areas. Many of the reasons parallel what the SDR Coordination Group has identified: inexpensive real-time access to imagery and products, particularly in areas with poor internet connectivity, backup access for emergency preparedness and disaster response, and low cost software to view the imagery and products.

Regional focus groups and training

The WMO VLab Regional Focus Group of the Americas and the Caribbean has been running monthly virtual briefings for over 11 years. The briefings made use of VISITview software to present GOES and POES satellite imagery from CIRA and GoToWebinar for voice communication over the Internet. During 2014, participants from the U.S. included: CIRA, the NWS Weather Prediction Center (WPC) International Desk at NCEP, NWS/OCWWS Training Division, the UCAR/NWS International Activities Office, and UCAR/COMET. Thirty countries outside the US participated: Algeria, Antigua and Barbuda,

Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Cayman, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Germany, Grenada, Haiti, Honduras, Jamaica, Netherland Antilles, Panamá, Peru, Poland, St. Kitts and Nevis, St. Lucia, Trinidad and Tobago, Suriname, and Uruguay. M. Davison at the NCEP International Desk led the discussions. Participants offered comments for their regions and tended to also bring interesting questions to the discussion. The number of countries participating each month ranged between 7 and 23 (average 10); and the number of participants each month ranged between 11 and 69 (average 27).

Mike Davison pointed out that this is a cost effective way to train. It brings experts and users together and exposes all participants to new products and proper application of the "tried and true." Having one person to deliver the briefing and one person to monitor the communications and audience has worked well. Mike would like to continue to evolve from a somewhat passive briefing to more active hands-on training. What would be helpful is viewing higher resolution GOES and POES imagery and exploring more RGB data and imagery. We have often thought about the best ways to motivate users to present mini case studies. They learn while they are preparing the case and they also learn and help others learn when they present the case.

José Galvez, who works closely with Mike Davison at the International Desk expressed interest in having visitors to the desk present their case studies at a monthly session or in addition to a monthly session.

Other ideas include having guest lectures from the Centres of Excellence. Gloria Pujol offered to present a session related to volcanic ash detection. We will pursue these ideas to get more user involvement. The link to GNC-A could be making the recordings available through the training channel.

Satellite data processing and visualization software (ILWIS & McIDAS-V)

This hands-on session was designed to introduce the users to three free software packages that can be used to view, analyze, and mosaic the GeoTIFF imagery that is now being sent through GNC-A. This was in response to comments received 2 years prior at a similar Train the Trainer event as well as through responses to surveys conducted by the SDR Coordination Group.

Diego Souza first presented the ILWIS software and led the group through a tutorial to import the GeoTIFF infrared images, apply a map and a pre-made color table, retrieve the physical variable (degrees Kelvin) from a pixel and convert that value to another unit (degrees C). The participants then worked in groups of 3-5 individuals to run through the same tutorial. Next Diego presented a tutorial on how to mosaic or stitch together imagery from more than one satellite (GOES and SEVIRI for example) using the software GDAL. The participants also worked through this example in small groups

Bernie Connell then presented similar instructions to perform the same functions utilizing the McIDAS-V free software: import the GeoTIFF infrared images, apply a map and a pre-made color table, retrieve the physical variable (degrees Kelvin) from a pixel and convert that value to another unit (degrees C).

In both the McIDAS-V and ILWIS software packages, procedures can be saved and rerun, allowing for fast retrieval and viewing of datasets whose characteristics do not change over time. All software and imagery were preloaded on the computers to maximize the time the participants had to work on the examples.

In working with the GeoTIFF imagery, the instructors noted that if the header information was available in the GeoTIFF file, it was not being read by the software. This is one aspect that will enhance the ability to time sequencing of the images being viewed and needs to be looked in to further. This will be taken forward as an action item.

After working on the examples, many participants expressed interest in having these training efforts improved upon and continued both virtually and through face to face training. This will be taken forward as an action item.

User Input, accomplishments, and needs: El Salvador

El Salvador and many countries in Central America appreciate access to real-time GOES imagery and they understand the importance of training to realize the benefits of satellite image interpretation. After the devastating effects of Hurricane Mitch in 1998, USAID funded a project through CIRA to install systems that ran McIDAS software to automatically download imagery from a server and display the imagery in loops on the computer. As the systems got old and were not replaced due to high costs of the full McIDAS software and declining budgets, many offices were wondering what to do.

In El Salvador, Juan José Amides Figueroa found out about the free version of McIDAS (McIDAS-V) and started working with it to perform similar functions as the older system as well as new functions - overlay surface observations and model output fields. Besides having this function in the central office, El Salvador wanted to share the same imagery, observations, and models fields with remote offices. Juan José embarked on the SAAPIS-HD (Sistema Automatizado de Adquisición y Procesamiento de Imágenes Satelitales y productos meteorologicos en High Definition, and in English: Automatic System for Acquisition and Processing of Satellite Imagery and meteorological products in High Definition) project. During the meeting he presented an excellent overview and showed satellite imagery and model output produced for and shown on internal Internet. This was packaged and linked with GNC so that satellite imagery and locally produced model output can be broadcast, received, and displayed in remote parts of El Salvador. They currently use a public ADDE server for access to satellite imagery. Having found out of the capability to receive geotiff imagery through GNC and view it in McIDAS-V, he was excited to explore using geotiff imagery to replace/supplement what they receive through the Internet. This would help reduce their dependency on the Internet, be useful during normal operations as well as be useful during emergencies. Juan José was a recent visitor to the NCEP International desk. He showed examples of information he had gained and adapted during and after his visit. This included scripts he modified to subsect model data for local use.

GEONETCast-Americas for emergency response and disaster management – Recent experiences, fly-away stations, plans for the next year.

The recent experiences of Angelica Gutierrez and Paul Seymour from the Costa Rica volcanic eruption (February 2015) stress the need for coordinated effort to perform practice sessions on how to invoke the Disaster Charter and utilize the disaster channel that has been set up on the GNC-A system. When the eruption occurred in Costa Rica, the director of the National Hydro-Meteorological Office in San Jose, Costa Rica (Juan Carlos Fallas), who is also the principal of GEO, a GNC-A user, and who provides support to the disaster office in Costa Rica, contacted Angelica through the Costa Rica embassy in Washington, D.C. The request was then relayed to from various groups within NOAA to assist in assessing the dangers of the eruption. Formal mechanisms and procedures were not in place to allow the delivery of the imagery to the Hydro-Meteorological Office via GNC-A in a timely manner.

Argentina also recently experienced the effects of ash from volcanoes erupting in Chile and Estela Collini mentioned that they too need to work with GNC-A more to be able to distribute products that they create and receive products in the field.
After discussion, an action proposed by the group was to plan, set up, and perform a test run with at least one country over the coming year. Candidate countries currently with GNC-A capabilities and include Costa Rica, El Salvador, INPE in Brazil and CONAE in Argentina. Other countries and Hydro-Meteorological Services that are expected to have functioning GNC-A stations within the next year and may want to participate in the test run include Belize, Barbados, Colombia, the Argentina Hydro-Meteorological Service and Mexico.

Diego Souza briefed on an inexpensive generator-powered portable or “fly away” GNC-A station that the Brazilians are looking into for disaster relief efforts. The desired characteristics of the antenna include: rapid deployment, lightweight with compact packaging, stability in wind, reliability, minimal maintenance, capability to perform fine as well as quick adjustment of azimuth and elevation, and minimal tools required for setup. A commercial version of the setup was quoted at $20K US. A low cost alternative, which sacrificed the capability to perform fine as well as quick adjustment of azimuth and elevation and stability in wind, might be possible for under $100 US. (Bernie’s comment: for that cost it would be worth trying just about anywhere!)

Update from the Coordination Group on Satellite Data Requirements for Regions III and IV

Luiz Machado, Co-Chair of the Satellite Data Requirements Coordination Group (SDR), and Stephan Bojinski summarized benefits of the SDR:

The group greatly aids in identifying and synthesizing user needs for satellite data, products and associated training, and assists in effective user-provider dialogue towards meeting these requirements. It helps find user-friendly and affordable cost-sharing arrangements for data access and distribution. Other areas that benefit include the preparation for the next generation of meteorological satellites, and support to operational services, application development, and capacity building in meteorology (weather and climate) in the Region. Being familiar with other groups inside and outside WMO, they are able to exploit

synergy with other users, applications and GEO Societal Benefit Areas. The goals of the SDR include standardization of Direct Readout Services, providing the opportunity to have locally produced products disseminated across the region, as well as promoting an integrated dissemination service.

Over the past 2 years, the group has had many accomplishments:

- Conducted 13 teleconferences
- Defined the Terms of Reference
- Recognized by the WMO RA III and RA IV
- Consolidated user requirements for satellite data access and exchange
- Proposed an optimized South America schedule for GOES 13
- Generated a GEO-LEO image mosaic to complement the new GOES schedule in southern South America
- Provided updates on GOES-R to users
- Plan activities for SDR and solve operational satellite and product issues

Training and data dissemination plans from JPSS and GOES-R

Mitch Goldberg, the NOAA Joint Polar Satellite System (JPSS) Program Scientist, talked about his vision to place direct receiving stations and data servers at critical locations around the globe to reduce data latency and provide timely data access to the users. In particular, he is encouraging the countries with ground receive stations to set up servers and share the imagery and products with others in their regions. He noted that a ground receiving station and data server will be placed at the University of Puerto Rico at Mayagüez during the next year. He voiced interest in supporting CIRA and the WMO VLab to hold training on how to access and utilize imagery and products that will be made available through the server.

Steve Goodman, the NOAA GOES-R Program Scientist, provided an update on the launch of GOES-R which is expected in the fall of 2016. He then went on to address the questions on everyone's mind: When will GOES-R become operational and where will it be placed? This is an important question for Regions III and IV as countries prepare to receive the new data, particularly if they plan on getting a relatively costly GRB receive station. They will need to start the process to acquire and install the new system now if GOES-R will replace GOES-East, but can potentially wait a year or two to install a new system if GOES-R will replace GOES-West.

NOAA's position is: "GOES-R will transition into operations immediately following an extended checkout and validation phase (approximately one year)." and "When GOES-R is launched in 2016 it will be placed in the 89.5° checkout orbit. It has not yet been determined where GOES-R will be placed in operational orbit. The final decision will be based on the health/safety/performance of the GOES constellation."

Steve offered further explanation on the health of the current GOES. One of the reasons why NOAA's answer is not more definitive and straightforward is that both satellites currently have degraded performance considerations. The current GOES-East satellite (GOES 13) has operational limitations for

Propulsion, the Space Environment Monitor, the Sounder (Filter Wheel), and the Solar X-Ray Imager. The Current GOES-West satellite (GOES-15) has operational limitations for the Attitude Control System (Star Tracker 1 is not operational), the Communication Subsystem, and the Sounder (Patch Configuration). Prior to when GOES-R becomes operational, the first satellite to reach its end of life fail will be replaced with GOES-14.

Steve also talked about the exciting new capabilities with the new GLM lightning mapper and collaborative experiments planned in South America.

Creating RGB imagery with VIIRS and SEVIRI imagery and linking to preparations for GOES-R. Hand-on session using McIDAS-V and ILWIS

The WMO VLab is a great place to share ideas; Red/Blue/Green (RGB) image combinations are frequently used to interpret multispectral satellite imagery; "McIDAS-V for Analysis and Visualization of EUMETCast data – Getting Started Guide" is an excellent guide that was put together by Hans-Peter Roesli for EUMETCast data.

For this session, we used this guide as a template and started adapting it for our user needs: to display multispectral VIIRS imagery with easily understandable instructions. Bernie Connell and CIRA colleagues worked with McIDAS-V and Diego Souza worked with ILWIS. While Diego was looking for information on how to create RGBs, he came across the GEONETCast Toolbox

Diego first gave a demonstration on how to use the GEONETCast ToolBox to create the natural colours and airmass RGBs and how to dynamically change the contribution for one of the colour bands. He also showed how to create the Normalized Difference Vegetation Index (NDVI). The participants were then engaged in groups to create their own Dust, Ash, and Convective RGBs as well as an NDVI image. Due to time constraints, Bernie reviewed the CLASS hand-on session very quickly. The case covered ordering GOES imagery. The tutorial is available and forms a basis for future training sessions on "How and where to access archive data for training cases." Next, she demonstrated the process of creating a Natural Colour RGB with VIIRS imagery for a recent case over northern Chile and Argentina. It nicely distinguished between snow, background, and low level cloud features. VIIRS image files are at high resolution (375 m and 750 m), hence can be quite large, and pose memory issues for McIDAS-V. McIDAS-V software is still being adapted and updated to view VIIRS imagery. This tutorial forms the basis for future training sessions and is guaranteed to be updated to reflect improved viewing of VIIRS imagery and products. Many of the channels available on VIIRS will also be available on GOES-R. VIIRS and other multispectral imagery can be used to prepare for GOES-R.

Recommendations identified during the event:

- Continue training, both virtual and in-person events, on the use of satellite data and associated visualization, processing and analysis tools.
- Update GeoTIFF header information to make the files more user friendly in software applications.

- Training should focus on preparing users from the Region on how to access and display new polar satellite imagery and products (JPSS for example).
- Training should focus on preparing users from the Region for GOES-R – both on what is new for GOES-R, and how to view the imagery and create products.

Agenda

25 April 2015	**Saturday**
09:00 am	Registration, Welcome, and Introductions – Bernie Connell, Paul Seymour, Kathy Ann and all.
09:30-10:00 am	WMO Virtual Laboratory for Education and Training in Satellite Meteorology Kathy Ann
10:00-10:30 am	The GEONETCast –Americas Data Dissemination System – Introduction and Progress over the past 1-2 years GEONETCast-Americas General view (data content, stations, hardware and software) Paul Seymour-Diego Souza
10:30-11:00 am	Break
11:00-11:30 am	Comments on potential use of GEONETCast from a GEO perspective And Discussion - Angelica Gutierrez and All
11:30-12:00 am	Regional Focus Groups and Training - Bernie Connell and Kathy-Ann Caesar
12:00-13:00 am	Lunch
13:00-15:45 am	Satellite data processing and visualization software (ILWIS & McIDAS-V): Demonstration with case data to import data, put on map, apply color table, simple calculations (i.e. converting from K to C). This will be followed by hands-on by participants with GEONETCast geotiff images. – Diego Souza, Bernie Connell, Rosario Alfaro, and Juan José Amides Figueroa
15:45-16:00 am	Wrap up first day – Bernie
26 April 2015	**Sunday**
09:00-10:00 am	User input, accomplishments and needs: Participant presentations and discussions El Salvador: Juan José Amides Figueroa All participants
10:00-10:30 am	GEONETCast-Americas for emergency response and disaster management – Recent experiences, fly-away stations, plans for the next year. Angelica Gutierrez, Diego Souza, Paul Seymour, Kathy-Ann Caesar, and Bernie Connell
10:30-11:00 am	Break
11:00-11:30 am	Coordination Group on Satellite Data Requirements for Region III and IV – Update – Dr. Luiz Machado, Stephan Bojinski
11:30-12:30 am	Comments on Training and Data dissemination plans from GOES-R and JPSS programs and discussion Steve Goodman, Mitch Goldberg
12:30-13:30 am	Lunch
13:30 – 15:45 am	Part 1: NOAA CLASS. How and where to access archive data for training cases. Part 2: Creating RGB imagery, NDVI, etc. with VIIRS and SEVERI imagery and linking content to preparations for GOES-R. Using McIDAS-V & ILWIS Software - demonstration and hands-on with case data Diego Souza, Bernie Connell, Rosario Alfaro, Dr. Luiz Machado, Juan José Amides Figueroa
15:45-16:00 am	Wrap up Bernie Connell and Kathy-Ann Caesar

APPENDIX K Sponsors

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