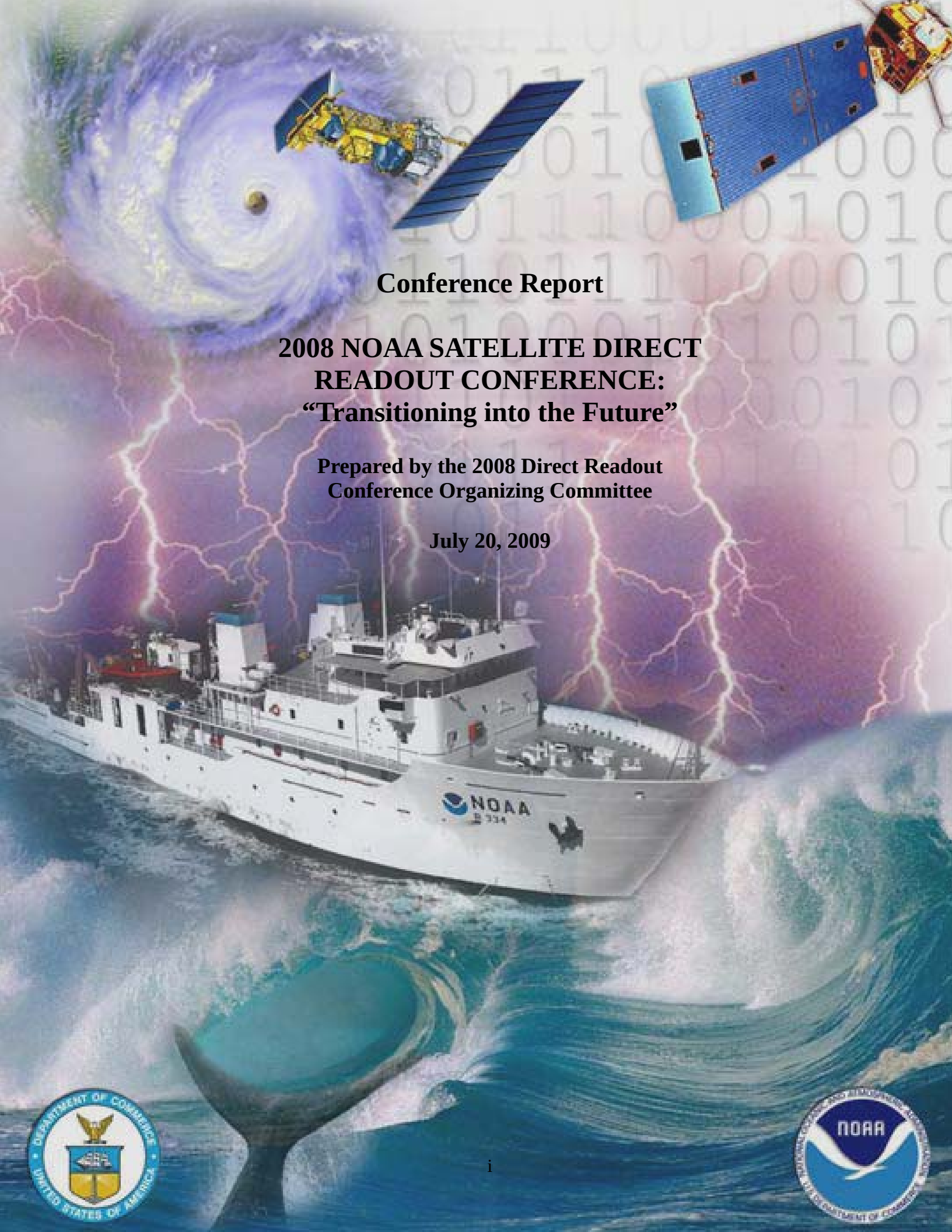

Conference Report

2008 NOAA SATELLITE DIRECT READOUT CONFERENCE: "Transitioning into the Future"

Prepared by the 2008 Direct Readout Conference Organizing Committee

July 20, 2009

2008 NOAA Satellite Direct Readout Conference: Transitioning into the Future
December 8 -12, 2008 Miami, Florida
NOAA Summary Report
Executive Summary

Background

The National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service (NESDIS) hosted the 2008 Satellite Direct Readout Conference: Transitioning into the Future, at the Hilton Miami Airport Hotel in Miami, Florida, December 8-12, 2008. This conference was primarily organized to benefit users of environmental satellite direct broadcast data and for those operating their own satellite data receiving stations. It also provided a forum to help NOAA customers prepare for upcoming changes in direct broadcasts from NOAA satellites. The 2008 conference continued discussions initiated during the 2002 and 2004 Satellite Direct Readout Conferences. This conference was organized to include all global users who receive data directly from NOAA's environmental satellites.

The success of the conference can be attributed to several government organizations that assisted NESDIS and made significant contributions in providing planning, financial, and meeting support. The contributing organizations included the GOES-R Program Office, the Integrated Program Office (IPO), NOAA National Weather Service, NOAA National Ocean Service, and the United States Geological Survey. The 2008 conference was the eighth in a series of cooperative international satellite user forums for Direct Readout users initiated by NOAA, NASA and the user community that began in 1980.

Objectives

The objectives of the conference were to ensure user readiness for upcoming changes to environmental satellite systems and to facilitate discussions and information sharing among environmental satellite operators, hardware and software vendors and the user community. The conference afforded users the opportunity to provide feedback on upcoming satellite changes, as well as engage in two-way communication with NOAA and NASA scientists and managers. It also provided NOAA the opportunity to inform users of the innovative new changes in direct readout technologies and new applications coming within the next decade.

Activities

Nearly two hundred participants from 25 countries participated in the conference. Some of them had participated in the 2002 and 2004 Direct Readout Conferences, while others had come for the first time. Conference participation included speakers representing NOAA satellite programs, representatives from other hydro-meteorological agencies, NASA, research organizations, universities, the WMO, and EUMETSAT.

The conference format consisted of seven sessions organized around the following topics: 1) international cooperation, 2) contributions of direct readout to the Global Earth Observation System of Systems (GEOSS), 3) current Polar and Geostationary Systems, 4) direct and re-broadcast satellite services, 5) satellite data applications and training, 6) the transition to the GOES-R and NPOESS series of satellites, and most importantly 7) user feedback sessions. Interactive focus groups and panel discussions were used to address specific topics such as the GEOSS, GOES-10

operations and a prototype receiver card developed for reception of LRIT/HRIT and EMWIN from current and future satellites. There were also opportunities for conference attendees to circulate through the vendor exhibits. For the first time, a poster session was added that attracted over 30 posters and displays. Conferees were asked to fill out an approved Satellite Direct Readout Survey and they were also able to post questions and comments on a large bulletin board.

Feedback Themes

A number of excellent ideas, suggestions and recommendations emerged from the conference plenary sessions, dialog sessions and breakouts. These ideas, suggestions and recommendations were grouped in four overall theme areas:

- Improve customer service and on-line information access including: help desk, web services, archives and training resources.
- Continue and expand outreach including: conferences, meetings, training sessions, opportunities for education, and suggestions for multi-language support.
- Improve direct readout and re-broadcast services including: LRIT, GOES DCS, Argos DCS, EMWIN, NOAAPORT, RANET and GEONETCast Americas.
- Expand outreach to and information resources for users on the transition of current Direct Readout and Re-Broadcast Services to the new generation of GOES-R and NPOESS series of satellites.

Summary and Conclusions

The 2008 Satellite Direct Readout Conference reaffirmed the value of targeted, user meetings and substantiated the need for continuing these types of conferences at regular intervals. Participants unanimously agreed that the conference was a success. Both NOAA managers and participants each took away a large volume of information that will benefit them and their organizations in preparing for satellite service transitions and new technologies. Overall, participants displayed a spirit of willingness to overcome obstacles and challenges in order to collaborate for the common good. The conference further helped identify common needs and areas for possible future cooperation as well as opening up idea-sharing for action planning. There was a general agreement that improved communications and information sharing among countries is an area that NOAA and the user community need to continue to address.

The future GOES-R series of geostationary satellites, the National Polar-orbiting Operational Environmental Satellite System (NPOESS), and European Space Agency's Metop series of polar-orbiting satellites represent major developmental efforts for NOAA and its partners. As such, user feedback to assist NOAA in its planning efforts is critical. Through feedback from this conference, many areas for improved coordination and cooperation have been identified such as gathering new requirements for broadcast systems, identifying potentially disenfranchised users, and technology sharing to aid in transition, as seen in the EMWIN/LRIT software-defined radio demonstration.

An important element of the Direct Readout Conference was the tremendous international participation generated. This was one of the key strengths of the conference. It provided a unique opportunity to bring together the users of environmental satellite data from around the world to work together. It is this spirit of international cooperation that enabled several important projects to become a reality. Examples include: GOES-10 support to South America, GEOSS in Americas, and

training symposiums held over the past two years in Argentina and Brazil. In the 2008 conference, NOAA managers clearly heard about the success of the GOES-10 move and how the region has benefited. There is a strong desire in the region to continue the program once GOES-10 is decommissioned in December 2009. Because of this feedback, NOAA will carefully examine the recommendations gathered during the 2008 conference and will report back to the user community over the next few months.

Several vendors displayed and demonstrated their products and services at the conference. Many of them made productive connections with the user community they support. Participants also experienced a live demonstration of the Envirocast Vision® TouchTable™ interactive satellite display system – a system NOAA helped develop and is currently using at its National Centers.

As NOAA moves closer towards significant changes in its satellite programs over the next decade, the need for interaction with Direct Readout users becomes ever greater.
Ongoing Direct Readout Conferences are a critical part of that effort and reflect NOAA's ongoing commitment to prepare the user community for these changes.

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The conference organizing committee would like to express its appreciation to the sponsors whose supported and made this conference possible. First of all, we would like to thank the NOAA participants, including the National Weather Service, the Satellite and Information Service (NESDIS) and its Office of System Development (OSD), Office of Satellite Operations (OSO), Office of Satellite Data Processing and Distribution (OSDPD), Office of International and Interagency Affairs (IIA) and the GOES-R Program Office. To the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Integrated Program Office (IPO) and the National Aeronautics and Space Administration (NASA), we offer our thanks for your funding, your support, and your participation. For the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) and the World Meteorological Organization (WMO), we offer our gratitude for your participation and for your support in assisting us in presenting a broader perspective of the future to a worldwide audience.

We would also like to thank all the other presenters for their contributions, particularly the many international partners who provided briefings and posters and participated in dialog sessions. In fact, we appreciate all of our international participants who have traveled from abroad to participate.

Playing an important leadership role in success of the conference were our session chairs: Kathy Kelly, Paul Seymour, Dave Benner, Tim Schmit, Tony Mostek, Charlie Baker, Hal Bloom, Dan Stockton, Brian Hughes, and Mark Mulholland. We'd also like to thank the Aerospace Corporation for the EMWIN/LRIT demo on Tuesday night and for Dave Jones, President & CEO, Storm Center Communications for being our banquet speaker on Wednesday night and providing and staffing the Envirocast Vision® TouchTable™ interactive satellite display system.

Finally, we wish to offer our gratitude to the many people on our Organizing Committee and our support staff, who provided their time and dedication to ensure that this conference was a success. We offer our appreciation to the session chairpersons for organizing interesting and exciting sessions, to all of our speakers and poster presenters who willingly shared their knowledge and experiences with us, and to the exhibitors for their outstanding exhibits. We also appreciated the excellent facilities and services provided by the Hilton Miami Airport hotel staff and by our Translation and Audio-Visual Support contractor, Seven Languages, Inc. Most of all, we wish to express our appreciation to those who participated, giving their time, attention, interest, and feedback to help us provide a smooth transition to new technologies over the next decade.

NOAA Organizing Committee:

Paul Seymour -	Conference Co-Chair, NOAA/Satellite and Information Service
Eric Madsen -	Conference Co-Chair, IAA/Satellite and Information Service
Tom Renkevens -	NOAA/Satellite and Information Service
Gary McWilliams -	NOAA/Satellite and Information Service
Tim Schmit -	NOAA/Satellite and Information Service
Kay Metcalf -	NOAA/Satellite and Information Service
Letecia Reeves -	NOAA/Satellite and Information Service

Nina Jackson - NOAA/Satellite and Information Service
Leesha Saunders - NOAA/Satellite and Information Service
Marlin Perkins - NOAA/Satellite and Information Service

Contract Support:

Dane Clark - Short and Associates, Inc.
Valerie Randall - Science Systems and Applications, Inc.

Additional On-site Support:

Alfreda Alexander - NOAA/Satellite and Information Service
Brian Hughes - NOAA/Satellite and Information Service
James Wydick - Satellite and Computer Systems, Inc.

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Introduction

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The success of the conference can be attributed to several government organizations that assisted NESDIS and made significant contributions in providing planning, financial, and meeting support. The contributing organizations included the GOES-R Program Office, NPOESS Integrated Program Office (IPO), a tri-agency team consisting of NASA, NOAA and Department of Defense, NOAA National Weather Service, NOAA National Ocean Service, and the United States Geological Survey. The 2008 conference was the eighth in a series of cooperative international satellite user forums for Direct Readout users initiated by NOAA, NASA and the user community that began in 1980.

The objectives of the conference were developed to ensure user readiness for upcoming changes to environmental satellite systems and to facilitate discussions and information sharing among environmental satellite operators, hardware and software vendors and the user community. The conference afforded users the opportunity to provide feedback on upcoming satellite changes, as well as engage in two-way communication with NOAA and NASA scientists and managers. It also provided NOAA the opportunity to inform users of the innovative new changes in direct readout technologies and new applications coming within the next decade.

Nearly two hundred participants from 25 countries participated in the conference. Some of them had participated in the 2002 and 2004 Direct Readout Conferences, while others had come for the first time. Conference participation included speakers representing NOAA satellite programs, representatives from other hydro meteorological agencies, NASA, research organizations, universities, the WMO, and EUMETSAT.

The conference format consisted of seven sessions organized around the following topics: 1) international cooperation, 2) contributions of direct readout to the Global Earth Observation System of Systems (GEOSS), 3) current Polar and Geostationary Systems, 4) direct and re-broadcast satellite services, 5) satellite data applications and training, 6) the transition to the GOES-R and NPOESS series of satellites and user services and most importantly, 7) user feedback sessions. Interactive and panel discussions were used to address specific topics such as the GEOSS, GOES-10 operations and a prototype developed for reception of LRIT/HRIT and EMWIN on current and future satellites. There were also opportunities for conference attendees to circulate through conference and vendor exhibits. For the first time in the history of the direct readout conference, a poster session was added that attracted over 30 posters and displays. Conferees were asked to fill out an approved Satellite Direct Readout Survey and they were also able to post questions and

comments on a large bulletin board called the “wall of wonder.”

In addition to keynote addresses, plenary sessions, a direct readout services showcase session, a poster session, and concurrent workshops, additional activities were scheduled to promote information sharing, networking, collaboration and problem solving. Government representatives were also available to speak with participants at the NOAA and NASA exhibits. During planned extended breaks, there were numerous opportunities to exchange information with colleagues and for open discussions with speakers and exhibitors. These multiple venues gave government managers and scientists excellent opportunities to hear directly from the user community.

Please note that presentations and a photo collection are available at both the conference web page (http://directreadout.noaa.gov/miami08/) or the Conference Tab on the OSDPD Web Site (http://directreadout.noaa.gov/miami08/)

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Session 1: Welcome and Keynote
Co-Chairs: Kathy Kelly and Paul Seymour

Introduction to the Session:

This opening session introduced the purpose of the conference and the organization of the agenda. Leaders from NOAA, NASA, WMO, and Environment Canada presented on the progress that has been made since the last Direct Readout Conference and provided information to the user community on current and future satellite programs and the need for users to prepare for the new series of satellites. They also highlighted international cooperation and the need for increased cooperation, as well as the need for feedback from both users and partners and the importance of this feedback in making decisions for the future of Direct Readout and satellite programs.

1.1 Conference Welcome and Logistics

Paul Seymour, Co-chair, Organizing Committee, Office of Satellite Data Processing and Distribution, NOAA Satellite and Information Service

Paul Seymour, the Co-chair welcomed the participants and presented conference logistics and information.

1.2 Conference Opening Remarks and Introduction

Kathleen A. Kelly, Director of the Office of Satellite Operations and Acting Director for the Office of Satellite Data Processing and Distribution, NOAA Satellite and Information Service

During her opening remarks, Kathleen A. Kelly, Director of the Office of Satellite Operations and Acting Director for the Office of Satellite Data Processing and Distribution, reviewed some of the major recommendations from the 2004 conference and some highlights of progress achieved since then. Some of the highlights include: the movement of GOES-10 over South America and the formation of an international GOES-10 Operations Committee, the successful training symposiums held in Brazil and Argentina, and successful projects to produce collaborative products, an example of which is the Hazard Mapping System. Another achievement is the GEOSS in the Americas initiative that has had two successful meetings. An outcome of GEOSS in the Americas is GEONETCast Americas which has now become operational. This service is a NOAA supported commercial satellite based broadcast for the purposes of distributing environmental products to all of the Americas. Another service is the Radio and Internet for the Communication of Hydro-Meteorological and Climate Related Information (RANET), a collaborative effort of many National Hydro-Meteorological Services, non-government organizations, and communities to make weather, water, and climate information available to rural and remote populations expanded into the Central America.
1.2_NOAA Direct Readout Conference Session 1.ppt

1.3 Keynote Address: NOAA Satellite Programs

Mary M. Glacken, Deputy Under Secretary for Oceans and Atmosphere and Acting NOAA Administrator

Mary Glacken, NOAA's Deputy Under Secretary for Oceans and Atmosphere, presented the Keynote address on NOAA Satellite Programs. She noted the vision and mission of NOAA and highlighted the contributions of satellite imagery and environmental products to the economy by issuing forecasts and warnings that mitigate the effects of natural disasters and other incidents such as tornado warnings, hurricane forecasts, aviation forecasts and by supporting monitoring efforts in meteorology, coastal regions, ecosystems and climate. She also briefed that while there have been many recent accomplishments, it will be a challenge to duplicate these advances within the current economic climate and that doing so will require engagement in partnerships with private enterprise, academia, international, government, and non- government organizations. It was also noted that NOAA strongly supports GEO: The Group on Earth Observation, and is an active contributor to the GEOSS. Two examples of this commitment is NOAA's support for the GEONETCast Americas Dissemination system and the SERVIR Project. Finally, it was also noted that an informed society is important to NOAA and that there are challenges remaining in choosing the correct path forward highlighting the need for input from all that are involved.
1.3_Glackin_Keynote_12-5-08.pptx

1.4 National Environmental Satellite, Data, and Information Service Welcome

Mary Kicza, Assistant Administrator, NOAA Satellite and Information Services

Mary Kicza, Assistant Administrator, NOAA Satellite and Information Services, presented an update of NOAA's satellite systems. She emphasized that NOAA is listening to satellite direct readout users about how to improve services. She went over the current geostationary constellation and noted that the next generation GOES-R launch is set for 2015 and will be a significant improvement over the older generation of GOES satellites. Ms. Kicza highlighted the importance of international cooperation with the current and future polar orbiting systems noting that the current POES and future NPOESS system are a partnership with EUMETSAT that will consists of NOAA 18, Metop-A, NOAA-N prime and the NPOESS satellite to be launched in approximately 2013. It was also noted that the Jason series of satellites was part of the NOAA-EUMETSAT partnership.

Ms. Kicza also explained the old paradigm of Earth observation, a combination of Earth observations with NOAA polar and geostationary satellites augmented by NASA research mission satellites, mainly to support weather forecasting and with ad hoc international exchanges of instruments, is changing to a new paradigm of an expanded mission, more conversion of NASA research missions to operations, international partnerships, and innovative commercial solutions. Other examples of NOAA's international partnerships are its participation in the Committee on Earth Observation Satellites (CEOS) now the coordination group for the space-based segment of the GEOSS, the repositioning of GOES-10 to supply geostationary imagery to the South America region, the GEONETCast Americas project, and Jason-2 developed with NASA, France and EUMETSAT.

In summary, Ms. Kicza stated that current NOAA satellite programs are healthy and the development of future systems is progressing. She reiterated the importance of users preparing for the new and increased data streams from the NPOESS and GOES-R series of satellites. She highlighted the fact that as NOAA develops the new satellite systems increased partnerships are becoming more important to bridge gaps and meeting new requirements and that partnerships, both

bilateral and international, will be required to coordinate the provision of satellite based observations for GEOSS.
1.4_Kicza_DRO_NESDIS_FINAL-1.ppt

1.5 National Weather Service Welcome

Dr. Louis W. Uccellini, Director, National Center for Environmental Prediction, NOAA National Weather Service

Dr. Louis Uccellini, Director, National Centers for Environmental Prediction (NCEP), NOAA National Weather Service, focused his presentation on how satellite data has improved NWS forecasts and warnings. Since the 1970's, satellite data has enhanced forecast advancements increasing predictability. We now have accurate 7 day operational predictions and forecasts. Global Low Earth Orbit (LEO) satellite data has been key to these improvements. Dr. Uccellini presented an example of a tornado outbreak predicted one week in advance as well as statistics showing hurricane accuracy improving from 1970 through 2006.

Dr. Uccellini stressed that satellite data has become essential to environmental prediction and the development of warnings. He noted that the global observing network is essential for all forecasts including ocean, atmosphere, land and cry sphere and that current numerical weather prediction uses 34 different satellite based data sets and that some products such as snow cover and sea ice rely on multiple data sets.

Dr. Uccellini also discussed the history of the uses of geostationary and polar imagery highlighting the different ways they are utilized. This led to a discussion on how the use of these imagery sets has blurred over the years. He also discussed the Joint Center for Satellite Data Assimilation (JCSDA) that was formed in 2002 as an interagency partnership for improving the application of satellite data.

In summary, Dr. Uccellini briefed that training is essential for success along with a balanced approach in regards to the use of computers, science and observations. There is a wide diversity of data that will challenge the data assimilation and modeling communities. There is also the need to be ready for NPOESS and the GOES-R systems "on day one."
1.5_UccelliniSatDirectReadoutMiami.ppt

1.6 National Aeronautics and Space Administration Welcome

Dr. Shahid Habib, Chief, Office of Applied Sciences, NASA

Dr. Shahid Habib, Chief, Office of Applied Sciences, National Aeronautics and Space Administration gave a presentation on the applications of satellite remote sensing. He briefed that accurate weather and climate predictions have become critical to the U.S. economy because weather and climate variability can have impacts of up to $100 billion a year in the U.S. Dr. Habib discussed the importance of monitoring Earth/atmosphere interactions as trace gasses are not accurately known but could contribute as much as 4 degrees to global warming.

Climate related disasters are growing faster than all disasters and increasingly, there is an inter-relationship between various hazards. Our success depends on our ability to provide decision makers with reliable and accurate information on the disaster. An example of a multi-disciplinary

approach to decision making is the SERVIR program at CATHALAC in Panama that combines satellite information with geographic information system products for the purposes of hot spot monitoring, disaster mitigation, urban studies, agriculture, fire detection, land cover/land use, forest monitoring, red tides, drought monitoring and climate change.

In summary, Dr. Habib stated that climate variability is important to understand and that there is an increasing need for trained people to handle the large amounts of data that will need to be assimilated. Satellite observations are critical to these issues. Satellite direct readout is a valuable investment for investigating regional or meso-scale problems with near real time data and provides a great opportunity for many nations to building their own capacity in Earth observations.
1.6_Direct Readout Dec 08 2008.pptx

BREAK

1.7 World Meteorological Organization (WMO) Space Programme

Jérôme Lafeuille, Chief of Space-based Observing Division, World Meteorological Organization (WMO) Observing and Information Systems Department

Jérôme Lafeuille, Chief of Space-based Observing Division, World Meteorological Organization (WMO) Observing and Information Systems Department presented a brief on the WMO Space Program. The goals of the WMO Space Program are to enhance space based observing systems, expand the benefits of space based products to WMO members, enhance timely access to data and products and build users' capacity to derive value from the observations.

Mr. Lafeuille discussed how there will be many new earth observing satellites launched in 2009 and that the WMO Global Space-Based Inter-Calibration System (GSICS) program has been formed to ensure consistency of datasets from different missions and operators. He also stated that since the vision for observing system through 2025 is now finalized, current actions and challenges include the need to transition several research and development systems to operations, work on coordinating polar equator crossing times, geostationary coverage over the Indian Ocean and continued coverage over South America beyond GOES-10.
Mr. Lafeuille also discussed the Integrated Global Data Dissemination Service (IGDDS) in the context of the WMO Information System. Digital Video Broadcast –S (DVB-S) based, broadcast systems are able to deliver time-critical data at low cost and with relatively simple receive stations. DVB-S systems like EUMETCast, FENGYUNCast and GEONETCast Americas are scalable and have a global data exchange capability. He also briefed that the RARS Program is the operational arrangements for the real-time acquisition of polar-orbiting satellite data over a wide region containing a network of direct readout stations and the rapid delivery of the data to the global user community through regional Processing Centres. Mr. Lafeuille stated that the South American RARS started in 2008 in Argentina and Brazil and that the global network should cover 80% of the globe in 2009 with all data to be on the GTS. He also stated that the RARS concept should be considered for ATMS and CRIS from NPP/NPOESS-C1.

Mr. Lafeuille also discussed the need for capacity building. He briefed that there are many resources on the WMO Space Programme web page (**www.wmo.int**) on the "Topics" and "Satellites" pages including: meeting dates and documents, reference docments and publications, summary satellite status (CGMS), instrument characteristics and many links to agencies, project websites and on-line

data. There are also training opportunities at the centers for training with the virtual laboratory sponsored by the various space agencies.

In conclusion, Mr. Lafeuille stated that there are many exciting space-based capabilities but that there are challenges to implement, sustain and use them and that cooperation is the key to success.
1.7_Lafeuille_WMOSpace Programme_ Miami-2008DRO-final.ppt

1.8 Global Earth Observation System of Systems (GEOSS) Overview

David Grimes, Assistant Deputy Minister, Meteorological Services Canada, Environment Canada

Mr. David Grimes, Assistant Deputy Minister, Meteorological Services Canada (MSC), Environment Canada (EC), presented an overview of the Global Earth Observation System of Systems, (GEOSS). Mr. Grimes stated that the Earth is a system of systems hence GEOSS is the Global Earth Observation System of Systems. The Group on Earth Observations (GEO) works to coordinate and sustain observation systems, provides easier and more open data access, and fosters use through science, applications and capacity building through GEOSS. GEOSS promotes interoperability arrangements, supports the understanding of how data are acquired and how they can be used. GEOSS supports geophysical data sharing principles: full and open data exchange within national policy frameworks. He also gave an update on the status of the GEO Portals and stated that data sets need to be registered so others can be aware of their availability. There is a web site for this purpose (http://www.geoportal.org/web/guest/geo_home).

Mr. Grimes described GEONETCast as another GEO supported project for promoting the near-real-time dissemination of satellite data, products, services and early warning. He mentioned that GEO BON is a the GEO supported Global Biodiversity Observation Network. Mr. Grimes stated that collaboration within the various Earth observing organizations is critical to the success and future use of satellite data applications with GEOSS as the regional initiative with more activities planned in the future.
1.8_Grimes 1 for Achache GEO Presentation (Final) Complete.ppt

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Session 1: Panel - GEOSS in the Americas
Co-Chair and Moderator: David Grimes

1.9 Panel - GEOSS in the Americas

The last event in Session 1 was the GEOSS in the Americas Panel discussion. The panel was moderated by David Grimes, Assistant Deputy Minister, Meteorological Services Canada, Environment Canada and Canadian GEO Principle. The panel members were:

Mary Glackin, Deputy Under Secretary for Oceans and Atmosphere, NOAA
David Grimes, Assistant Deputy Minister, MSC/EC (Canada),
Jerome Lafeuille, Chief, Space-based Observing Division, WMO,
Luiz Machado, Director, CPTEC, INPE
Albert Jones, Vice President, WMO RA IV

Mr. David Grimes began the panel with a presentation on the GEOSS in the Americas. He noted that Earth observations are critical to the Americas region as there is a large and diverse geography with tropical to high-Arctic ecosystems. He also noted that the area was vulnerable to natural disasters and had a varied communications infrastructure with some areas having inadequate internet access.

Mr. Grimes presented the goals of GOESS in the Americas, which are:

- Increase understanding of GEOSS in the region,
- Raise awareness about existing GEOSS in the Americas activities,
- Advance a dialogue about Earth observation opportunities, capabilities, and requirements,
- Identify and support new GEOSS implementation opportunities arising from regional priorities,
- Improve the utilization of Earth observations by strengthening partnerships,
- Encourage the use and exchange of data, and
- Engage additional countries and organizations in GEO and the development of GEOSS.

He also noted that the GEOSS in the Americas was launched in Washington by Argentina, Brazil, Canada, Chile and the U.S. in April 2007 and held the first organizing meeting in Sep 2007 in Brazil (GEOSS in the Americas Symposium 2007).

In summary, Mr. Grimes noted that GEOSS in the Americas is an important regional initiative contributing to the development and implementation of the Global Earth Observation System of Systems (GEOSS). The organization will build on the strong foundation of existing initiatives and activities of countries and organizations, while initiating new developments as appropriate. Collaborative activities and approaches with key regional organizations are essential to realizing success for GEOSS in the Americas.

The panel discussion began with remarks noting that there are and will be a variety of challenges to overcome, but also a lot of synergies. The U.S. supports the development of an Earth Observation roadmap for the Americas. It was noted that coastal applications are of increasing importance and that the ARGO system has 27 nations participating. The panel said that GEO should build on the good practices of existing programs, new ground stations will increase the satellite reception

footprint, and that Amazon deforestation monitoring is important. NOAA was thanked for repositioning GOES-10 in support of the South American countries.

The "small country" prospective was presented as originally looking at GEOSS solely from a political point of view. Unfortunately, many small countries and are struggling financially, so it is important to demonstrate the value of participation before getting the buy-in of the smaller countries. Fortunately, GEOSS decisions are not confined to political borders, but serve the community at large. Several questioners said that they had learned much about GEOSS from the panel that they will take back to their policy makers. One key point that was brought out was that capacity building is important to the small countries. Also, they would like to be a part of something that is working.

Regarding the interoperability of data, a question was asked about how the global community will be encouraged to participate in developing GEOSS. The panel's response was that there is a community that is working together (data and architecture committee) to understand what should be the standard. A best practices document is currently under development. It was added that a metadata data profile necessary for the larger user community is also under development.

On a related issue, an audience participant noted that there are so many data sets from various disciplines that there is a need for training in the use of the different data sets and asked whether training will that be a part of the program? Mary Glackin answered that NOAA recognizes that this is a problem and that NOAA is working with its partners in the region to provide training opportunities noting that NOAA worked with INPE in 2007 and CONAE 2008 in sponsoring trainings. The panel added that GEOSS brings a community of experts together and that even though challenges exist the expertise is there to provide solutions.

Another participant noted that Landsat imagery could be used for earthquake and landslide prediction. They wondered what GEOSS is doing to provide these kinds of data applications to the user communities. Luiz Machado of INPE noted that they were using new precipitation data to update their prediction models and that they are willing to share their experience with others. The panel noted that the sharing of how data sets can be used in new and unexpected ways was a key part to making GEOSS in the Americas a success.

A participant from the Pacific island region asked that since GEOSS was not present in the pacific islands, how could the island countries of the Pacific get involved in GEOSS? In particular, they want to strengthen their meteorological services. The panel recommended that any interested country could go to the GEO web site to find descriptions of the system and mechanisms for becoming a member. It was suggested that it seems to work bests if there is a proponent, a person or group, in the country who can champion joining GEO. One possible strategy would be to define focus areas and work with active GEOSS members to get started. The panel pointed out that those countries who are already members need to encourage non-members to join. It was noted that small countries have much to offer to GEOSS such as in the climate change area. It was emphasized that they do not have to bring anything in order to join. GEOSS is intended to link the many communities of practice together. Although, GEOSS and its goals are new, its intent is to work with other organizations to avoid duplication of effort. The only thing a country needs to agree to in order to join is the vision and the framework. There is a lot to gain by connecting experts together, allowing combinations of expertise and channeling of energies.

An audience participant asked whether there is a standard used to determine and declare when data are ready for operational use. The simple answer is that it is up to the provider to decide when it is

ready. Another participant asked that since GEOSS is to collect data that are already available, will GEOSS help other countries obtain the data that they need? The Panel's answer was yes. GEOSS is all about making as much data available as possible to the all those who can use it. It is up to the members to decide which data they need. The last questioner wanted to know about using alternate sources of data such as Weather Underground? The short answer is that again, it is up to the member countries to decide what data are to be used.

In summary, the GEOSS Panel noted that more work had to be done to reach more countries and communities of practice and that the best way to learn about new data sources and new data sets and their uses is through training. It was noted that training programs could and should be made available to the widest audience possible.
1.9_Grimes 2 Overview of GEOSS in the Americas (Final).ppt

2008 NOAA Satellite Direct Readout Conference: Transitioning into the Future
December 8 -12, 2008 Miami, Florida
Conference Report
Session 2: Current Satellite Systems/Instruments
Chair: Kathy Kelly

Session 2 reviewed the current suite of environmental satellites commonly utilized by Direct Readout users. Satellite program updates were provided for the NOAA GOES and POES series of satellites, the European Meteosat and Metop series of satellites and the Japanese MTSAT satellite. Also covered are the NASA EOS satellites and the NPP program. A presentation designed to inform users of the end-to-end process of getting satellite imagery from sensor to user covers the NOAA imagery reception and processing system that starts at the Wallops Island, Virginia and Fairbanks, Alaska Command and Data Acquisition Stations continues through the Satellite Operations Control Center in the NOAA Satellite Operations Facility in Suitland, Maryland and eventually through transmission paths to the user communities.

Keynote

Albert Jones, WMO Regional Association IV (North America, Central America and the Caribbean)

Albert Jones, keynote speaker session 2 was introduced by Kathleen Kelly, Session Chair and presented a talk on the conference theme of "Transitioning Into The Future: Global Satellites For Global Needs."

Mr. Jones reviewed the history and progress of direct readout services from environmental satellites beginning with the reception of graphic images on a facsimile machine and their use in the production of surface and upper air analyses. Mr. Jones remembered that "It took a lot of the guess work out of the equation as they prepared to give the best scientific prediction on weather and climate forecast." These products from the Geostationary Satellites were invaluable to the everyday operations of our Caribbean and Central American Weather offices. As a technician, I can remember the panic the forecasters had if the Facsimile receiver was not working, and they had to make a forecast the old way, just their locally generated charts." In later years, more useful imagery was received via direct readout from both geostationary and polar orbiting satellites via the WEFAX and APT broadcasts.

He also reviewed the contributions of having the GOES DCS services allowing for the transmission of reports from Automatic Weather Stations. The addition of this capability allowed his country, Belize, to add reports from offshore to their analyses; which was an improvement. He noted that currently, the data collection platforms transmit hourly that are very useful for the emergency managers that serve their communities and also discussed that more tidal stations are being added to the network of reporting sites that will also transmit their data via the GOES satellites. Mr. Jones also discussed the valuable services on the Polar Orbiting satellites including the APT direct readout service and the search and rescue capability. \

Mr. Jones notes that "Satellite data, be it from Geostationary or Polar Orbital, are an essential part of our everyday lives. We rely on satellites for most of our communication, be it entertainment or work. We therefore need good management of the data reception and dissemination. Regional centres are playing an increasingly important role in facilitating the distribution of satellite information. In our region in particular, Central America, the regional centre in Costa Rica and

CATHALAC in Panama provide great support to the region for Capacity Building as it relates to satellite information." He continued with the observation that the present is an exiting time in the satellite and research community and that everyone is anticipating the new data sources that will become available in the near future.

Mr. Jones speech is available in full at: Albert Jones Address to Conference.doc.
Albert Jones Sat Conference.pptx

NOAA Geostationary Operational Environmental Satellite (GOES) Overview
Chris Wheeler, NOAA Satellite and Information Service

Mr. Wheeler described the GOES mission including imagery for weather forecasting, environmental data collection and search and rescue that are directly applicable to direct readout users. He also described the GOES constellation including the on-orbit spare that can be activated within 48 hours and the current 3rd operational GOES satellite; GOES-10 that is stationed over South America. Along with the various imagers, Mr. Wheeler described the broadcast and direct readout services supported by the GOES satellite including GOES Data Collection System (DCS), Low Rate Information Transmission (LRIT), Emergency Managers Weather Information Network and the Search and Rescue Service. Also discussed were details of the scan strategy and current status of the GOES satellites and instruments. The future "flyout" schedule for the remainder of the N/O/P series of satellites was also briefed.
www.oso.noaa.gov/goes is website for more info.
2.2_Wheeler_GOES_Overview.ppt

European Organization for the Exploitation of Meteorological Satellites (EUMETSAT): Geostationary Satellites Systems
Michael Williams, Head of Control Centre Division, EUMETSAT

Highlights of Mr. Williams' presentation included an overview of the EUMETSAT ground segment detailing the data flow from satellite to acquisition, processing and transmission to users. He also detailed the evolution of the Meteosat series of satellites and presented information on the SEVIRI imagery and a comparison of imagery between Meteosat 7 and Meteosat 8 and SEVIRI Data.

He also described the product architecture system and the EUMETCast product and imagery distribution system which has 2600 user ground stations including 50 for the EUMETCast Americas broadcast. The "Product Navigator" was introduced as the way to discover data in the EUMETSAT system. This system is available on the EUMETSAT Web Site that will soon be broadcast on all of the GEONETCast Services.

Mr. Williams also detailed the Meteosat third generation (MTG) satellite concept. This includes the Flexible Combined Imager (FCI), Lightning Imager (LI), Data Collection System (DCS) and Search and Rescue (GEOSAR) instruments on Infrared Sounder (IRS), Ultra-violet and Visible and Near Infrared Sounder (UVN) on the MSG-S or sounder satellite.

In summary, Mr. Williams briefed that EUMETSAT had achieved 30 years of continuous operations since 1977.
EUMETSAT Web Page - http://www.eumetsat.int/Home/index.htm

2.3_Williams_EUM_GEO3.PPT

Status of the Japan Meteorological Agency Multi- functional Transport Satellite (MTSAT) Series

Mark Mulholland, Deputy Director, Office of Systems Development, NOAA Satellite and Information Service

Mr. Mulholland briefed that there are two MTSAT platforms; MTSAT-1R and MTSAT-2. The satellites capture one visible and four infrared channels. Primary missions include cloud distribution and motion, sea surface temperature and water vapor extent. Both the LRIT and HRIT standards are currently used for direct readout. Data Collection Platforms are also supported as well as a special mission for the Japanese Civil Aviation Bureau. Also noted was that Northern Hemisphere images are recorded every 30 minutes; a doubling over previous rates and that there have been nearly 100,000 observation sets collected monthly. A highlight of the brief was the statement that "MTSAT provides information to 27 countries and territories in the region.

Future plans were briefed including the follow-on to MTSAT-2 that will be launched in 2015. The imagery is planned to be a GOES-R ABI or MTG FCI. At that time, HRIT and LRIT services will be discontinued and distribution will be transitioned to the Internet. It was also briefed that the DCS mission will be continued.
2.4_Mulholland_MTSAT_Pitch_Final.ppt

Polar-orbiting Operational Environmental Satellites (POES) Overview

Cindy Hampton, NOAA Satellite and Information Service

Highlights from this presentation included an overview of the history of NOAA polar orbiting satellites from the NASA TIROS N satellite through NOAA 18 (N) representing continuity of operations since the early 1960's. The current constellation was briefed highlighting the cooperative effort between NOAA and EUMETSAT begun in May 2007 resulting in the combined current constellation consisting of NOAA POES and EUMETSAT Metop satellites. It was noted that this effort, currently the Initial Joint Polar System, will continue into the NOAA NPOESS era.

Ms. Hampton also reviewed the direct readout services resident on NOAA POES satellites including High Picture Resolution Picture (HRPT), Automatic Picture Transmission (APT), Data Collection ARGOS and Search and Rescue system. The High Picture Resolution Picture (HRPT) service provides worldwide direct readout of full-resolution spacecraft parameters and instrument data to ground stations within the footprint of the NOAA polar orbiters. It was noted that HRPT transmissions contain data from all instruments aboard the NOAA polar satellites. The Automatic Picture Transmission (APT) service downlinks smoothed 4-km (2.5-mi)-resolution IR and visible imagery derived from the AVHRR/3 instrument and transmitted within the footprint of the NOAA polar orbiters. The Data Collection ARGOS system collects and relays scientific data from around the globe. The environmental data comes from instruments aboard remote platforms that transmit directly to the spacecraft. These datasets come from a wide range of applications and are used throughout scientific research and educational applications. The Search and Rescue (LEO) service relays distress alerts from aviators, mariners and land-based users. Annually, approximately 250 persons are rescued in the United States annually through this cooperative effort between NASA, NOAA, the U.S. Air Force and the U.S. Coast Guard. It was noted that approximately 38 countries

participate in program internationally.

The pending launch of the NOAA-N Prime satellite was also discussed. It was noted that the launch is planned for February 4, 2008 from Vandenberg AFB California (Note: as of the writing of this report the NOAA-N Prime satellite was successfully launch into orbit). This satellite will be place into a similar orbit to NOAA-18 – LTAN 2:00 PM. Some changes from the NOAA-18 platform include an advanced DCS System with a new deployed antenna and with a frequency 465.9875 MHz, an upgraded Search and Rescue Processor (SARP-3) that will provide Search and Rescue capabilities, and an upgraded Inertial Measurement Unit.

The health of the NOAA POES system was also discussed with a status on all of the satellites. It was noted that NOAA-14 was decommissioned on May 23, 2007 due to multiple system problems and that NOAA-12 was decommissioned on August 10, 2007 due to a power failure.

For current status, go to www.oso.noaa.gov/poesstatus.
2.5_Hampton_POES Overview.ppt

European Organization for the Exploitation of Meteorological Satellites (EUMETSAT): Polar Orbiting Satellite Systems

Michael Williams, Head of Control Centre Division, EUMETSAT

Mr. Williams highlighted the contribution of the Metop-A satellite. He explained the Metop-A's role in the Initial Joint Polar System (IJPS). He briefed that there are currently two planned follow-on missions to Metop-A; Metop-B in 2012 and Metop-C in 2016. He also highlighted EUMETSAT's role in the coordinated program explaining the exchange of instruments between programs; (ATOVS from NOAA, MHS from EUMETSAT) and the coordination of operations, data and services.

Along with an explanation of the sensors aboard the spacecraft including examples of products from the AVHRR, ATOV, HIRS, and GOME, he reviewed the Metop-A direct readout services. He explained that the Low Rate Picture Transmission (LRPT) service on Metop-A has been discontinued due to the in-flight failure of the nominal amplifier unit. He also noted that the redundant unit causes interference to the HIRS sensor. The decision has also been taken that the LRPT service will not be activated on Metop-B & C. Also briefed was the status of the High Rate Picture Transmission service or HRPT. The HRPT service is being operated over a restricted geographic area as the instrument design has been found to be very sensitive to heavy-ion radiation. A partial reactivation scenario that involves switching the HRPT on when entering areas of lower heavy-ion density has been implemented. He explained that the current operations area is over Europe and the North Atlantic during North to South orbits. Mr. Williams also noted that both the Argos Data Collection System and Search and Rescue instruments are also flown aboard the Metop-A satellite.

Mr. Williams also noted that the EUMETSAT Polar System guarantees continuity for the mid-morning orbit and calibrated (level 1b, level 1c for IASI) instrument data products of all meteorological instruments and selected geophysical products (level 2) from the Ground Segment. Also noted was the availability of an archive service for all products for the life of the Metop mission. The planned 14 year length of the Metop mission should assure the user community of near-real-time and archive data services for meteorological and climate monitoring applications.

Also briefed was the status of the JASON mission that was successfully launched on June 20th 2008. The Jason instrumentation will provide precise altimetry measurements for use in marine meteorology and oceanographic services along with its main mission of climate change monitoring with respect to changes in the sea level and continuous altimetry data (in support of operational activities in marine meteorology, seasonal forecasting and oceanographic services.
2.6_Williams_EUM_LEO.ppt

Status of the National Aeronautics and Space Administration (NASA) Earth Observing System (EOS)

Patrick Coronado, NASA Direct Readout Laboratory

Mr. Coronado presented an overview of the EOS spacecraft; Terra, Aqua and Aura including a description of the entire EOS architecture. It was noted that all of the missions are operating nominally and are delivering excellent science products. It was briefed that although the Terra mission has experienced some problems, most instruments are functioning well at this time. It was also noted that a Senior Review was completed where the 2007 Terra proposal was rated highly and that the Terra mission life has been extended through 2011 and that a new 2009 proposal is due in March of 2009. It was also briefed that the Terra mission is in its 9th year of producing excellent science.

He also reviewed the Aqua mission noting that on May 4, 2008 Aqua passed its 6-Year Design Life anniversary with all sub-systems nominal and connected to the primary hardware. As with Terra, Aqua underwent a Senior Review, was rated highly and the Aqua mission has been extended until 2011. He also noted that during the Spring of 2009 a series of A-Train inclination adjust maneuvers will occur and then be repeated each year in the future. Also highlighted was that the Terra mission is in its 6th year of producing excellent science.

In summary, Mr. Coronado briefed that the Terra Flight Dynamics 2008 analysis indicated that Terra can continue science operations through ~ 2014 and that Aqua/Aura has sufficient propellant reserves to last until 2016; noting that these estimates we based solely on propellant usage and projected solar flux.

A daily contact schedule is posted with the Aqua and Terra scheduled Direct Broadcast turnoff times. The turnoff schedules are published at:
ftp://is.sci.gsfc.nasa.gov/ancillary/ephemeris/schedule/aqua/downlink/
ftp://is.sci.gsfc.nasa.gov/ancillary/ephemeris/schedule/terra/downlink/

Mr. Coronado also presented an update of the upcoming NPOESS Preparatory Project Mission (NPP). Highlights of this talk were that NPP launch would be delayed due to delays in the delivery of the VIIRS instrument. Also noted were that the CERES and OMPS instruments completed their instrument level activities in October and November and were delivered to the Spacecraft Facility on or before December. Also briefed was that the CrIS instrument integration was slated for January of 2009. The spacecraft has been modified to accommodate the CERES instrument and CERES was electrically and mechanically integrated. It was noted that no realistic schedule is available at this time.
The Direct Readout Website is at: http://directreadout.sci.gsfc.nasa.gov/
For Questions Regarding the Direct Readout Laboratory (DRL), Ground Station Capabilities, and

Software Availability contact Patrick Coronado at patrick.l.coronado@nasa.gov.
For Questions Regarding EOS Satellite Status/Mission Operations contact Angie Kelly at angelita.c.kelly@nasa.gov.
2.7_EOS-NPP Update DB Meeting Miami 2008-12-9.pptx

2.8 Update on the Coordination Group for Meteorological Satellites (CGMS)
Michael Williams, Head of Control Centre Division for EUMETSAT

Mr. Williams briefed that the CGMS was founded in 1972 by the European Space Research Organization (ESRO), NOAA and the Japan Meteorological Agency (JMA). Currently, EUMETSAT is the CGMS Secretariat. He noted that major objectives of CGMS include: the exchange of technical information on geostationary and polar-orbiting meteorological satellite systems including research and development missions, the harmonisation of meteorological satellite mission parameters and the encouragement of complementarity, compatibility and possible mutual back-up in the event of system failures. The CGMS holds annual plenary meetings with meetings of the four standing working groups: Telecommunications, Satellite Products including Satellite Winds, Contingency Planning and Global Data Dissemination. Major accomplishments relating to inter-agency cooperation include contingency planning, global data dissemination, increased space weather reporting, fire monitoring, GEONETCast and training.
More information on the CGMS can be found at:
http://www.wmo.int/pages/prog/sat/CGMS/CGMS_home.html.
2.8_Williams_CGMS2.ppt

Satellite Operations Control Center (SOCC) and Wallops Island and Fairbanks Command and Data Acquisition (CDA) Overview
Ms. Cindy Hampton and Mr. Chris Wheeler, of the NOAA Satellite and Information Services Office of Satellite Operations

Ms. Hampton provided an overview of the data flow between the GOES and POES satellites and the processing of the imagery at the Command Data Acquisition Facilities. She provided a brief on the NOAA Satellite Operations Facility in Suitland, Maryland that provides command and control functions for the GOES, POES and DMSP satellites and also the Jason-2 platform on a continuous basis. Data acquisition, spacecraft navigation, spacecraft commanding, platform health and safety monitoring, orbit determination, mission scheduling, anomaly response and resolution and trend monitoring are all functions performed at the NSOF. Remote sensing data are also received at the NSOF for processing. She also provided information on the processing and distribution functions the above imagery and that both NOAA and non-NOAA imagery products are provided to the Satellite Data Processing and Distribution components for the production of land, ocean and atmospheric applications. Also supported are the U.S. National Ice Center, the NOAA National Weather Service, NASA, FEMA, the U.S. Coast Guard, the FAA and others along with the general public.

Ms. Hampton also briefed operations at the Wallops Island, Virginia and Fairbanks, Alaska Command and Data Acquisition Facilities. It was noted that both facilities support continuous operations of command, telemetry and mission data for GOES, POES, and Jason-2 programs while Wallops Island supports the NASA ACE programs, the uplink of LRIT, DCS (Local Readout Ground Station (LRGS)) and EMWIN broadcasts while Fairbanks supports the COSMIC program.

She also briefed that Wallops Island operates a backup facility for GOES imagery at the Goddard Space Flight Center at Greenbelt, Virginia. There was also a discussion of the data paths for both POES and GOES data from satellite through processing to data distribution networks.

For more information see the Office of Satellite Operations web site at: http://www.Oso.noaa.gov. 2.9_Hampton_Wheeler_ SOCC Overview.ppt

2008 NOAA Satellite Direct Readout Conference: Transitioning into the Future
December 8 -12, 2008 Miami, Florida
Conference Report
Session 3: Current Direct Readout Workshop and Showcase
Chair: Dave Benner

Conference participants were divided into eleven, nearly equal-sized groups. These groups then rotated through the eleven Satellite Services Stations. At each station, a NOAA expert gave a short presentation introducing the Services topic and led a discussion. After all the groups had visited all 11 stations, the participants reconvened in the Plenary for a Showcase Panel interactive session. Highlights of these sessions are summarized below.

LRIT

Panel Member: Paul Seymour

- The reception of digital LRIT data seemed to be a challenging issue for many at the conference, especially for image data that would replace the analog WEFAX.
- There is a need for out-reach to users. Users wanted to know how NESDIS would contact them, for instance when new data products were coming available.
- Users wanted to know how the products were chosen for inclusion in the LRIT data stream. It was suggested that users contact the NESDIS LRIT representative.
- Users wanted to know how NESDIS set the image resolution. It was explained that there was a balance between data density and latency.
- Users asked where they could purchase an LRIT receiving system. It was explained that systems were commercially available and some of the vendors were at the conference.
- There were questions about support of data visualization. The utilization of LRIT data in McIDAS systems was given as an example of LRIT data visualization.
- The LRIT web site is: http://noaasis.noaa.gov/LRIT/.
- Other issues/concerns mentioned were data latency, antenna size and receiving systems costs.

3.2.1_Seymour_LRIT_1pager.ppt

The recurring thread here seemed to be a need for information sharing by NESDIS with those who are using or are contemplating using LRIT data.

Argos

Panel Member: Bill Woodward

Argos was explained as the Polar DCS system. The capabilities and characteristics of the system were briefly explained with data forwarding utilizing about 55 global readout stations.

- Potential Argos users have to demonstrate that there is no commercially available service that could do the job before considering Argos and the application should be for environmental monitoring. NOAA has set a strict set of guidelines for the use of Argos as an environmental monitoring system.
- Given the current decoding requirements, the data cannot be read directly from the satellite by a user.
- Argos is available globally.
- The transmitters generally require about 1 watt, but the smaller units can be as low as 100 milliwatt.
- There is a wide range of transmitters; some extremely small ones are used for wildlife

applications and range up to those used for larger tracking purposes.

- A third generation Argos service is on Metop-A and it will be on N-prime. The upgraded system includes a two-way communication that allows an acknowledgement of message reception.
- A good place to start learning about Argos is the web site: http://noaasis.noaa.gov/ARGOS/.

3.2.4_Woodward_ARGOS_1pager.ppt

The pervasive questions seemed to be about the environmental data verses non-environmental, data and the required use of commercial systems when they are available.

EMWIN

Panel Member: Santos Rodriguez

- Hardcopies of the product can be printed as they are received, but there are significant memory requirements.
- There are no user fees; users acquire a system and receive the data.
- Products in the EMWIN data stream are weather forecasts, warnings, and other information directly from the National Weather Service in near real-time.
- The downloaded information can be distributed over the Internet for public use.
- For those interested in receiving L band data, the EMWIN specifications and other information, can be accessed at the NWS EMWIN web site: http://www.weather.gov/emwin/.

3.2.2_EMWIN_1pager.ppt

Questions were mostly about understanding the EMWIN user requirements.

NOAAPORT

Panel Member: Brian Gockel

- Users wanted the details of the dissemination format? Specifically, the high-level headers (SBN headers, WMO headers, GRIB/BUFR headers), and also the lower-level data formatting at the bit stream (DVB-S) level. NOAA will look at revising the information on the NOAAPORT User's Page, which describes this (though incompletely). http://www.weather.gov/noaaport/html/noaaport.shtml.
- Currently there is no place (e.g., a server) for users to access all the NOAAPORT products? There are, however, various NOAA archive services (such as CLASS and the radar archives) for pulling specific data types.
- The IP or UDP Multicast has been considered as an alternative mechanism to receive the NOAAPORT stream, but has not gained a lot of momentum. Perhaps because NOAA-internal offices have mechanisms for requesting products they have missed on NOAAPORT.
- The network's broadcast frequency is C Band.
- The NOAAPORT Users' Page has a list of vendors that sell NOAAPORT downlink systems.
- NOAA will attempt to identify resources to get ICDs updated or written.
- NOAA will attempt to identify resources to have the product catalogs updated. They are indeed outdated today.
- NOAAPORT is a regional network serving North America and specific OCONUS areas and was built with the primary objective of serving the data needs of NOAA's NWS field offices. Other users are encouraged to "tune in" and use and/or sell value-added products. However, the network's original primary driver continues today. There are no current plans to stream data.

3.2.11_NOAAPORT_onepager_BGockel.ppt

Concerns were raised about knowing the LRIT/EMWIN GOES-R transition requirements

GOES DCS
Panel Member: Kay Metcalf

- The main difference between GOES DCS and Argos is the data latency. GOES is always there for the data reception while polar data collection is available only during the overhead pass. There are 28,000 DCS platforms now and projected growth indicates the possibility of a capacity issue in the future. To accommodate this anticipated growth, the DCS program will use narrow-band channels; doubling the capacity in the future. A DCPI/two-way communication function is also being developed.
- The 100 bps service is currently being phased out and converted to 300 bps.
- Formats are being evaluated with the objective to arrive at a standardized format. DCS users are responsible for their end use format. More information can be accessed at: http://noaasis.noaa.gov/DCS/.
- Three agencies collect and distribute DCS data. A public National Weather Service web site where DCS data products can be accessed is: http://www.nws.noaa.gov/oh/hads/.

3.2.3_Metcalf_GOES_DCS_1pager.ppt

The primary concern here is the required changes in user systems due to changing bandwidth and future DCP two-way enhancements.

EGVAR/GRB (GOES R)
Panel Member: Bill Mazur

- GRB stands for GOES rebroadcast data, while EGVAR is emulated GVAR data that will assist in the transition from GVAR to GRB. EGVAR will continue up to two years after launch of GOES-R with parallel data streams up to that time. It is a transition concept and there are plans for a close liaison to be maintained with the user community.

- Antenna sizes for GOES-R will remain the same, but data density will increase 15 times. Communication technology has changed greatly since GVAR was implemented.

- The GOES-R algorithm descriptions can be made available since they are government owned.

- A GOES-R Users Guide will be made available, but not necessarily the software code. NOAA will consider making the code available in the future, when available.

- The users must be prepared for either GOES-E or GOES-W to be transitioned to the GOES-R data stream. It is up to NESDIS to determine a recommended work around and to advise the users of how best to be prepared. The impact is that there will be limited time to transition, since there is no certainty of the replacement schedule.

The primary concern here is maintaining a close liaison between NESDIS and the user community in order to promote a smooth transition from GVAR to EGVAR and GRB.

GVAR
Panel Member: Chris Wheeler

It was reported that almost all who participated in the GVAR panel were GVAR users and had a good understanding of the data.

- For improved communication with and between NESDIS, users are encouraged to register using the Internet at http://www.osd.noaa.gov/gvar/gvar.asp.
- Users are encouraged to increase information sharing between each other.
- Data streaming GVAR re-broadcast data are not available. CLASS is the official office and the data are available but not in real time.
- GOES-10 service is due to end by December 2009 due to the fuel exhaustion. NESDIS is considering its options for continuing GOES services to the South American Region.

3.2.5_Hughes_GVAR_1Pager.ppt

The primary concerns are NESDIS/User data information interaction and the future of and after GOES-10.

GEONETCast Americas
Panel Member: Chris O'Connors

- The cost of an operational ground station to received GEONETCast data are between $3000 and $6000.
- There is a form available detailing procedures for providing data to GEONETCast Americas on the GEONETCast web site: http://www.geonetcastamericas.noaa.gov/product-register.html.
- The originator provides the necessary information and the decision will be made by the appropriate user countries on procedures for providing a suggested product.
- Emergency products seem to be most in demand.
- GEONETCast is a satellite data dissemination process, see http://www.geonetcastamericas.noaa.gov/. There are various products in the data stream.
- It's possible to regionally tailor the data, but its benefits will have to be weighed against the need for other products in a limit bandwidth service.
- The internet is being used for data distribution, like the dissemination service SRVIR in Panama. Satellites provide the advantage of being a space based communication platform. In severe weather cases land lines tend to be lost early. Satellite Internet could be an option if there are service providers.
- The focus is on the GEO societal benefit areas and products that provide information to decision makers whether they are government officials or a farmer. In the U.S. we have other satellite imagery broadcast systems (LRIT, GVAR, HRPT, and APT). For our GEONETCast contribution we don't want to duplicate what already exists. Therefore, we would not expect satellite imagery to be distributed, unless there is described a significant need that doesn't exist.
- NESDIS has a voluntary database for registration. We like to know who our users are but can't require registration. The customer survey can be found at http://directreadoutsurvey.noaa.gov/user/survey_form.jsp.
- NOAA will post hardware manufactures on the GEONETCast Americas web site if they contact our office.

3.2.9_O'connors_GeonetcastAmericas_1pager.ppt

HRD, Simulcast/IPOPP
Panel Member: John Overton

Simulcast data are available for free. It only requires registration at the direct readout site.

- As far as data links, currently the Internet is being used but there could be changes due to bandwidth requirements and availability. A closed network could also be used.
- It cannot be directly displayed on Google Earth but there is software available to do it.
- The data are transmitted in real time, the only delays are due to data processing.
- The data are geo-registered with two views: a space craft view and a map projection view.
- There are plans to have data available over South America as soon as it is available with IPOPP.

(3.2.8_Overton_ IPOPP _Featuring Simulcast_1pager.ppt)

A comment was made that it would be helpful for NOAA to let users know what data are available and to who is receiving and/or distributing it. A chart is needed showing what is distributed and where.

RANET
Panel Member: Kelly Sponberg

- Users wanted to know the relationship of RANET to GEONETCast. RANET is complementary to GEONETCast and is to add information to existing data. The project is just getting up to speed in Latin America and determination is underway to ascertain what is needed. Emergency and hazard warning systems are to be supported.
- Users wanted to know where the operational center for RANET is located. The RANET program is housed within multiple owners at the National level. Efforts are underway to try to get the principles and countries to share their experiences.
- Currently there is only one vendor marketing systems for the RANET. It is hoped that there will soon be more.
- Currently there is no European sponsor for Africa, but they can apply for participation. There is now a chance to demonstrate the system. Each nation will control their data.
- The pilot Chatty Beetle program will be accepting applications from interested parties by December 15.
- The Chatty Beetle uses a standard Iridium address. There is movement toward point to point communication rather than satellite.
- The cost of the Chatty Beetle system is about $3500 including messaging, while the equipment costs $1500.

http://www.ranetproject.net/
http://www.publicaffairs.noaa.gov/worldsummit/ranet.html
3.2.10 Sponberg RANET 1Pager.ppt

HRPT/APT
Panel Member: Marlin Perkins

- The HRPT/APT types of services have been available for 30 years. However, it will now be necessary to transition to NPOES.
- NOAA is working on the issue of receivers for the NPOESS era, but specifications are not available from the NPOESS Office yet.
- NOAA will have to work on the transition from POES APT and HRPT to NPOES LRD and HRD. It is a critical concern but there is nothing specific available yet.

The main concerns captured during the Showcase were:

- Loss of GOES 10 service in Latin America
- Closer communications between NESDIS and users in just about all technical areas

- Training seems to be implied with the above.
- Loss of the HRPT/APT type of service in the NPOES era.
- The system complexity and cost of the digital LRIT replacement for analog WEFAX service.
- GOES R transition procedures (e.g. GVAR/GVAR R) are dominant concerns for the future.
- GOES DCS Bandwidth demand is a concern due to increasing system usage.

The individual panel members presented a wrap-up of their respective panel at the conclusion of the showcase panel interlude to the conference members. This included a review of the issues that seemed to be repeated in the eleven groups that participated in the separate sessions. The contents of the reports are included in the above panel summaries.

2008 NOAA Satellite Direct Readout Conference: Transitioning into the Future
December 8 -12, 2008 Miami, Florida
Conference Report
Session 3: GOES-R / AEROSPACE HRIT/EMWIN
Prototype Receiver Card Demonstration
Co-Presenters: Paul Seymour, Rob Wagner, Santos Rodriguez
Bill Mazur, Dr. Jeremy L. Roberson and Dr. Esteban Vallés

This demonstration introduced a prototype software defined radio based receiver for the reception of the HRIT/EMWIN combined service planned for GOES-R and will replace the current, individual EMWIN and LRIT services. The prototype was developed for the GOES-R Program by the Aerospace Corporation and is intended to support user readiness and transition to the new, combined HRIT/EMWIN broadcast.
This broadcast will combine a larger data rate of 400 Kbps and new frequencies for both services and a different modulation type for the EMWIN service. For the purpose of backward compatibility, the prototype hardware and software is configurable to receive all current and future EMWIN and LRIT signals from the GOES I Series and GOES-M Series satellites with a minimum of hardware changes/upgrades. The prototype is designed to prove that a low-cost, personal computer based solution for an HRIT/EMWIN receive system is possible for all data rates and modulations.

The current plan is to make the prototype available, to the extent possible, to the user and vendor communities during the 1st quarter of calendar year 2009. The goal of this technology sharing effort is to make the transition for the user community into the future GOES-R broadcast less expensive and easier. In addition, the prototype should prove useful to system manufacturers wishing to develop transition ready equipment that can use the current broadcasts, as well as, make use of the improved broadcast services available from the GOES-R spacecraft.

During the session, a brief description of the EMWIN and LRIT services was presented. The GOES-R Program Office then presented the rationale for developing the prototype; highlighting a description of the new combined service. The Aerospace Corporation then provided a brief on the development effort, the technical specifications and the plan to compete the project. This was followed by a demonstration using a live feed from the GOES-11 (GOES-West) broadcast received via an antenna situated outside the hotel complex.

Interaction with the audience was extensive. The major discussion points revolved around questions on technical aspects of the prototype and the schedule of its availability. NOAA briefed to the participants that the prototype would be available after applicable reviews were completed in the coming weeks and the information would be available via the GOES-R Web Site at http://www.goes-r.gov/. The applicable presentations 6.4 and 3.4 are available through the presentations tab on the conference web site.
http://directreadout.noaa.gov/miami08/

2008 NOAA Satellite Direct Readout Conference: Transitioning into the Future
December 8 -12, 2008 Miami, Florida
Conference Report
Session 4: Applications and Training
Co-Chairs: Tim Schmit and Tony Mostek
Plenary Session

Keynote

Arona Ngari, President WMO Regional Association V (South-West Pacific)

Mr. Ngari discussed the high level of support by local forum leaders and the need for capacity building. He mentioned that the U.S. National Weather Service provides their Pacific Desk but that products can be modified and that NOAA products are available to NMFs.
He showed several imagery examples that are used operationally. NOAA products used are: GEONETCast, FengYunCast, EMWIN, LRIT and RANET. He said that old products are still used, but just because they are old doesn't mean they are not significant -- but there is room for improvement. One of his most important points was that they need better coverage of the Pacific Region. He asked what this conference will do to ensure that the Pacific Region is covered adequately. He also discussed possible avenues for collaboration looking for improvements in their products.

The COMET Program: Satellite Meteorology Training Resources for the Atmospheric Science Community

Tim Spangler, University Corporation for Atmospheric Research (UCAR) Cooperative Porogram for Operational Meteorology, Education and Training (COMET)

COMET was founded in 1990. Currently it has a staff of 37 and is sponsored by 11 organizations, three of which are international. It offers free distance learning opportunities to over 64,000 registered users worldwide and some are available in Spanish and French. Training is done in many areas of interest. Examples given were: a microwave remote sensing series from the COMET web site and other training modules. The number of satellite meteorology modules is now up to approximately 45. Another example is a module on tropical meteorology. Many modules have been translated into Spanish. This effort was based on requests from the last Direct Readout Conference in 2004. A new module being developed is the GOES R module.
4.2_TSpangler_COMET .pptx

Cooperative Institute for Meteorological Satellite Studies (CIMSS) VISITview

Scott Bachmeier, CIMMS

The purpose of VISIT view is to promote new applications for the National Weather Service. It is Java based and developed at CIMSS and is freely available to anyone. It was developed as available software was expensive and inadequate (in 1998). The primary users are the NWS, EUMETSAT and the WMO. It provides special satellite imagery enhancements and interactive features. Users are invited to try it, use it and send critical comments and recommendations for improvement. A GOES-R proving grounds page is being developed to prepare for the future.
4.3_Bachmeier_VISITview.ppt

Satellite Training Activities: Cooperative Institute for Research in the Atmosphere (CIRA)

Bernadette Connell, CIRA

National activities are VISIT, SHyMet, and GOES-R Proving Grounds. International activities are: partnerships with RTC's, WMO virtual focus groups and training events. Visit activities were summarized from 1999 to 2008.

4.4_Connell_Applications_and_Training.ppt

Satellite HydroMeteorology (SHyMet) NOAA Distance Training Course

Tony Mostek, NOAA National Weather Service

The course is primarily for forecasters and the approach has proved successful. It is being expanded to include more international participation. There is now a microwave remote sensing topics course at METED. Plans for future satellite courses include: fire weather, hydrology, climate, and decision support for high impact event managers and for translating the courses into Spanish.

4.5_Mostek_apps&Training_Direct_Readout_08_V3.ppt

Satellite Training and Education and Naval Research Lab Monterey, California

Arunal Kuciauskas, Tom Lee, F. Joseph Truk, K. Richardson, and J. Hawkins, Naval Research Laboratory

NexSat demonstrates VIIRS capabilities for the upcoming NPP and NPOESS era with training and tutorials provided through collaborations with COMET. User feedback is highly encouraged. The goal is to increase usage throughout the Direct Readout community. They are looking to hear from the Direct Readout Community about: region specific products and subsectors, as well as training on satellite principles and products.

(4.6_Kuciauskas_NexSat_20081210_a.ppt)

McIDAS-V: A Powerful Data Analysis and Visualization Tool for Multi- and Hyperspectral Environmental Satellite Data.

Dave Santek, University of Wisconsin Space Science and Engineering Center

McIDAS-V is an analysis and visualization tool primarily for satellite data. For the future, McIDAS-V will provide a new, open environment for developing algorithms and new visualizations that take advantage of multi-and hyper-spectral data from emerging observations systems. It also will support the development of applications for the NPP/NPOESS and GOES-R science teams. It will also expand documentation and training materials.

4.7_McIDAS-V_NOAA_DB_2008.ppt

NCEP Direct Readout Usage: Current and Future Satellite Applications at NCEP's Aviation Weather (AWC) and Storm Prediction Center (SPC)

Jim Heil, NOAA National Weather Service

The GOES Direct Readout Acquired Imagery is critical to the Aviation Weather and Storm Predictions Centers. Use of specific McIDAS macros (developed at NCEP) has led to scientific advancement of severe storm meteorology and aviation safety for the analysis and forecasting of:

low clouds and fog, volcanic ash and global convective diagnostics. NESDIS developed-products have also contributed to forecasts and warnings in the following areas: GOES sounder derived products, Volcanic ash, smoke, precipitation estimates, precipitable water and QuikSCAT.
4.8_AWC-SPC_UsesOfGOESImagery_v3.ppt

NCEP Use for Forecast Models

Lars Riishojgaard, Joint Center for Satellite Data Assimilation

The Joint Center for Satellite Data Assimilation (JCSDA) provides coordinated research to improve the use of satellite data. Accomplishments of the JCSDA are many. These include new short term goals to use the largest number of satellite observations possible in the most effective way for NWP use, since NWP products have a large and growing economic value. It was noted that satellite data have a large and growing impact on NWP skill and that NCEP is the key civilian NWP user of satellite data in the US. It has also been found that timeliness is one of the most important attributes of the data.

Current and Near-term GOES Operations and Applications

Tim Schmidt, NOAA Satellite and Information Service

Improved image examples for GOES 13 were compared to GOES 12 showing improved signal to noise in images. Eclipse problems are also reduced in GOES 13.
GOES O/P will have improved resolution and improved sounders with the potential for several new sounder products to improve forecasts. An example was given where GOES 10 sounder products were used to improve monitoring for the Chaiten volcanic eruption in Chile.
4.10_Schmit_10Dec08_goes_apps.ppt

From Data to Products to Weather Forecasting and Air Quality Monitoring: Direct Broadcast at Its Best

Allen Huang, Cooperative Institute for Meteorological Satellite Studies (CIMSS)

CIMMS, with the support from NASA and NOAA, has conducted activities which are aimed at providing the Direct Broadcast Community with EOS end-to-end processing systems (IMAPP), NPP/NPOESS end-to-end processing systems (IPOPP), the Direct Broadcast version of CIMSS Regional Assimilation System (DB-CRAS), an international version of infusing satellite data into environmental air quality applications (IDEA-I) and International Remote Sensing Training Workshops. Workshops have already been held in various countries from 2004 to the present and are planned for 2009 and 2010.
4.11_AllenHuang_Applications_and_Training.ppt

4.12 EOS Direct Broadcast Products Used In Operations

Kathy Strabala, Cooperative Institute for Meteorological Satellite Studies (CIMSS)

Two NASA EOS satellites, Terra and Aqua, provide direct broadcast (MODIS) to more than 400 world-wide users. MODIS is used in Area Forecast Discussions as a tool in decision making as mentioned in NWS Forecast Offices 69 times. Online surveys, taken by forecasters, show that 75%

of forecasters rate Direct Broadcast MODIS in AWIPS products as either very useful or useful. The most important products are Visible Imagery, SST, fog products and Water Vapor Imagery.
4.12_NOAA_Direct_Readout_2008_Strabala.ppt

4.13 Geoscience Educations Utilizing Satellite Imagery: A Direct Readout Experience from the EXLORES! Perspective

Paul Ruscher, Florida State University

EXLORES (1991 to 2008) is a Florida State University Outreach program for Geo-science Education utilizing satellite imagery. Its main goal is teacher awareness and their development in the use of satellite data. GLOBE is one example of a program that integrates scientific inquiry (by students) with scientists' views of science. The speaker gave examples of politicians who support the science and satellites and encouraged attendees to get involved with geo-science teaching.
4.13_Ruscher_EXPLORES.ppt

4.14 Evolution of the EUMETSAT Advanced Retransmission Service (EARS)

Christelle Ponsard, European Organization for the Exploitation of Meteorological Satellites

The objectives of the EARS Services are to: 1) collect Data from Polar-Orbiting Meteorological Satellites via a selected set of HRPT stations; 2) process and retransmit the data to end users via the GTS and the EUMETCast (Ku-Band Europe); and 3) provide timeliness adequate for local and regional numerical weather prediction applications.
4.14_Ponsard_EARS_Evolution_Miami_2008.PPT

4.15 Use of RARS data in the UK Met Office

Richard Francis, Satellite Data Processing System Group, Meteorological Office, United Kingdom

EARS was very popular with EUMETSAT, therefore, it was extended to RARS (Regional ATOVS Retransmission System) and uses GTS and services like EUMETCast and the Internet. The amount of Global coverage was shown with plans to increase the amount of the globe that is covered: aiming for 90% coverage. Benefits of RARS are many: extra sounding data, timely data arrival, improved forecasts of surface pressure, large impact on Southern Hemisphere, continuous impact of NWP performance and extra sounding data. RARS is planned for NOAA N Prime, METOP B and C.
4.15_Francis_RARS_UK_MetOffice.ppt

4.16 National Weather Service Requirements for Real-time Satellite Data

Jim Heil, NOAA National Weather Services

Polar Direct Readout data continues to be an important and critical resource for the NWS Alaskan Region. In addition to NOAA polar data, DMSP satellite data are routinely used after processing by the University of Alaska Fairbanks. There is also a strong relationship between the Air Force, NWS Alaska Region and the University of Alaska. They all work together to optimize direct readout satellite use by: collaboration and cooperation, infusion of science and operational test beds for products. This includes the inclusion of critical Arctic data.

4.17 GEONETCast Americas

Paul Seymour, NOAA Satellite and Information Services

GEONETCast is a near real time, global network of satellite-based data dissemination systems designed to distribute space-based, air-borne and in situ data, metadata and products to diverse communities. NOAA/U.S. has begun regional, initial operational capability over the Americas, termed GEONETCast Americas. The initial operational capability is now in place and being used with current efforts focused on capacity building and user engagement. To that end, the Americas region if working directly with data providers such as: SEVIR, USEPA, RANET, INPE, AMESD, and CBERS. There is also a number of EU Environmental and ICT projects that include use of GEONETCast -- which are DevCoCast and AIDA. A concept for the use of GEONETCast in training and disaster response applications is being developed.
4.17 Seymour geonetcast americas.ppt

2008 NOAA Satellite Direct Readout Conference: Transitioning into the Future
December 8 -12, 2008 Miami, Florida
Conference Report
Session 4: Poster Session
Co-Chairs: Tim Schmit and Tony Mostek

For the first time in a Direct Readout Conference, NOAA planned and held a poster session. We hosted 35 posters from various disciplines plus 11 from the Direct Readout Showcase. The poster session was an opportunity for attendees and presenters to browse posters relevant to conference issues and during the poster session to speak with the authors of the posters. A short description of the 35 posters that were not in the Showcase follows with links to the posters and short "one-pager" descriptions slides if they are available. The posters and slides can all be found at: ftp://satepsanone.nesdis.noaa.gov/volcano/2008DRO/Posters.

The 11 Direct Readout Showcase posters can be found at ftp://satepsanone.nesdis.noaa.gov/volcano/2008DRO/Session3_Showcase along with a summary slide show: 3.1_Showcase_Overview_Summary.ppt.

Poster A1 "Thunderstorm Nowcasting using the Satellite Receiver Station at NOAA-CREST"
Brian Vant-Hull, Arnold Gruber, Bob Rabin, Shayesteh Mahani, Reza Khanbilvardi, Bob Kuligowski, Mamoudou Ba, Stephan Smith

Data from the SeaSpace installation at NOAA-CREST is used to run the EUMETSAT Rapidly Developing Thunderstorm (RDT) algorithm. Comparisons have been made to other storm detection algorithms and work is underway to select an extrapolation method.

For more information see the poster and the poster abstract slide at:
A01_vanthull_ccny_1pager.ppt
A01_vanthull_ccny_1pager.ppt

Poster A4 "A Single-Antenna Field Deployable Polar/Geostationary Direct Readout System"
Michael Guberek of Global Imaging, 201 Lomas Santa Fe Drive, Solana Beach, CA 92075
http://www.globalimaging.com

Global Imaging's new Mark X portable, tactical earth station is capable of receiving, processing, and displaying digital LRIT data from the latest GOES, MSG and MTSAT-1R next-generation geostationary satellites and NOAA HRPT and DMSP polar imagery using a single antenna and workstation. The Mark X system contains all the electronics, computers and software necessary for an autonomous field meteorological operation.

For more information see the poster and the poster abstract slide at:
A04_Guberek-Single_Antenna_Poster.ppt
A04_Guberek- Single Antenna-1pager.ppt

Poster A8 "New Method of Identification and Tracking of Storms from Satellite Images"
Ranjini E. MA

This paper proposes a method to identify and track storms using the movements of cloud patches. The images used for this purpose are from Infrared satellite instruments. To do this prediction, a sequence of satellite images are used, which is taken at regular intervals. When a cloud moves above ocean, it collects a huge amount of water and it may turn out to be a powerful storm.

Poster A11 "NPOESS Field Terminal"
Joseph A. Bradley

The NPOESS Field Terminal Poster will display and the staff in attendance will respond to questions and discuss with attendees the following topics:

Proposed NPOESS Architecture (including current predicted processing and storage requirements)
Concept of Operations of the NPOESS Field Terminal
Schedule of events for development and demonstration of the NPOESS Field Terminal DPE Software

Poster A16 "Extending Satellite Meteorology Education Resources to the International User Community: Current Modules, New Initiatives, and the ESRC"
Patrick Dills and Wendy Schreiber-Abshire

The COMET Program receives funding to make a wide variety of education & training materials and resources about satellite meteorology available to the world for free via the web at www.meted.ucar.edu.

For more information see the poster and the poster abstract slide at:
A16_Dills_poster.ppt
A16_Dills_1pager.ppt

Poster A20 "Real-Time NASA-Langley Cloud Products Derived From GOES Imager Data"
Douglas A. Spangenberg, Patrick Minnis, Louis Nguyen, J. Kirk Ayers, Fu-Lung Chang, Rabi Palikonda, and Chris R. Yost

Half-hourly GOES cloud products are available with $\leq$ 0.5 hour lag time (USA). The products are used in NCAR aircraft icing risk and RUC model assimilation.

For more information see the poster and the poster abstract slide at:
A20_Spangenberg_poster_R1.ppt
A20_Spangenberg_1pager.ppt

Poster A26 "J. Cross Polarization and Dual Polarized GOES-R Re-Broadcast (GRB) Link"
Model, J.O. Taylor, R.M. Wezalis

The use of dual polarization transmissions to increase the bandwidth capability of a given channel is well known. This method will be used in the GOES-R GRB link, in both the uplink (linear dual

polarized channel at X-band) and the down link (circular dual polarized channel at L-Band). While the affects of cross polarization isolation (XPI) and cross polarization discrimination (XPD) are well documented above ~ 3.5 GHz, the same cannot be said for L-Band.

For more information see the poster and the slides at:
XPD_poster_for DRG_Mod_D.pdf

Poster A27 "Vegetation Health Products from NOAA Operational Polar-Orbiting Satellites: From Research to Applications"
Felix Kogan

In the past 10 years, the new Vegetation Health (VH) theory was developed, algorithms for Advanced Very High Resolution Radiometer (AVHRR) data processing and VH calculation were designed and data products were developed and issued at the NOAA/NESDIS/STAR web site: http://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/index.php.

Poster A30 "The Satellite Analysis Branch Hazard Mitigation Programs and Customers Supported"
Jamie Kibler

The poster explores the following areas: 1) data flow of satellite imagery into products, 2) the smoke, fire and air quality program, 3) the volcanic ash program, and 4) the tropical program.

For more information see the poster and the poster abstract slide at:
A30_Kibler_SABHazard_poster.ppt
A30_Kibler_SABHazard_1pager.ppt

Poster A32 "Geoscience Education Utilizing Satellite Imagery - A Direct Readout Experience from the EXPLORES! Perspective"
Paul Ruscher

The EXPLORES! program (EXPloring and Learning the Operations and Resources of Environmental Satellites!) was launched in 1991-1992 with the first state sponsored NOAA direct readout program to support reception of APT and WEFAX imagery in schools. The program continued annually with state support through 2001 and remains viable in many of the over 200 schools by virtue of NOAA's continued support of APT transmission of 4 km channel 2, 3, 4, and 5 data from AVHRR. With the advent of the World Wide Web, many users of satellite imagery utilize the world-wide-web, but there continue to be high demands for direct readout in the educational arena, in particular.

Poster A34 "A Rapid Product Generation System From SeaSpace Corporation USA For EOS Direct Broadcast Sensors and Beyond"
Kota Prasad, Dan Waltman (kprasad@seaspace.com) and Hae-Yong Shin (www.seaspace.com) of SeaSpace Corporation

An automated data generation system for EOS Terra and Aqua MODIS/AIRS, using a SeaSpace TeraScan® software system, has been developing utilizing SeaDAS and NASA DAAC algorithms

in batch processing scripts to generate over 150 level 2 products in less than 10 minutes after data acquisition by a direct broadcast ground station.

For more information see the poster and the poster abstract slide at:
A34_KPrasad_SeaSpace_poster.pdf
A34_KPrasad_SeaSpace_1pager.ppt

Poster A38 "A Local Real-time Mesoscale Prediction System for MODIS Direct Broadcast Sites"
Robert M. Aune, Kathy Strabala, Allen Huang

Scientists at the Cooperative Institute for Meteorological Satellite Studies (CIMSS), University of Wisconsin, have developed a version of the CIMSS Regional Assimilation System (CRAS) that assimilates products from the Moderate Resolution Infrared Spectroradiometer (MODIS) instruments onboard the NASA Aqua and Terra satellites. The Direct Broadcast CRAS, or DBCRAS as it is called, is available for distribution to MODIS Direct Broadcast (X-band) sites using the International MODIS/AIRS Processing Package (IMAPP) to generate derived products using radiances from the 35-channel MODIS instrument. The goal of the DBCRAS project is to help global direct broadcast users in remote areas to improve their local mesoscale forecasting capabilities.

Poster A40 "Describing the NPOESS Preparatory Project Cross-track Infrared and Microwave Sounder Suite (CrIMSS) Environmental Data Records"
Bonnie Reed, G. Bingham, B. Guenther, C. Hoffman, H. Kilcoyne G. Mineart, and K. St. Germain, NPOESS Integrated Program Office (IPO), NOAA, Silver Spring, MD with contributions from Northrop Grumman Space Technology (NGST) and the NPOESS IPO CrIMSS Subject Matter Experts

The Cross-track Infrared Sounder (CrIS) and the Advanced Technology Microwave Sounder (ATMS) are two of the instruments that make up the suite of sensors on the NPOESS Preparatory Project scheduled to launch in 2010. Together, CrIS and ATMS will produce three Environmental Data Records including the Atmospheric Vertical Temperature Profile (AVTP), Atmospheric Vertical Moisture Profile (AVMP), and the Atmospheric Vertical Pressure Profile (AVPP). The AVTP and the AVMP are both NPOESS Key Performance Parameters. This poster will describe the CrIMSS algorithms used to generate these EDRs and provide a current estimate of performance based on pre-Launch test data.

For more information see the poster and the poster abstract slide at:
A40_Reed_CrIMSS_poster.ppt
A40_Reed_CrIMSS_1pager.ppt

Poster A41 "Describing the NPOESS Preparatory Project Visible/Infrared Imaging Radiometer Suite (VIIRS) Aerosol Environmental Data Records"
Heather Kilcoyne, B. Guenther, C. Hoffman, G. Mineart, K. St. Germain, and B. Reed, NPOESS Integrated Program Office (IPO), NOAA, Silver Spring, MD with contributions from Northrop Grumman Space Technology (NGST) and the NPOESS IPO Aerosol Subject Matter Experts

The VIIRS is one of the instruments that make up the suite of sensors on the NPOESS Preparatory Project (NPP) scheduled to launch in 2010. VIIRS will produce three Environmental Data Records (EDRs) describing atmospheric aerosol information: the Aerosol Optical Thickness (AOT), Aerosol Particle Size Parameter (APSP) and Suspended Matter (SM) data products. This poster will describe the VIIRS algorithms used to generate these EDRs and provide a current estimate of performance based on pre Launch test data.

For more information see the poster and the poster abstract slide at:
A41_Kilcoyne_VIIRS_Aerosol_poster.ppt
A41_Kilcoyne_VIIRS Aerosol_1pager.ppt

Poster A43 "Describing the NPOESS Preparatory Project Visible Infrared Imager Radiometer Suite (VIIRS) Ocean Environmental Data Records (EDRs)"
Bonnie Reed, B. Guenther, C. Hoffman, G. Mineart, K. St. Germain, and Heather Kilcoyne, NPOESS Integrated Program Office (IPO), NOAA, Silver Spring, MD with contributions from Northrop Grumman Space Technology (NGST) and the NPOESS IPO VIIRS Ocean Subject Matter Experts

The VIIRS is one of the instruments that make up the suite of sensors on the NPOESS Preparatory Project (NPP) scheduled to launch in 2010. VIIRS will produce two Ocean related EDRs including Ocean Color/Chlorophyll and Sea Surface Temperature (SST), which is a key EDR. This paper will describe the VIIRS Ocean algorithms used to generate these EDRs and provide a current estimate of performance based on pre-Launch test data.

For more information see the poster and the poster abstract slide at:
A43_Reed_VIIRS_Ocean_poster.ppt
A43_Reed_VIIRS Ocean_1pager.ppt

Poster A44 "The NPOESS Preparatory Project Visible Infrared Imager Radiometer Suite (VIIRS) Land Environmental Data Records (EDRs)"
Bonnie Reed, B. Guenther, C. Hoffman, H. Kilcoyne, G. Mineart, and K. St. Germain, NPOESS Integrated Program Office (IPO), NOAA, Silver Spring, MD with contributions from Northrop Grumman Space Technology (NGST) and the NPOESS IPO VIIRS Land Subject Matter Experts

The VIIRS instrument on NPP and NPOESS will produce several Land EDRs including Land Surface Temperature, Vegetation Index, Surface Albedo, and Surface Type. Additionally, VIIRS will produce an Active Fires Application Related Product. This paper will describe the VIIRS Land algorithms used to generate these EDRs and ARP and provide a current estimate of performance based on pre-Launch test data.

For more information see the poster and the poster abstract slide at:
A44_Reed_VIIRS_Land_poster.ppt
A44_Reed_VIIRS Land Poster_1pager.ppt

Poster A46 "The NPOESS Preparatory Project Ozone Mapping and Profiling Suite (OMPS) Environmental Data Records"
Maria. Caponi, B. Guenther, C. Hoffman, H. Kilcoyne, G. Mineart, K. St. Germain, and B. Reed, NPOESS Integrated Program Office (IPO), NOAA, Silver Spring, MD with contributions from Northrop Grumman Space Technology (NGST) and the NPOESS IPO Ozone Subject Matter Experts

The Ozone Mapping and Profiling Suite (OMPS) is one of the instruments that make up the suite of sensors on the NPOESS Preparatory Project (NPP) scheduled to launch in 2010. The OMPS will produce two Environmental Data Records (EDRs) describing ozone properties; the Ozone Total Column (TC) and Ozone Nadir Profile (NP). This paper will describe the OMPS algorithms used to generate these EDRs and provide a current estimate of performance based on pre-Launch test data.

For more information see the poster and the poster abstract slide at:
A46_Capino_OMPS_ozone_poster.ppt
A46_Caponi_OMPS Ozone_1pager.ppt

Poster A47 "The NPOESS Preparatory Project Visible/Infrared Imaging Radiometer Suite (VIIRS) Cloud Environmental Data Records"
Heather Kilcoyne, B. Guenther, C. Hoffman, G. Mineart, K. St. Germain, and B. Reed, NPOESS Integrated Program Office (IPO), NOAA, Silver Spring, MD with contributions from Northrop Grumman Space Technology (NGST) and the NPOESS IPO Cloud Subject Matter Experts

The VIIRS is one of the instruments that make up the suite of sensors on the NPOESS Preparatory Project (NPP) scheduled to launch in 2010. VIIRS will produce seven Environmental Data Records (EDRs) describing cloud properties. This poster will describe the algorithms used to generate these EDRs and provide a current estimate of performance based on pre-Launch test data.

For more information see the poster and the poster abstract slide at:
A47_Kilcoyne_VIIRS_Cloud_poster.ppt
A47_Kilcoyne_VIIRS Cloud_1pager.ppt

Poster A48 "Direct Readout Technologies developed by a partnership of NPOESS IPO and NASA Direct Readout Lab"
John Overton

The Direct Readout Laboratory (DRL) has developed a Simulcast technology which—in real time and with a single Client—allows users to select and view quick look instrument data from multiple missions and spacecraft. Simulcast is a stand alone, Java-based technology that provides real-time geo-location and pseudo-calibration, and projects data on Mercator and Polar maps. The Simulcast Client features an Auto Day/Night mode to allow passes near a pole to be viewed in True Color mode during the day portion, and Infrared mode during the night portion. The Client can also export displayed images to JPEG format. Simulcast can replay recent satellite passes. Simulcast is scalable and capable of supporting many users, both local and remote.

Poster A50 "GOES-R Baseline Instruments"
James J. Gurka, Timothy J Schmit, Steve Goodman, Steven Hill, Mathew M. Gunshor

GOES-R Baseline Instruments will include: 1) Advanced Baseline Imager, 2) Geostationary Lightning Mapper, 3) Solar Ultra Violet Imager, 4) EUV and X-Ray Irradiance Sensors, 5) Space Environment in-situ Suite and 6) Magnetometer.

For more information see the poster and the poster abstract slide at:
A50_Gurka_2008_GOES-R_instrument_poster.ppt
A50_Gurka_GOESRInstruments_1pager.ppt
DRC_onepager_template_draft-NESDIS.ppt

Poster A51 "Satellite E-tools and On-line Curriculum for Pre-College and Undergraduate Education"
Margaret Mooney

The Cooperative Institute for Meteorological Satellite Studies (CIMSS) has been developing computer applications to facilitate the use of satellite data for over two decades. Along with training operational forecasters, CIMSS is committed to maintaining the pre-college pipeline for future geoscientists and professional meteorologists. This session will highlight the following tools and curriculum recently developed at CIMSS;

- Reusable Content Objects (RCOs) developed for /Satellite Observations in Science Education/, a course aimed at undergraduates.
- Educational Applets (small applications) recently developed for two on-line courses for middle and high school science teachers.
- A new ABI module developed and added to Satellite Meteorology for Grades 7-12, an on-line course for middle and high school students.

Poster A52 "GOES-R Direct Broadcast Capabilities"
Andrew W. Royle

Through the GOES Rebroadcast (GRB), GOES-R will provide an order of magnitude increase in the types, quality, and quantity of direct broadcast data, offering enhanced capabilities to users in the same L-band frequency range. Upgrades to GOES unique payload services (DCS, EMWIN, LRIT, and SARSAT) will also occur.

For more information see the poster and the poster abstract slide at:
A52_Royle_GRB_poster.ppt
A52_Royle_GRB_1pager.ppt

Poster A54 "Using TRMM Measurements to Validate the Operational GOES Infrared Rainfall Estimation Technique: Case Studies"
S.A. Hsu and Brian Blanchard , Coastal Studies Institute, Louisiana University, Baton Rouge, Louisiana

The application infrared satellite surface brightness temperatures are higher and thicker and hence produce more rainfall than those with warmer tops. For example, convective thunderstorms are characterized by very low cloud (– 18, T.D. - 12, Hurricane – 13, Hurricane Lorenzo – 28) top temperatures (CTT) (< -63°C) and rapid spatial and temporal changes in the cloud top structure (Vicente et al., 1998). Enhancement in the GOES sensor platform now allows near-continuous (-15 minute) monitoring of cloud systems at a resolution (field of view) of 4 km. This is suitable for nowcasting, flash flood and river forecasting, and land surface modeling (after corrections) (Vasiloff et al., 2007).

For more information see the poster slide at:
A54_hsu_poster.pdf

Poster A55 "A Flexible Low Cost EMWIN-LRIT Receiver for the GOES-R Transition"
J. Roberson, E. Valles, K. Tarasov, K. King, E. Grayver

A prototype, software defined radio concept prototype receiver is being developed by Aeropspace Corporation for the GOES-R Program Office. The prototype receiver will be able to receive current and GOES-R EMWIN and LRIT signals.

The future GOES-R EMWIN/HRIT signal will operate at 927 ksyms/s. It will require an IF/RF Digitizer. Custom hardware parts cost < $100 and COTS retail price is approximately $775.

For more information see the poster and the poster abstract slide at:
A55_Roberson_EMWIN_LRIT_Receiver_Poster.ppt
A55_Roberson_EMWIN_LRIT_Receiver_1pager.ppt

Poster A56 "Unique Payload Services (UPS) Interfaces to the GOES-R Ground Segment In the GOES-R Era"
Christian Wallisch, Michael K. Milligan

The GOES-R Ground Segment will support the Unique Payload Services (UPS) for the GOES-R User in the 2015 and beyond timeframe. The UPS Service, such as the Data Collection System (DCS) and the Low-Rate Information Transmission (LRIT)/ Emergency Managers Weather Information Network (EMWIN) will be supported and distributed through the GOES-R Ground Segment and the GOES-R Satellite to the end users. The characteristics the Ground Segment that support these Unique Payload Services will be discussed in this paper and poster. The architecture will be defined and the interface requirements will be depicted and explained. Additionally, the products used to create the EMWIN, DCS and LRIT data streams will be discussed.

Poster A58 "GOES-R Rebroadcast (GRB) over DVB-S2 Low-Cost Receiver"
J.Model, R.M. Wexalis, J.O. Taylor and W.E. Mazur

The digital video Broadcast over Satellite (DVB-S2) standard is a European Space Agency broadcast standard. It is the successor to the DVB-S standard, used in NOAAPort and other systems. DVB-S2 incorporates Low Density Parity Check (LDPC) + BCH forward error correction to facilitate transport of video, audio and associated data over satellite links. The success of this standard has spurred the development of monolithic chipsets and low-cost receivers. We have constructed a testbed for DVB-S2 receivers that can send arbitrary data, including CCSDS frames. We compared a

low-cost, $200 model to a state-of-the-art high performance receiver. Our Bit-Error-Rate tests indicate that the performance of the two is comparable at GRB data rates. The following discussion will examine these test results and how GRB users could be able to take advantage of the features of DVB-S2 receiver cards.

For more information see the poster abstract slide at:
Low Cost DVB-S2_DRGS_REVB.pdf

Poster A59 "National Polar-orbiting Operational Environmental Satellite System (NPOESS) Architecture"
Gary McWilliams and Frank Hinnant, NPOESS Integrated Program Office, Silver Spring, MD

NPOESS is an end-to-end system to acquire, process, and deliver meteorological, oceanographic, terrestrial, climatological, and solar-geophysical observations to NOAA and DoD central processing facilities. Beginning in 2013, NPOESS spacecraft (C1 through C4) will be launched into two different orbits (1330 local time ascending node – LTAN and 1730 LTAN). The poster addresses the instrument packages, acquisition architecture and dissemination strategy of the NPOESS constellation.

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Session 5: Global User Perspective
Chair: Charles S. Baker

5.0 Introduction

Charles S. Baker, Deputy Assistant Administrator, NOAA Satellite and Information Service

Mr. Baker welcomed the participants back to the fourth day of NOAA's 2008 Satellite Direct Readout Conference and introduced himself as the Chair of Session 5 on the Global User Perspective. Mr. Baker noted that the previous session of this conference were mainly about updates on the status of NOAA's and other agencies satellites and instruments as well as the various direct readout services. The conference participants had also heard about the training opportunities that are available on the use of satellite data. As well as presentations on some of the interesting applications that are being used and developed for satellite data. Session Five changes the focus to the user's perspective.

Mr. Baker admitted that NOAA sometimes forgets that there are a lot of users of NOAA satellite data outside of the U.S. As most of the participants know, NESDIS's main customer is the U.S. National Weather Service (NWS). NESDIS works very closely with NWS in the development of the satellite systems; but the NWS is not the only users of NOAA data. That is why Session Five is of particular importance to NOAA.

During Session Five the participants heard from a very wide range of non-U.S. users, from the backyard hobbyist to the seasoned forecaster and researcher. Specifically, the Session started off by hearing a Keynote address from a South American regional perspective from the representative of the President of WMO Regional Association III. There were other regional perspectives given from the South Pacific as well as from the meteorological services of Costa Rica, Chile and Canada. The participants heard presentations from the research fields from the National University of Rosario in Argentina and the center for weather forecasting and climate studies in Brazil. The participants also heard from representatives of the independent satellite enthusiast and small users. In short, the participants received a good overview of how NOAA satellite data are being used over a large portion of the global and from a wide variety of users. This is particularly important to NOAA, because we need to hear what you are doing with our data and how we can improve our services to you. Mr. Baker then took opportunity to thank the speakers for coming to the conference, some from great distance, to speak.

5.1 Keynote Address: WMO Regional Association III Perspective

Alejandro Muñoz, Deputy Director, Chilean Meteorological Service

Alejandro Muñoz is the Deputy Director of the Chilean Meteorological Service and is representing General de Brigada (Av.) Ramón Jesús Viñas Garcia, President of WMO Regional Association III. Mr. Muñoz spent the first part of his presentation describing how the various meteorological services in South America receive NOAA satellite data. The methods for receiving the data vary widely as do the types of data they use depending on the capabilities of each service. By in large, most

services do receive NOAA satellite data directly from the satellites, but only a few services have access to GVAR stations. Most of the services also get data through the internet. GOES-12 data are the most commonly used data set. Brazil and Argentina are also receiving GOES-10 data and making it available through their web sites. The use of NOAA POES satellite data is very limited. As with meteorological services elsewhere in the world, the services in RA III use the data for forecasting, but numerical modeling is still relatively scarce in the region.

5.2 Group on Earth Observation

Francis Bell, Director, Group on Earth Observation (GEO)

Francis Bell is the Director of the Group on Earth Observation (GEO); not to be confused with the Group for Earth Observation (GEO). GEO was formed in 2003 to represent the interests of individuals, educational, and non-commercial users of weather satellite data. The underlying philosophy of the group is to share skills, knowledge, and experiences of live weather satellite reception. The group is relatively small but very resourceful acting as a conduit for its members to share information and solve problems in satellite data reception. GEO produces a quarterly magazine and has available in its "shop" some hard to find equipment.

GEO has published several technical articles on LRIT and EUMETCast reception. Mr. Bell played an audio tape of the interference that is hampering NOAA 18 APT reception caused by the pager system in Europe and went on to describe how GEO members' testing efforts identified pager resistant receivers. In short, GEO is a good place to find computer support, help with writing computer software or finding help with existing software along with assistance in using satellite data for meteorology and oceanography as well as radio design.

5.3 Private Individual Users of Weather Satellites: The Future

Dave Cawley, Remote Imaging Group (RIG)

David Cawley is the Treasurer for the Remote Imaging Group (RIG), which is internationally recognized and represents the interests of its members to the Radio Communications Agency in the UK, EUMETSAT in Europe and to NOAA in the USA. RIG caters to everyone interested in imaging from satellites, and has approximately 1600 members in 45 countries. The group is keen to assist new members and provide an on- going service to our existing members, which includes both professional and amateur satellite image users. After the launch of the first Earth observing satellite TIROS-1 in April of 1960, the U.S. developed a policy that the data from weather satellites are to be free for all mankind. RIG represents the interests of the Private Individual User (PIU) of Earth observing satellite data. Who are these users? They are weather enthusiast, golfers, small private plane pilots, yachtsman, and anyone with an interest in technology for self training.

What does the PIU what from the worlds satellite operators? They want assurances that the full and open policy for access to satellite data are continued and expanded where it is not followed. They want easy transitions between satellites and systems. And, most importantly, they want continuity of data from the satellites.

In 2004, we had WEFAX, which was simple, used a small antenna, and inexpensive equipment. Since 2004 WEFAX was ended and the number of PIU users has dropped dramatically because the new systems are much too expensive and complicated to use. The impact has been particularly hard

in Third World countries where the institutional users, such as the meteorological services, cannot afford the expensive equipment for the new systems.

What the PIU and the many in lesser developed countries want is a data reception system that is easy to set up using amateur-based technology. The systems needs to be relatively low cost, use a small antenna, and, if possible, is broadly analogue based so that it does not require any specialized technology. One possible solution would be to re-establish a WEFAX type service.

5.4 NOAA Data at the Costa Rican Meteorological Service

Werner Stolz, Chief, Forecasting, Instituto Meteorológico Nacional-Costa Rica

Mr. Werner Stolz, Chief of forecasting for the Instituto Meteorológico Nacional of Costa Rica, gave a presentation on his national service. Mr. Stolz described the various atmospheric and oceanic phenomenon that affect Costa Rica and Central America including tropical storms, tsunamis, forest fires, cold fronts, tropical cyclones, tropical waves and troughs.

Mr. Stolz also described the NOAA products that are used in Costa Rica and Central America including: GOES-12 data, detection of hot spots, hydro estimator, WAFS-METLAB, METAR and several others. He also described the use of data from DART and Caribbean Sea buoys. Costa Rica is participating in the Central American Flash Flood Guidance (CAFFG) system as well as GEONETCast. Costa Rica uses numerical weather models, the Global Forecasting System (GFS) and the Weather Research and Forecasting Model (WRF).

The recommendations that Mr. Stolz presented included:

- Address problems with the WAFS-METLAB transmission,
- Improve the capabilities of the Central America region to integrate BUFR data,
- Encourage the acquisition of GEONETCast equipment in the region to improve data reception and sharing,
- Address the fact that several countries in Central and South America receive NOAA data from EUMETSAT; requested NOAA to investigate the possibility of disseminating more of its data through EUMETSAT,
- Investigate a way that the results from the GFS model runs can be transmitted through the WFS-METLAB in a timelier manner and
- Improve the hydroestimator.

5.5 NOAA Data by the Chilean Meteorological Directorate

Alejandro Muñoz, Chief, Forecasting Department, Dirección Meteorológica de Chile

Mr. Alejandor Muñoz, Chief of the Forecasting Department of the Chilean meteorological service gave the presentation. Mr. Muñoz described the application of satellite data at the Directorate. The Directorate has six regional centers each has a satellite ground station of some sort. Four Centers have GVAR stations and three have HRPT stations. Communications between the centers is done through the “WAN” network and is distributed with a multiprotocol network.

Mr. Muñoz described some of natural phenomenon that they use NOAA data for: fire detection, cold and ice, volcanic eruption, intense rain fall, lightning and hail. Besides NOAA data the Directorate also receives data from the TERRA and AQUA satellites.

5.6 Use of Satellite Direct Readout in the South Pacific

Colin Shulz, Pacific Regional Environment Program

Colin Shulz from the Pacific Regional Environment Program gave an overview of direct readout usage in the Pacific region. The region itself is very large, but has a very low population. The people in the region use direct readout because other delivery services can be expensive, slow, and unreliable. The internet is often slow and unreliable. Leased lines are extremely expensive. Direct readout allows for local ownership and control of the system. The satellite services that are used include GVAR from GOES West, HRIT from MT-SAT 1R, LRIT from GOES West and MT-SAT, EMWIN from GOES West and GOES-7, HRPT and APT from Polar satellites and DCP/DCS to GOES West and MT-SAT.

GVAR and HRIT are only used at the larger stations like Fiji, Guam, Hawaii and Tahiti. LRIT is currently being installed in 16 locations throughout the region under a NOAA/WMO VCP program. GOES West is the preferred satellite because of its much greater data content, but covers only as far west as 150° East.

EMWIN provides a very valuable service to the region. It is the primary source of warning for many locations. About 6 – 8% if EMWIN data stream is used by the Pacific region. However, the region needs to update their receivers and software to the next generation systems. There is a need to prepare for the transition to EMWIN N any time in the future. It could be sooner rather than later.

GOES-7 is still being used by the region. It is old and blind but not deaf. Still used for distance education, telehealth, emergency management and EMWIN in the Pacific, it is in a highly inclined orbit so we need tracking antennas in order to use it. The satellite and ground systems are nearing their end of life.

HRPT is used only in a limited number of locations. APT is not used as much as in the past. DCS are used in a number of locations for automatic weather stations, tide gauges and special systems monitoring.

Why do we need all this technology? The ultimate goal of it all should be to protect and enhance people's lives and property. We should not lose sight of this goal. Our goal is to deliver information that will protect and enhance quality of life to all. We need to reach out to the "last mile," which is difficult to do where there are not even basic services and provide better and timelier warning and watches. We need NOAA's help to provide better products and services. We all need to work together to accomplish these goals.

The Pacific regions wish list for NOAA is:

- Transmit MT-SAT imagery on GOES West LRIT
- Additional Pacific related graphical products on GOES West LRIT
- Extend reliable EMWIN coverage to the Western Pacific
- Trial of FY-CAST from CMA
- Improve our outreach to the "last mile."

We in the Pacific Islands would like to thank NOAA, NESDIS and the NWS for their invaluable assistance over the years. Particular thanks to the NWS PRH who have always been there when we needed help.

5.7 The Role of Satellite Data in the Meteorological Service of Canada

David Bradley, Project Coordinator, Space-Based Monitoring, Meteorological Service of Canada

David Bradley, Project Coordinator, Space-Based Monitoring, Meteorological Service of Canada (MSC) gave the presentation. Mr. Bradley started out his presentation with a brief description of MSC, which is responsible for weather and environmental forecasting and environmental monitoring as well as science and technology. It is the largest user of satellite data in the Canadian Government and uses satellite data from the U.S. and European satellites. Mr. Bradley described the Space-Based Monitoring Project as understanding Canadian satellite data requirements, ensuring data access and exchange and strategic planning.

Mr. Bradley described MSC's satellite data reception capabilities for GOES and POES satellites as well as how they used the data, such as in operational and numerical weather prediction, research, data collection systems and environmental prediction and monitoring. He also described the Canadian ground segment infrastructure, noting that NPOESS and GOES-R are emerging requirements for MSC.

Mr. Bradley then described a new satellite mission that they are working with the Canadian Space Agency (CSA) to develop called the Polar Communications and Weather (PCW) Mission. PCW will provide reliable communications in the high latitudes (north of 70°) and high temporal and spatial resolution meteorological data above 50° north.

In concluding Mr. Bradley noted that GOES, POES and Metop are critical to MSC. That GOES-R and NPOESS are significant elements of the Government of Canada ground segment and that the PCW mission represents an opportunity to complement geostationary and poplar orbiting earth observations.

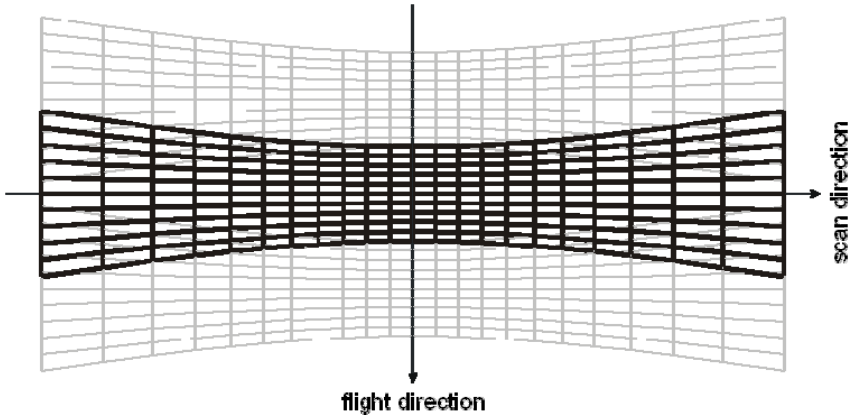
5.8 Comparative Evaluation of NOAA AVHRR, Feng Yun 1D, MODIS and Landsat TM5 Images Working as a Satellite Constellation for the Detection of Burned Areas in the Flooding Valley of Parana River, Argentina

Carlos Cotlier, Universidad Nacional de Rosario, Facultad de Ciencias Exactas, Ingeniería y Agrimensura, Centro de Sensores Remotos, Argentina

Carlos Cotlier from the remote sensing center at the Universidad Nacional de Rosario in Rosario, Argentina presented his work using different satellite data sets to detect burned areas. Brush and other natural vegetation are burned on the islands in the Paraná River flood plain in order to obtain grasses for cattle. Burning has intensified over the last several years destroying wild wetlands with unique flora and fauna even though these islands and wetlands are supposed to be protected from indiscriminate burning.

NDII (Normalized Difference Infrared Index) and BAI (Burned Area Index) indexes were applied for the analysis of the affected areas by creating images from combinations of infrared bands. Using calibrated images (radiance) from different satellite sensors over the study area we tried to determine which combination of data from a satellite constellation would produce the optimum spatial and spectral resolution. A LandSat 5 TM image was used (February 18, 2006) to determine the fire center location with the greatest accuracy. A fire center with a large smoke column was chosen.

With the aid of high temporal resolution NOAA-AVHRR, Feng Yun 1D and MODIS images from the next day (February 19, 2006) we were able to check the burned areas and analyze the different sensors spectral response. In contrast to other scanning sensors such as AVHRR, during each scan MODIS covers ten lines of 1km spatial resolution (40 lines of 250m resolution and 20 lines of 500m resolution, respectively). Due to this unique feature, the so called panoramic "bow tie" effect occurs at the border of each scene. In the figure, a schematic layout of the "bow tie" effect is presented.



Three consecutive MODIS scans each consist of ten 1km lines. Due to the panoramic "bow tie" effect, the scans are partially overlapping at off Nadir angles. The first and third scans are represented by the light grey grids, while the second scan is shown in black.

The conclusions we came to from this study was that:

- An optic satellite constellation proved to be optimum for fire damage analysis when satellite revisit times allow it. With the aid of low and medium spatial resolution images, a more precision size of the burned areas and possible assessment of the damage caused were determined.
- The use of a LandSat TM 5 image with a 30 meters spatial resolution to determine the main fire center and with the help of lower spatial resolution images but with higher daily and hourly revisit such as NOAA, Feng Yun and MODIS allows for better and more accurate data information in the 24 hours period after fire detection. Care should be taken not confusing the burned areas with water bodies (pure water) or any other surface that can confuse the analysis.
- The question remaining is: how to work with this constellation methodology when LandSat revisit time is 16 days? In this case we recommend the use of other satellite images like IRS, SPOT (30 meters resolution), SAC-C (with a 175 meters spatial resolution), CBERS (25 meters resolution), IKONOS, QuickBird (1 meter resolution), etc
- Each year more countries are putting in orbit more medium resolution satellites. In the near future Nigeria, China, Israel, France and Korea will have or are going to have MIR band satellites with a spatial resolution of 30 meters or lower.
- If no commercial satellite matches the revisit time, MODIS can be used because of its daily revisit time and spatial resolution of 500 meters.
- Finally, we concluded that the use of an optic satellite constellation, when revisit dates allow, is optimum for fire damage analysis. Medium and low resolution platforms can be used to determine an accurate size of burned areas and precise assessment of the damage.

5.9 Low Orbit Meteorological Satellite Products and Analysis Tools at INPE/CPTEC, Brazil

Carlos Angelis, INPE/CPTEC

Carlos Angelis from the center for weather prediction and climate studies (CPTEC) at the Brazilian space research agency (INPE) gave the presentation. CPTEC is located in Cachoeira Paulista in Brazil and has a number of supercomputers and maintains a large archive of GOES, METEOSAT, POES, ACUA, TERRA, TRMM and other satellite data. CPTEC is also responsible for about 1500 rain gauges throughout Brazil as well as access to 8 weather radars and the national lightning detection network. CPTEC works in the areas of remote sensing of the atmosphere, data assimilation, numerical weather forecasting, climate prediction, and meteorological and environmental data. The CPTEC-INPE Satellite Division has facilities in Cuiabá and Cachoeira Paulista. Most of the data CPTEC receives is made available through their web page.

Some examples of the products they produce from NOAA POES data include: fire, NDVI, ATOVS, CST, SST, and chlorophyll. From AQUA and TERRA data they produce aerosol, fire, ozone profiles, kindex, temperature, rainfall estimation, MSPPS, and USProb.

The CPTEC research team is focusing on rainfall estimation, nowcasting, soundings, surface radiative processes and others. One project is focusing on trace gases through an inter-comparison and field campaign. They also did a CO – AIRS validation study. Another project focused on aerosol retrieval regionalization.

CPTEC also does a great deal of capacity building and is a WMO Center of Excellence for Portuguese speakers. They give many distance learning type courses using the VISITview format.

CPTEC is supplying derived regional products, such as fire monitoring, lightning, rainfall nowcasting, UV index, and vegetation, for broadcast through GEONETCast. CPTEC is in the process of developing software, called SIGMACast to be used for handling meteorological data from GEONETCast.

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5.10 Luncheon Panel on GOES-10 Operations

The last event in Session 5 was the GEOS-10 Panel discussion. The panel was moderated by Chris Wheeler, GOES Team Lead, NOAA Satellite and Information. The panel members were:

Luis Machado, Director, center for weather forecasting and climate studies (CPTEC) at the Brazilian space research agency (INPE)

Timothy Schmit, Senior Scientist, Center for Satellite Applications, Advanced Satellite Products Branch, NOAA Satellites and Information Service.

Chris Wheeler, the GOES Team Lead, started the panel presentations out by giving a brief history of GOES-10. It was launched in April of 1997, made operational as GOES West in July of 1998 where it remained until of June of 2006 when it was replaced by GOES-11. In November of 2006 GOES-10 began operations in support of South America. The instruments on GOES-10, although degraded some from nearly 10 years in space, continue to function well. However, GOES-10 is all but out of fuel. There is sufficient fuel to maintain its east west position, but not fuel to maintain its north south position.

The repositioning of GOES-10 has allowed for the uninterrupted imaging and, for the first time, sounding of South America. Since there is no fuel to maintain its north south position GOES-10 inclination is increasing. The fix for this was the development of the Extended GOES Operations at High Inclination (XGOHI) software, which takes the wobble out of the images. XGOHI has been working very well since it began service in October of 2007.

The fuel status on the GOES-10 is reaching the end-of-life state. GOES-10 will be taken out of service and de-orbited in December of 2009.

In summary:

- GOES-10 performing well after 11 years on-orbit,
- GOES-10 fuel will be exhausted by December 2009,
- GOES-10 will be de-activated and South America operations will end in December 2009,
- NOAA is looking at future constellation options but currently has no plan to provide support for South America beyond GOES-10, and
- Any future decisions on South America coverage will be based on the overall health of the NOAA constellation.

Luis Machado, Director of the center for weather forecasting and climate studies (CPTEC) at the Brazilian space research agency (INPE) gave a presentation on how they are using the GOES-10 data. Mr. Machado began the presentation with a brief overview of the CPTEC's facilities and satellite reception and data processing capabilities. CPTEC is taking all the data from GOES-10, processing it and archiving it at their facilities. The archive is available through the CPTEC web page. He then described some of the products they are producing such as color brightness for temperature threshold, color channel combinations, visible and IR, GOES-10 and MSG 8

composites, cloud classification, solar radiation, and hydro estimator.

These products are being used to do drought monitoring, cloud drift winds, nowcasting, probability of cloud ground lightning strike, and fire detection. Many of these products were not being done before because of the lack of or if available, consistent data. GOES-10 has greatly improved the accuracy of the products that CPTEC is producing.

There has been a significant increase in the use of the CPTEC web page that is directly related to the availability of GOES-10 data. GOES-10 has also allowed for improvements of services to emergency management groups in South America. CPTEC is developing resources for capacity building using the Virtual Laboratory software. A workshop was hosted at CPTEC facilities in June of 2007 specifically focusing on the use of GOES-10 data. There were over 70 participants representing most of the countries in South America.

In conclusion:

GOES 10 dedicated to South America has provided a very useful tool for the deliver of important information to South America users. For the first time South America has uninterrupted 15 minutes meteorological images and sounding capability.

INPE-CPTEC is working to improve the technical interchange, access to the products, and knowledge sharing mainly with: Civil Defense, Regional Weather Services, Environmental Secretaries of each Brazilian State, Electrical Energy Producers, Oil Producer Company, Universities, Brazilian Agro and Cattle Agencies, Brazilian Institute for the Environment and Renewable Natural Resources, and Public Health Entities.

Tim Schmit from NOAA's Advanced Satellite Products Branch (ASPB) gave a brief presentation focusing on the Extended GOES Operations at High Inclination (XGOHI) software that was developed by ASPB. Mr. Schmit began his presentation with a short description of the GOES constellation and the impact of Rapid Scan Mode (RSM) on the imaging schedule of GOES-East. He then showed how you can access GOES-10 data and products on the Cooperative Institute for Mesoscale Meteorological Studies (CIMMS) web site at the University of Wisconsin-Madison. The data access site is in English and Spanish.

Mr. Schimt continued with an explanation of the sounder schedule on GOES-10, which is doing the first ever soundings over South America. Along with the sounding schedule, he explained the different bands that are available from the GOES-10 sounder.

Mr. Schmit then went into an in depth explanation of the XGOHI software. The software is used only on the imager data. Due to the large satellite inclination, a remap (before) GVAR distribution for GOES-10 Imager data were considered. [IMC "saturates" at 2 degree inclination.] Remapped GOES-10 GVAR data from 25-June-2007 and via the satellite re-broadcast (12-July-2007, 23-July-2007) were investigated. Without XGOHI, the growing satellite inclination would continue to cause loops with an ever increasing 'wobble'. The result of the investigation was that there was no meteorological reason found that NOAA/NESDIS should not remap the GOES-10 Imager data. However, care must be taken to monitor hotspots for fire detection products. Given the current remapping parameters, the pro's of XGOHI (steady image loops) outweigh the con's (slightly changed hot spot detection). GOES-10 Imager XGOHI operations started at 19:13UTC on October 2, 2007. The XGOHI software has been seen as a great success by NOAA, in that it could be used to prolong the life of geostationary satellites with increasing inclination.

Much of the discussion after the panelist presentations focused on what will happen after GOES-10 runs out of fuel. NOAA made it clear that they could not commit to a replacement until the GOES O and P satellites are launched and safely in orbit. If everything goes well with the launches and the GOES constellation remains healthy, NOAA will re-evaluate the possibility of finding a replacement for GOES-10.

There were many expressions of appreciation for NOAA's effort in making GOES-10 available for use over South America and the hope that circumstances would allow for a replacement. Most users of GOES-10 data said that once the satellite is de-commissioned they will switch back to using the GOES-East data. Brazil did mention that they are exploring the possibility of launching a geostationary satellite.

Another suggestion was made that EUMETSAT be approached to see if one of their old geostationary satellites could be moved in support of South America.

The suggestion was made that NOAA explore the possibility of decommissioning GOES-10 in place. With the growing debris in space, particularly after the recent shooting down of a satellite by the Chinese and international treat obligations to de-orbit old satellites, this possibility was not possible.

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Co-Chairs: Hal Bloom and Dan Stockton

6.1 Future of Direct Readout and Satellite Systems

Abigail Harper, Deputy Assistant Administrator, Systems, NOAA Satellite and Information Service

Abigail Harper, Deputy Assistant Administrator for Systems, NOAA Satellite and Information Service welcomed all back to Session Six of NOAA's 2008 Satellite Direct Readout Conference on the future of direct readout systems. Ms. Harper thanked all those who had given presentations earlier in the conference and expressed her appreciation to able to hear all the uses that are being found for the data coming from NOAA satellites.

Ms. Harper hoped that all knew about the changes that will be coming with the new generation of NOAA satellites that are under development, NPOESS and GOES-R. It is important that the user community has an understanding of how new satellite systems are planned. This conference is one way that NOAA is communicating these changes. But, more important, this conference gives NOAA an opportunity to hear from its users. It is important for NOAA to know what the users' needs are and how the data they get from NOAA is used.

Ms. Harper went on to describe how GOES-R and NPOESS will be major challenges for all users, in that the volume of data that will be coming from the new generation of satellites is a significantly larger than what is coming from the current generation of satellites. All will have to deal with this increase volume. Not only will there be much more data, but the resolution of the data will higher and the quality better. All will have to work hard to prepare themselves, their products, forecasts and models to ingest the new improved data. The bright side to all the increased volume and quality of data are that the whole user community will get much improved forecasts and monitoring of environmental processes.

There are challenges in the new generation of NOAA satellites in the form of calibration and validation efforts and the need to make equipment changes and upgrades. Ms. Harper expressed a hope that NOAA has started early enough to allow the user community to be prepared to use the new data as soon as the satellites are turned on. She again expressed the importance to NOAA of getting feedback for the user community.

6.2 GOES-R Satellite and Program and Review

Hal Bloom, Deputy Director of the NOAA Satellite and Information Service, GOES-R Program Office

Mr. Bloom reviewed the GOES-R Program Mission that includes: weather sentinel functions to support hurricane, severe storms and flash flood products; input to meteorological models and forecast and warning products and many other meteorological, oceanographic and climate monitoring efforts. Also mentioned were the Data Collection System and Search and Rescue Services. Mr. Bloom also explained that GOES-R would provide continuity of the GOES missions and of the two satellite constellation. He also explained that increases in spatial, spectral and

temporal resolution would enhance all of the products produced using GOES-R imagery. He noted that GOES-R would be in a new GOES-West location; to be 137°W instead of current 135°W. This new location eliminates conflicts with other satellite systems in X-band frequency at 135°W.

Mr. Bloom presented a summary of the instruments that would be deployed on GOES-R. He briefed that the Advanced Baseline Imager (ABI) and the new Geostationary Lightning Mapper (GLM) would improve: hurricane track and intensity forecasts, thunderstorm & tornado warning lead times and aviation flight route planning. He also noted was the planned Extreme Ultra Violet Sensor/X-Ray Sensor / Irradiace Sensor (EXIS) that will improve solar flare warnings for communications and navigation; the Solar Ultra Violet Imager (SUVI) that has been designed to improve power blackout forecasts due to solar flares; and the Space Environmental In-Situ Suite (SEISS) that should provide data allowing for improve energetic particle forecasts. Mr. Bloom also noted the continuation of the GOES services that will include the Low Rate Information Transmission (LRIT), the Emergency Managers Weather Information Network (EMWIN), the Data Collection System (DCS), the SARSAT Search and Rescue Service and the GOES Rebroadcast (GRB) service that is designed to replace the current GVAR broadcast. Mr. Bloom also reviewed the GOES-R system architecture and a functional review of the planned ground system.

In summary, Mr. Bloom noted that GOES-R is monitoring the following milestones: GOES-R instrument contracts are underway, it is expected that the spacecraft contract will be awarded in December 2009, and that the ground contract should be awarded by the third quarter of fiscal year 2009 (April-June 2009). He also noted that the next GOES users conference is in November 2009 at the University of Wisconsin at Madison.

More information can be found at: http://www.goes-r.gov/.
6.2_bloom_futurereadout.ppt

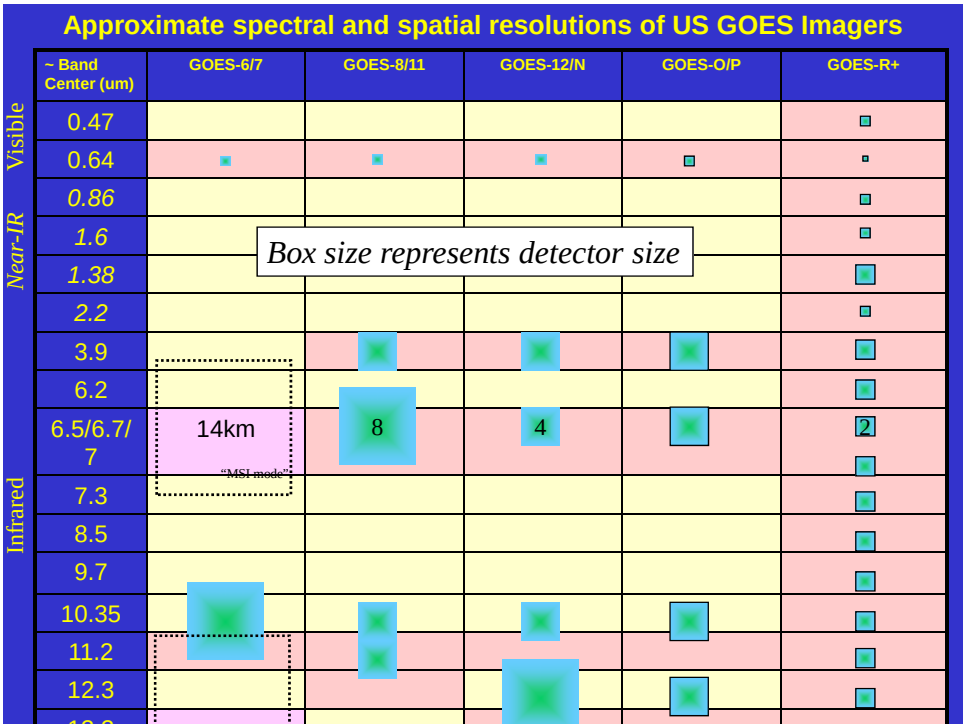
6.3 GOES-R Instruments and Products.

Tim Schmit, NOAA Satellite and Information Service

Dr. Schmit began with a review of the Geostationary Lightning Mapper (GLM). He emphasized that this is a new instrument for NOAA geostationary satellites that will detect total lightning strikes from within clouds, cloud-to-cloud and cloud-to-ground. This system will complement land-based systems but will also enhance them as the land-based systems only measure the cloud-to-ground strikes that account for approximately 15% of the total strikes. The GLM will also increase coverage over the total land area and over the oceans.

Dr. Schmit then presented an extensive discussion of the Advance Baseline Imager (ABI). He noted that the ABI scans five times faster than the current GOES imagery. He also discussed important features of the ABI including that there were sixteen bands in the visible, near IR, and IR range for performing various functions. The ABI will be able to image the continental U.S. every 5 minutes for routine monitoring of many types of events including storms, dust, clouds, fires and winds compared to every 15 or 30 minutes with the current GOES imagery in routine mode. Dr. Schmit also presented several examples of simulated products from the expected GOES-R ABI along with tables showing the products that are to be produced compared to the current suite of products on the current GOES satellites. The following table shows some of the characteristics of the ABI and the following graphic “box” compares the spectral and spatial resolutions of the historical GOES imagers to the GOES-R ABI instrument.

Spectral Coverage	16 bands	5 bands
Spatial resolution		
0.64 mm Visible	0.5 km	Approx. 1 km
Other Visible/near-IR	1.0 km	n/a
Bands (>2 mm)	2 km	Approx. 4 km
Spatial coverage		
Full disk	4 per hour	Scheduled (3 hrly)
CONUS	12 per hour	~4 per hour
Mesoscale	Every 30 sec	n/a
Visible (reflective bands)		
On-orbit calibration	Yes	No



More information can be found at: http://cimss.ssec.wisc.edu/goes/abi and ftp://ftp.ssec.wisc.edu/abi/srf.
6.3_Schmit_11Dec08_goesr.ppt

6.4 GOES-R Direct Readout Implications

Mr. Bill Mazur, NOAA Satellite and Information Service, GOES-R Program Office

Mr. Mazur began by summarizing the instrument package planned for GOES-R and the significant changes and upgrades from the current GOES satellite sensors. He noted the very large increase in the data rate that will be generated by the GOES-R series of imagers and services. He also presented a comprehensive graphic of the projected GOES-R downlink frequency plan and how it differs from the GOES-N/O/P satellites. It was noted that GOES-R downlink frequencies are packed in between frequencies allotted to other communities.

Mr. Mazur also discussed the GOES-R Re-broadcast service or GRB in detail. The GRB will replace the current GVAR broadcast. He noted that this data stream will include full resolution data from all the GOES-R instruments and sensors and that it will all be calibrated with navigation; "level 1B." Some products will be carried at a level 2 state. The new data rate will be 31 Mbps. That represents a large increase from the current 2.1Mbps on the current GOES satellites. He also discussed that the GRB service will require changes to the direct readout ground receive stations. Noted was the fact that there would be significant upgrades necessary to receive GRB as the signal will have a dual polarization, changes to modulation and forward error detection coding.

One significant issue that was discussed is the deployment of the dual-polarization scheme. This is a known method for maximizing the available frequency. This is important as the ability to obtain additional frequency allotments is very difficult. The GOES-R Program Office completed a study of the use of dual polarization and determined that the proposed scheme is a viable approach to meeting the designed capacity requirements. This study is summarized in the poster prepared for the conference: XPD poster_for _DRG_Mod_D.pdf that is available at XPD_poster_for _DRG_Mod_D.pdf .

Mr. Mazur also presented information on the Emulated GVAR broadcast. eGVAR will provide GOES-R imagery to users that currently receive a GVAR broadcast. This broadcast will be transmitted through a spare satellite from GOES N/O/P series as a communications platform. The data stream will have GVAR characteristics such as frequency and power levels. The format will be the same as the current GVAR signal. There will be five wavelengths (ABI channels 0.64, 4.9, 6.19, 11.2, 13.3 μm) and the imagery will be mapped to the GOES-N/O/P resolution. This broadcast will not include sounder data and will likely be limited to half-hour full disk scenes. It was emphasized that this is a contingency plan and not an option for long-term use. It will become operational based on user readiness for the GRB broadcast.

Mr. Mazur also discussed the services that would be deployed on GOES-R. First, he briefed the planned combined HRIT/EMWIN broadcast that will supersede the current Low Rate Information Transmission (LRIT) and the Emergency Managers Weather Information Network (EMWIN) broadcasts. The new, combined broadcast will feature a combined information bit rate of 400 Kbps that allows for growth for both of the current broadcasts. The modulation will be BPSK; representing another change for the EMWIN broadcast. To ease transition to the new broadcast a prototype "Software Defined Radio" has been developed (demonstrated at the conference – see Session 3: GOES-R / AEROSPACE HRIT/EMWIN Prototype Receiver Card Demonstration). This relatively low-cost hardware and software package will be able to receive all current and future LRIT, EMWIN and HRIT broadcasts and features a GUI interface for controlling the application and for viewing files. This development is being performed for the GOES-R Program by Aerospace Corp and will become available on the GOES-R web site when completed. He also briefed the changes to the GOES-DCS Service. GOES DCS will continue to have two communications services; Data Collection Platform Receive (DCPR) and Data Collection Command (DCPC) that was previously "Interrogate", or DCPI. He briefed that there would be a continuation of achieving increased channel efficiency and system capacity. There will be narrower DCPR channel assignments allowing both East and West satellites to support 200 simultaneous platform signals, with a system capacity of about 72,000 platforms. There will also be a new DCPC service that is currently in development that will have one channel on each N/O/P satellite and two channels on each GOES-R series satellite. The service to current users having 15.0 G/T will continue to be supported. In summary, Mr. Mazur briefed that DCPR uplink frequencies will be unchanged but that the downlink frequencies will shift from 1694.5 MHz to 1683.3 MHz and that there will be a

change in demodulator frequency. He also discussed the SARSAT service on GOES-R. He briefed that the SARSAT signal characteristics will be modified slightly and that GOES-R will "transpond" rather that "re-modulate" the up-link band. This will require changes to the LUT receivers although the center frequencies for both up and down-link will be the same. Also discussed was that GOES-R will be required to operate with 32 dBm uplink power (versus 36 dBm for GOES-NOP) to account for degraded Beacons. The transponder will be required to operate with a minimum of 10 uplink beacons simultaneously; providing improved capability to support beacons with weak signals. This change conforms to COSPAS/SARSAT Specification T001, Issue 3 Revision 8 dated Nov 2007.

Lastly, Mr. Mazur briefed that on GOES-R the Solar X-ray imagery or SUVI instrument data will be down-linked with the other instrument data (at X-band), processed to Level 1B and broadcast to users via the GRB link instead of to the Space Weather Prediction Center in Boulder, CO on a separate satellite downlink as is the case with current GOES satellites.

For more information, visit www.goes-r.gov.
6.4_Mazur_GOES-R Direct Readout Implications.ppt

6.5 GOES-R Outreach Activities.

Jim Gurka, NOAA Satellite and Information Service, GOES-R Program Office

Mr. Gurka presented an overview of outreach efforts undertaken by the GOES-R Program Office to inform users on the changes that are coming with the GOES-R Series of satellites. An outreach program was undertaken early on. Forums included and continue to include: conferences, formal user education and training, information provided on the GOES-R web site, and the satellite proving ground concept. Major meetings and conferences where GOES-R information and training was provided included the series of GOES Users' Conferences, the annual meetings of the American Meteorological Society (AMS), meetings of the National Weather Association, the Direct Readout Conferences, the AMS conferences on Satellite Meteorology and Oceanography, EUMETSAT Satellite Users' Conferences and previous Direct Readout Conferences. Early conferences focused on user requirements and planned instruments and sensors while in recent events the emphasis has shifted to user and community readiness

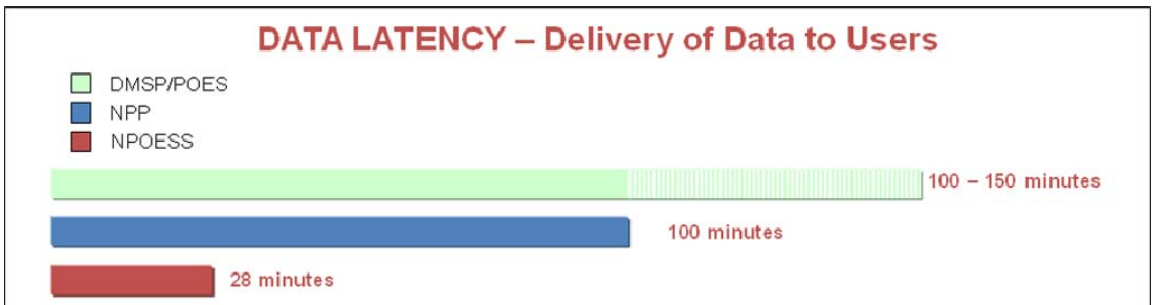
He explained that they are using the "Proving Ground" or "Testbed" concept to help ensure user readiness. This was proven to be a very successful model during the inception of the NEXRAD Program. This concept uses optimized display techniques, simulators, decision aids and proxy or simulated data sets. There is an opportunity for direct user input during this process . This process also leverages expertise at the Cooperative Institutes and other existing Testbed locations. Also noted was that there has already been important work done on proxy and simulated GOES-R data sets by the Algorithm Working Group (AWG); on developing proxy GOES-R datasets from MODIS and SEVIRI imagery; on developing computer simulated atmospheres and imagery with ABI attributes at CIMMS and CIRA; and on demonstrating synergy between high spectral resolution AIRS and high temporal ABI. Mr. Gurka explained that several important education initiatives are being following up at the Cooperative Program for Meteorology Education and Training (COMET), the Virtual Institute for Satellite Integration Training (VISIT), and the Satellite Hydrometeorology Course (SHyMet). Some examples of education resources are: 1) 30 satellite specific modules with at least 100 hours of instruction, 2) satellite products in most of COMET library of over 200 modules, 3) Environmental Satellite Resources Center Online and 4) a GOES-R module series that is currently under development (1st module release in Jan. 2009).

For more information see:
www.goes-r.gov
http://www.comet.ucar.edu/
http://rammb.cira.colostate.edu/training/shymet/
http://rammb.cira.colostate.edu/visit/visithome.asp
http://cimss.ssec.wisc.edu/goes_.
6.5_Gurka_GOES-R_Outreachv2.ppt

6.6 Satellite and Program Review

Dan Stockton, Program Executive Officer for Environmental Satellites, NOAA Satellite and Information Service

Mr. Stockton's presentation began with the mission statement (Environmental Monitoring System in Support of Defense and Civil Applications) and major features and benefits of the NPOESS program. The features listed include: 1) rapid data delivery; four times faster than legacy systems enabling quicker reaction to changing conditions; 2) ten times the data of existing systems; 3) more accurate data for the production of improved forecasts; 3) international collaboration; and 4) contributions to 14 of 26 essential climate variables. The greater benefits of NPOESS were stated as providing critical inputs to weather forecast models and global change monitoring; science quality data to operational users and research scientists and the continuity of environmental climate data records. He then went over a concept of operations that included mention of the two direct readout broadcasts to field terminals (one for low rate data and the other for high rate data terminals) and the broadcast of the stored mission data to the SafetyNet™ receptor sites with the SafetyNet™ sites being connected by a global fiber network. Mission management will occur at the NOAA Satellite Operations Facility (NSOF) in Suitland, Maryland and at an alternate site in Aurora, Colorado. All EDRs will be delivered to NOAA, U.S. Air Force and U.S. Navy Centrals. He also explained the improvements that will be made to data latency and data volume that will be achieved by the NPOES program. The following graphic highlights some of the data latency projections.



Improvements Over Heritage	Data Rate	Data [1] Volume	Encryption	Spectral Capability	Vertical Resolution
Heritage	1.5 Mbps	6.3 GB/Day	Total	5 bands	40 bands
NPOESS	20 Mbps	5.4 TB/Day	Selective	22 bands	1300 bands

Mr. Stockton also summarized the status of the instrument development and testing; the highlight of which was the note that the VIIRS instrument is into the final stages of environmental testing. He noted that the VIIRS will enable improved cloud analyses resulting in improved forecast model performances, enhanced aerosol cloud discrimination, and higher quality products for military

applications. Also discussed was the planned availability of multispectral imagery that will greatly enhance scene feature discrimination. Other improvements will be an advanced sounder that will result again, in improved forecasts and enhanced monitoring of tropical cyclones.

In summary, Mr. Stockton noted that real hardware and software are being delivered, the Command, Control and Communications System is complete & installed at NOAA Satellite Operations facility (NSOF); and that it will be transitioned to Operations and Support, the Integrated Data Processing System is in transition to Operations and Support at NSOF and will be complete by June 2009, the NPOESS Sensor EDU integration and test with NASA NPP spacecraft is completed, the sensor flight hardware is completing rigorous testing and finally that the operational space segment development is currently on track for implementing the Nation's next generation of polar orbiting environmental monitoring systems.

6.6_Stockton_NPOESS Satellite and Program Review.ppt

6.7 NPOESS Direct Readout Mission

John Overton, NOAA Satellite and Information Service, NPOESS Integrated Program Office

Mr. Overton began with recognition of the Direct Readout Mission Team members. He noted that there were several team participants from three organizations primarily responsible for this development: Patrick Coronado and Kelvin Brentzel from the NASA Direct Readout Lab, Allen Huang and Liam Gumley from CIMSS/SSEC at the University of Wisconsin and Bill Thomas and Bonnie Reed from the NPOESS Integrated Program Office.

He also reviewed the history of the Direct Readout Program from the earliest NOAA POES and DoD DMSP along with the SeaStar mission through the NASA Aqua and Terra missions and into the future with first NPP then the NPOES missions. Mr. Overton noted that there are now over 200 X-band receiving stations in the community. Also reviewed were the high and low rate downlink characteristics. These are presented in the following table from the presentation:

Mr. Overton also briefed the International Polar Orbiter Processing (software) Package (IPOPP) that will enable the Direct Readout user community to smoothly transition from Aqua and Terra EOS missions to the NPOESS mission. The IPOPP will host government sanctioned algorithms that will enable the DB community to process, visualize, and evaluate NPOESS Sensor data and generate Environmental Data Records (Level 2) in near real-time from direct broadcast of EOS and NPOESS high and low rate data. He also presented the NASA Direct Readout Laboratory (DRL) Simulcast application that allows users to "select and view quick look instrument data from multiple missions and spacecraft."

For more information, please visit the following sites:
NPOESS website: http://www.npoess.noaa.gov
NPP Website: http://jointmission.gsfc.nasa.gov
The Direct Readout Web Portal: http://directreadout.sci.gsfc.nasa.gov
6.7_Overton_ NPOESS Direct Readout Mission.pptx

6.8 NPOESS Direct Readout Operational Enhancements Model for Future Polar-orbiting Systems

Mr. John van de Wouw, Northrop Grumman Space Technology

Mr. van de Wouw gave a presentation highlighting the direct readout (DRO) technical capabilities of the NPOESS mission. He noted that the direct broadcast X-band High Data Rate (HRD) link will operate at 20 megabits per second (Mbps) and the L-band Low Data Rate (LRD) link at 3.16 Mbps. The ground user station will consist of the open source IPOPP DRO ground processing software that will not require any data usage or licensing cost to the user but that hardware procurement will be a user responsibility. This capability will enable the user to process 34 HRD environmental data records and advanced data collection system readings.

He also noted that the configuration of data types down-linked via direct readout was programmable and that the configuration could be changed to support regional or mission requirements. In summary it was noted the NPOESS mission represented a paradigm shift in servicing the Direct Readout Mission.

6.8_NOAA NPOESS DRO 20081211.ppt

6.9 NPOESS Preparatory Project Calibration and Validation Supporting Direct Readout Users.

Heather Kilcoyne, NOAA Satellite and Information Service's NPOESS Integrated Program Office

Ms. Kilcoyne described the methodology planned to formulate a successful calibration and validation Cal/Val program for NPOESS. She updated the conference on the risk reduction goals of the NPP mission. Her main points included ensuring the operational viability of the products, providing independent verification and validation of algorithm results, acting as a liaison between the contractor and the technical community and providing program information and technical support to the user community. She also reviewed the lessons learned from heritage Cal/Val programs. They include the following points from her presentation:

Sensor Performance and Sensor Characterization are the cornerstones of all data products,
Experience and resources from past operational and science missions should be fully exploited and incorporated into the NPP and NPOESS Programs,
Customer and User Satisfaction are achieved through participation in the Cal/Val process,
Community Proficiency with Operational Algorithms is essential to efficient Cal/Val and Community buy-in,
Space-borne assets, Global models, Surface Networks and Data Assimilation provide a cost effective comprehensive view of sensor and algorithms performances,
Targeted Campaigns and Special Studies will be planned and executed as needed, and
EDR Performance and corrective actions will be handled in accordance with established Program priorities.

Ms. Kilcoyne also briefed that the NPP community has responsibilities and roles in the Cal/Val project. She briefed that customer such as the data centers and products center (AFWA, NESDIS, FNMOC, NAVOCEANO and NASA) need to integrate the data records into their mission systems and provide feedback. Users such as the Direct Readout Community and the academic and research communities need to provide feedback and analysis of the products to the Cal/Val team. She summarized by briefing that the Cal/Val program is maturing, the IPO is engaging the DRO

Community to make sure program satisfies their needs and that the Direct Readout Community is encouraged to participate in the Cal/Val process.

6.9_Kilcoyne_CalVal with DRO.ppt

6.10 Transitioning from POES AVHRR to NPOESS VIIRS: Understanding the Relationships between POES and NPOESS Data Products

Bonnie Reed, NOAA Satellite and Information Service, NPOESS Integrated Program Office

Ms. Reed summarized the Visible Infrared Imager Radiometer Suite (VIIRS) program for the audience. She noted the heritage sensors such as OLS, AVHRR, SeaWifs and MODIS. She noted that VIIRS will provide spectral resolutions from 0.412 – 12.0 microns in 22 bands spatial resolution at ~375 meters at nadir. Also noted was the ability to map the globe with a single sensor in one day. Some of the specifications of VIIRS parameters were presented in the following table from the presentation:

Select Parameters	**DMSP**	**POES**	**NPOESS/VIIRS**
Vis/IR Imagery Resolution Global	3.25 Km	4 Km	0.750 Km
Vis/IR Imagery Resolution Region	0.65 Km	1 Km	0.375 Km
Multi-spectral Imaging Capability	2 channels	6 channels	22 channels
Sea Surface Temp Resolution	3.25 Km	8 Km	0.750 Km
Sea Surface Temp Accuracy	+/- 50 K	+/- 1.50 K	+/- 0.20 K
Data Latency	120 - 150 min	120 - 150 min	< 30 min

Ms. Reed also went over the VIIRS bands and compared them to those of AVHRR and reviewed the environmental data records, intermediate and application related products that will be coming from VIIRS. They are presented in the following two graphics:

Comparison of VIIRS & AVHRR Bands

AVHRR					VIIRS					
Band	Band Center (um)	Wavelength (um)	Wavelength Type	Spatial Resolution at Nadir	Band	Band Center (um)	Wavelength (um)	Wavelength Type	Spatial Resolution at Nadir	Typical Use
					I1	0.64	0.60-0.68	VIS	375 m	Imagery
					I2	0.865	0.845-0.885	NIR	375 m	NDVI
					I3	1.61	1.58-1.64	SWIR	376 m	Snow
					I4	3.74	3.55-3.93	MWIR	377 m	Imagery Clouds
					I5	11.45	10.05-12.4	LWIR	378 m	Cloud Imagery
					M1	0.412	0.402-0.422	VIS	750 m	Aerosols, Ocean Color
					M2	0.445	0.436-0.454	VIS	750 m	Aerosols, Ocean Color
					M3	0.488	0.478-0.498	VIS	750 m	Aerosols, Ocean Color
					M4	0.555	0.545-0.565	VIS	750 m	Aerosols, Ocean Color
1	0.63	0.58 - 0.68	VIS	1.09 km	M5	0.672	0.662-0.682	VIS	750 m	Aerosols, Ocean Color, Clouds, Surface Mapping
					M6	0.746	0.739-0.754	NIR	750 m	Atmospheric Correction
2	0.8625	0.725 - 1.00	VIS	1.09 km	M7	0.865	0.846-.0885	NIR	750 m	Aerosols, Ocean Color, Land-Water Boundaries
					M8	1.24	1.23-1.25	SWIR	750 m	Cloud particle Size
					M9	1.378	1.370-1.386	SWIR	750 m	Cirrus/Cloud Cover
3A	1.61	1.58 - 1.64	SWIR	1.09 km	M10	1.61	1.58-1.67	SWIR	750 m	Ice, Snow
					M11	2.25	2.225-2.275	SWIR	750 m	Clouds
3B	3.74	3.55 - 3.93	MWIR	1.09 km	M12	3.7	3.61-3.79	MWIR	750 m	SST, Night Clouds
					M13	4.05	3.973-4.128	MWIR	750 m	Fires, SST
					M14	8.55	8.4-8.7	LWIR	750 m	Cloud Top Properties
4	10.8	10.30 - 11.30	LWIR	1.09 km	M15	10.763	10.263-11.263	LWIR	750 m	SST, Night Clouds
5	12	11.50 - 12.50	LWIR	1.09 km	M16	12.013	11.538-12.488	LWIR	750 m	SST
					DNB	0.7	0.5-0.9	VIS	750 m (across full scan)	Imagery

4

VIIRS EDRs, IPs, and ARPs

EDR-Environmental Data Record | IP-Intermediate Product | ARP-Application Related Product

Land
- Active Fire [ARP]
- Land Surface Albedo
- Land Surface Temperature
- Vegetation Index
- Surface Type

Cryosphere
- Ice Surface Temperature
- Sea Ice Characterization
- Snow Cover/Depth

Ocean
- Sea Surface Temperature
- Ocean Color/Chlorophyll

Imagery & Cloud
- Imagery
- Cloud Mask [IP]
- Cloud Optical Thickness
- Cloud Effective Particle Size Parameter
- Cloud Top Parameters
- Cloud Base Height
- Cloud Cover/Layers

Aerosol
- Aerosol Optical Thickness
- Aerosol Particle Size Parameter
- Suspended Matter

5

In summary, Ms. Reed noted that VIIRS builds upon its heritage sensors such as OLS, AVHRR, SeaWiFS and MODIS. Also noted was the improved spectral, spatial, and radiometric resolution that will improve feature identification and more consistent mapping and precision at the outer edges of the swath. NPOESS will also have the capability to accomplish complete global coverage daily and routinely generate imagery, land, cryosphere, ocean atmosphere and aerosol products.

6.10_AVHRR2VIIRS-Reed.ppt

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Session 7: User Services and Impacts
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7.1 Future of Direct Readout and Satellite Systems

Brian Hughes, NOAA Satellite and Information Service

Mr. Hughes summarized NOAA's Satellite Services Program including the primary interface for the environmental satellite user community, the Satellite Services Division (SSD.) He provided a review of the various U.S. and international satellites that provide data, as well as the products and services available. He reported that the SSD web page is currently being upgraded to improve information and details about these satellite products and services. He noted that SSD also provides management for the growing Data Collection System (both GOES and Argos) and other user services like real-time notices to users, thus providing a continual interface between users and engineers. Another important role of SSD is the help desk function, monitoring imagery and providing a first-line information portal. Help desk improvements underway include: monitoring over 400 operational products and database improvement to provide enhanced services. These improvements will allow users to call with a problem and the help desk will be better able to provide a solution. This will also provide immediate notice to NOAA administrators of significant problems. SSD also supports and organizes outreach conferences such as this one, as well as the GOES User Conference to solicit user input and feedback. SSD users vary from national and international, to Corporate and government. SSD will be heavily involved in the planning of GOES-R and NPOESS and will play a key role in training and education to prepare users for the upcoming changes.
Key web sites are:
www.ssd.noaa.gov
www.osdpd.noaa.gov
Brian.Hughes@noaa.gov

7.2 The Importance of Geostationary Weather Satellites in Hurricane Forecasting: A Perspective

Jack Bevin NOAA National Weather Service, National Hurricane Center

Mr. Bevin, Senior Hurricane Forecaster and satellite focal point for the National Hurricane Center (NHC,) reported on the critical importance of environmental satellite imagery and products in modern day Hurricane forecasting. He cited two examples of severe Hurricanes striking the Texas Coast near Galveston: one in 1900, producing a death toll of about 8,000, and another just last year. Thanks to significant improvements in forecast accuracy and warnings, to a large part due to improved temporal and spatial observations afforded by modern environmental satellite data, there were two orders of magnitude less loss of life. Geostationary satellite imagery allowed continuous real-time tracking of the storm and warnings to people, while NOAA's polar satellite data provided critical sounding information used by the computer forecast models. He next traced the improvements in Hurricane technology over the past 150 years, from ship data only, to the improved data from modern satellites. Today, with global satellite coverage, NHC utilizes GOES East and West and METEOSAT data for the Atlantic Ocean. These satellites cover areas of the earth where no other data are available. He also noted the importance of satellite-derived winds and products. He explained the Dvorak technique for classifying Hurricanes using cloud patterns to estimate the

intensity of the storms, from pre-storm stage through the mature hurricane stage. The technique has been available for over 30 years and remains quite accurate and very useful for Hurricane Forecasters. In the future, NHC is looking forward to more satellite channels, more frequent scans, and higher resolution. His conclusions were that Geostationary Satellites have had the single largest impact on forecasting hurricanes since scientists first defined the Hurricane in the mid 1800's.

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Session 7: User Services and Impacts – Plenary Breakout Session
Co-Chairs: Mark Mulholland and Brian Hughes

During the week, conference participants signed up for one of three breakout groups depending on their interests. During Session 7, three Breakout groups convened to discuss GOES, POES and Services topics. NOAA provided a Facilitator and Expert for each group. Group members were asked to openly discuss important user issues. The end goal was to produce 3-4 key concepts for presentation in the Breakout Panel. During the Breakout Panel, a spokesperson from each group presented these concepts in the form of user issues and recommendations. The following is a list of the major topics discussed and these user issues and recommendations for each breakout group.

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Session 7: User Services and Impacts - Geostationary
Co-Chairs: Mark Mulholland and Brian Hughes
Breakout Groups: Geostationary Operational Environmental Satellites

Section 1: GOES (present and near-term)

- CLASS
  - No 15 minutes data
  - Data not documented sufficiently.
  - Need a centralized data description page for GOES data, etc.

- GOES EAST, GOES WEST
  - GOES 10
    - Communications issues and a lack of monitoring
    - Need a better monitoring of GOES-10 using phone calls from South American customers to NOAA/NESDIS staff
    - Need Spanish speaking NESDIS staff member

- Documents too technical for users
  - Need better communications and documenting changes for non-technical users.

- Users of GOES-10 data
  - How will their needs be satisfied during the GOES-12 era, particularly the sounder data?
  - Needs:
    - Re-task the sounder on GOES-12
    - Ensure all users are aware that GOES-10 is being decommissioned in December 2009
    - Monitor time length of RSO and determine if it is too long.

- Develop a one-stop shop web page for GOES instrument status
  - A flash page would be useful as well as end to end documentation.

Section 2: GOES (future – GOES-R)

- Are we bringing back WEFAX?
  - Cost implications
  - Ease of set up for amateur users

- When should GVAR users start thinking about investing in GRB?

- When will users know E-GVAR is going to happen?
  - How, and to whom, will this information be sent out to?

- How will GOES-R meet NWS needs?

- Need technical conference/workshop for users
    - What do they need?
    - What do they need to do to change h/w, s/w for GOES-R?

- What happens if GOES-R has a problem?
    - What will be the back-ups?

- How long will the GOES-R post-launch testing be?
    - How long, after that before it becomes operational?
    - Will there be an archive of the PLT data for users?

- Will there be an Antenna loan program?

- Will there be a portal for GOES-R archived and simulated data?
    - Will the current proving grounds be expanded?
    - Will there be backwards compatibility between GOES-R and GOES N, O, P?

Section 3: GOES (user information sharing/receiving)

- Need better information on how to get archived data
    - In Spanish

- Need to get metadata by event
    - Example: metadata for Hurricane Ike

- Need more information and messages through GTS

- Educate users on how to get data from back-up systems
    - In Spanish

- Users need to better understand the NESDIS communication system
    - In Spanish

- There is a need for the DRO Conference to tie into GOES-R User Conference
    - Have a DRO splinter group at the next GOES Users conference.

- Need for NOAA to provide important information into other languages
    - Example: technical pages and information into Spanish

- Need Spanish speaking science experts at the ESPC helpdesk?

Section 4: GOES (education and training needs)

- Conduct a Technical workshop for those who use and maintain equipment

- More virtual training

- Publicize the training – more of it!

- Need for a list of the participants at DRO Conference
    - Attendees would like more information on the badges at DRO Conferences and a participant listing in the DRO Conference workbook

GOES user issues and recommendations:

- South American regional support following GOES-10

- Need for a technical workshop/conference for users, to focus on technical issues regarding transition from GOES-N/O/P to GOES-R

- Need for an all-inclusive information portal for GOES data, access, archive, messages, and status charts including "Real-time status" pages

- NOAA to review the internal (NWS/NESDIS) procedures for calling GOES-12 Rapid Scan Operations (RSO), and possibility of adding a special sounder for South America

- Provide documentation (technical documents, messages) in different languages

- Adding a "splinter session" of DRO users during next GUC

- The ability to access more archived GOES data, including "special events"

- Analyzing and assessing the current overall NESDIS information architecture (information, data, communications) and suggest improvements

- How to shift the focus of user conferences from requirements to actual technical aspects of GOES-R

- Identifying the ability for users to "fall back" to GOES-N/O/P in case of a failure of GOES-R

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December 8 -12, 2008 Miami, Florida
Conference Report
Session 7: User Services and Impacts - Polar
Co-Chairs: Mark Mulholland and Brian Hughes
Breakout Groups: Polar Operational Environmental Satellites

Major POES topics from discussions:

- What is the status of the VIIRS instruments for NPP?
  - Cross talk issues
    - Color product
    - May affect algorithms

- Consider the needs for the very low data rate user:
  - Omni-directional antenna users
  - Universities
  - Remote users: ships, small countries
  - Polar EMWIN services
  - Consider low cost

- Develop a safety net – available as a real-time data stream
  - Hard look at Argos
  - Sites share the data
  - Central – near real-time data
  - Service – broadcast simulcast

- Allow immediate access and products for international Met services.
  - Need to prepare – develop EDS/NPP/NPOESS
  - Algorithms – IPGPP versus commercial

- Consider distribution of polar data over GEONETCast

- Address the issue that the Internet is not available to many APT users

- Provide mechanisms to obtain data.

- Provide education empowerment

  - Develop coordination/partnerships (IJPS) for other countries
  - Share their data
  - Calibration information
  - I GEOLAB
  - CGMS distribution of information

- Make LRD lower cost to support APT users
  - Tracking antenna
  - Reduced cost of bands

- Train forecasters – Air Force
    - Hit core capabilities – key channels, standard channels.

- Design HRD to have receivers/systems for specific channels - See if other nations could add APT capability.

- Impediments defined:
    - Network capability
    - Using CD's
    - No high speed internet
    - Adapt to user needs
    - Translate to other formats
    - NPOESS and GOES-R recommends using same data formats

- 14. Look at: NPOESS – HDFS, GOES-R – METCDF

- 15. Provide users a list of current available algorithms.
    - NOAA, EOS and METOP

POES user issues and recommendations:

- Need to develop an equivalent capability to APT
    - Low data rate
    - No connectivity solution
    - VHF for use with Omni-directional antennas
    - Possible alternate solutions:
        - Rebroadcast through GEONETCast or EMWIN
        - Internet delivery (though not good for remote locations)
        - Redesign broadcast system or add helical transmitter
            - Impact to satellite design

- Enable near real-time access to safety-net downlink – rebroadcast, CLASS, or other
    - Need to work with individual safety-net sites.
    - Need to determine if current policy allow this.

- Need better access to information, training, algorithm availability, international capabilities and other satellite systems

- Define and correct impediments to data distribution.
    - Issue areas:
        - Networks, Politics, commercial interests

- Need access to LEO-archived data.
    - Need to define the amount and ease of access to LEO data.
    - Need to know how to mine for specific data.
        - In Spanish

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Conference Report
Session 7: User Services and Impacts – Satellite Services
Co-Chairs: Mark Mulholland and Brian Hughes
Breakout Groups: Satellite Services

Services Breakout Group

Major Service's topics from discussions

- DCS (GOES) should investigate additional capability on GOES-R
- NOAA should work with other countries to improve service capabilities
- NOAA to provide ground station information for future systems
  - Hardware and cost among other information
- Provide users an inventory of NOAA broadcast services and data they provide
- Identify Pacific Region data broadcast requirements through coordination
- NOAA to work with users and vendors to standardize or make data formats compatible
  - The goal is to increase the ease of data sharing.
- NOAA to develop multi-lingual web pages and service documentation
  - Potential comet grant
- NOAA/NESDIS to leverage other international meetings, especially WMO and NWS for GOES/DCS/Services
  - Outcome of that meeting is to make a recommendation to GEOSS
- Users can benefit from diagrams and discussions on message routing; i.e. GTS
- Once ITAR is cleared, NOAA will distribute software defined radio information
  - NOAA will work to develop a demonstration project to file test WEFAX, LRIT, and EMWIN
- NOAA to work with industry to develop a market for software defined radios
- NOAA to identify if software exists to strip EMWIN data from LRIT
- Use GOES-R, NOAASIS, EMWIN and WMO to post information on software defined Radio development
- Define future options for replacing APT transitions
  - Iridium – Chatty Beetle

    - Satellite internet broadcast
    - NOAA may help APT community find options to receive low resolution polar data on small moving platforms and for low-end users

- Explore whether NOAA can provide GNC-A coverage to the pacific region

- NOAA will provide a product list for the operational broadcast

Services user issues and recommendations:

- Focus on identifying direct broadcast service requirements and options for the Pacific

- Leverage national and international coordination groups (i.e. WMO) to disseminate information about services. Need to set-up regional meetings coordinated by NWS

- GOES-R office to distribute information about the universal GOES radio receiver and work with users to demonstrate capability

- NOAA to help APT users find options for receiving low resolution images

- DCS – additional capacity needed

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Closing Remarks

Conference Closing Remarks were presented by – Ms. Abigail Harper, Deputy Assistant Administrator, NOAA Satellite Service

Coming into the Direct Readout Conference the major expectations were: 1) a more informed user community; and 2) a clearer understanding of the user's needs. I believe we have achieved these goals. We have also identified areas for improvement and cooperation such as GEONETCAST and technology sharing as seen in the EMWIN/LRIT software-defined radio demonstration. The Direct Readout Conference reflects NOAA's ongoing commitment to prepare all users for these changes. We hope this past week has been beneficial to all of our participants. Over the past few days you have had the opportunity to hear a number of presentations on current and future applications and user-readiness. There have also been panel discussions, poster sessions, and various briefings touching on the incredible array of user programs and applications that rely on environmental satellites. I trust these have been both informative and insightful.

We appreciated the excellent feedback we received from the Breakout Groups expressing the various needs, concerns, and other transition issues from the user services community as we move towards our future satellite programs. This is exactly the type of input that NOAA needs to help us in our planning and transition efforts in order to better serve you in the future. It is also why getting this feedback from you, the users, was one of the major objectives of this conference. The future GOES-R series of geostationary satellites and the NPOESS and METOP series of polar-orbiting satellites represent major developmental efforts for NOAA and our partners. As such, we rely upon this type of feedback to assist us in our planning – just as we hope you rely on our input to prepare in your planning efforts too. The changes brought about by these new satellite systems will be enormous. And it will affect all current and future users of environmental satellites. But these programs will only be successful if we are all prepared ahead of time to be able to take in and start using the data once it's available.

Another important element of the Direct Readout Conference is the tremendous international participation that we receive. Indeed, this is one of the key strengths of the conference as it provided a unique opportunity to bring together the users of environmental satellite data from around the world. It is that spirit of international cooperation which enabled GOES-10 support to South America to become a reality following recommendations from the 2004 Direct Readout Conference. We understand the desire to continue the program once GOES-10 is decommissioned next December, and we will continue to examine our options on possible replacements.

We also appreciate the user feedback we received this week. You responded back to us in your questions after talks, issues you raised in the Showcase, and questions and recommendations you gave us in the Wall-of-Wonder and Survey. We also received your input during the Poster Session and Breakout Groups that will help us shape your important issues into conference recommendations in the coming weeks. For instance, during the conference we heard several requests to expand the capacity and coverage of GEONETCast Americas. We have noted these requests and will taken them back and see what options we may have.

For this year's conference, I'd like to thank, in particular, the representatives from the World

Meteorological Organization (WMO), EUMETSAT, panelists for the GEOSS in the Americas panel, and the presenters for the Global User session. Also, of course, all the other presenters for your contributions this week particularly the many international partners who provided briefings and posters. In fact, we appreciate all of our international participants who have traveled from abroad to participate!

I'd also like to recognize the following individuals who made the Direct Readout Conference this week such a success: To all our participants, exhibitors, presenters, panelists, and showcase participants; our session chairs: Kathy Kelly, Paul Seymour, Dave Benner, Tim Schmit, Tony Mostek, Charlie Baker, Hal Bloom, Dan Stockton, Brian Hughes, and Mark Mulholland; I'd like to thank Aerospace for the EMWIN/LRIT demo on Tuesday night and Dave Jones, President & CEO, Storm Center Communications for being our banquet speaker on Wednesday night; I'd like to thank our translation services – *great job!*

And last, but certainly not least, I'd like to offer a big thank you and congratulations to the Direct Readout Conference Committee: Paul Seymour and Eric Madsen, our Conference Co-chairs; Kay Metcalf, Letecia Reeves, Valerie Randall, Gary McWilliams, Dane Clark, Tim Schmit, Tom Renkevens, Nina Jackson, Leesha Saunders, and the additional on-site support from Brian Hughes, Jim Wydick and Alfreda Alexander.

Finally, as we move towards our future satellite programs the need for the Direct Readout Conference becomes ever greater. Plans call for our next conference to be held in about two years or so. We certainly hope you will not only plan to join us then but to participate in any variety of ways available. In the meantime, let's keep the dialogue and the new lines of communication forged at this conference open. Let's not wait until the next Direct Readout Conference to pick up where we left off. The future of the direct readout and user services community depends on it!

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Participant Survey

During the 2008 NOAA Satellite Direct Readout Conference, participants were asked to complete an approved user survey produced by NOAA for the Direct Readout Community. Fifty-four surveys were turned in at the conference. Almost all of the surveys NOAA received were from direct readout users, including many from the international community. A few of the surveys were completed by operators and vendors. Participants in the survey were asked to respond to 16 questions. Using a scale of 1-5, they were asked to indicate whether they were satisfied or unsatisfied with a number of satellite data and services areas. The resultant data from these responses (Exhibit 1), lists the questions and the number and percentage of responses in each category, for each question. Over 90% of the responses to all questions indicated users were satisfied or extremely satisfied.

Participants were also asked to comment on a number of questions about satellite data and services. Names of the individuals offering the comment are listed, if they signed their survey. This data, and a few responses that were received on the wall-of-wonder bulletin board at the conference, were summarized in the following four categories:
1) information aids, help desk, archives, 2) technology, 3) direct readout services, and education and communication. The following user comments, together with information from the survey questions, were the basis for many of the conference recommendations found in this report.

INFORMATION AIDS, HELP DESK, ARCHIVES

- CLASS has a number of problems for users:
  - Slow (stated by several people), not user friendly
  - Documentation poor
  - Users forced to search for conversion tables to access data
    - Brian Vant-Hull (City College of New York)
    - Darryl Williams (Halifax, Canada)

- Help desk and over all documentation of satellite data need improvement. It needs better search applications.
    - Werner Stolz – Costa Rica

- Expressed need for NOAA technical representatives to speak Spanish. Need for more and better information in Spanish. Better timeliness and clarity of responses from NOAA needed.
    - Edgar Imana (Bolivia)
    - Jose Nilson Castrol (Honduras)
    - Luis Garcia Guirola, Roberto Ceron, Edwin Escobar (El Salvador)
    - Tom King (Las Cruces, NM)
    - Alejandro Munoz (Chile)

- NOAA web page – too busy/hard to locate products

TECHNOLOGY

- Need for a more robust Internet system

- Need more multi-spectral data
  - Carlos Cotlier (Argentina)

- More University science into products

- Need GIS products – also s/w related to digitalization. One idea: compilation of historical hydrometeorology data in Central America.
- - Edgar Imana (Bolivia)
  - Emil Cherrington (Panama)
  - Mark Smith (USGS)

- Need better standards set for software for AVHRR products
  - Gerado Lopez Saldaua (Mexico)

DIRECT READOUT SERVICES

- For DCS
  - Expand HADS
  - Go operational with DADDS
  - Need to establish permanent archiving of message data that can be retrieved by users - A great benefit to South/Central American users
    - John Parks (USGS)

- Need for a WEFAX II
  - Unhappy with LRIT
  - Narrow band spacing
  - JPEG compressed
  - Small antenna

- EMWIN
  - Keep reception costs low
  - Install AAFG
  - S/W for hydrometeorological products
    - Jose Nilson Castrol (Honduras)
    - John Parks (USGS)

- Need EOS data on NOAAPORT

- Make US direct broadcast similar to EUMETSAT

- Need access to more satellite data from other nations

- Need raw data in the GEONETCast
    - Carlos Augeler and Lewiz Madialo (Brazil)

- 18. More frequent satellite data for the Central Pacific
    - Arona Ngari (Cook Islands)

EDUCATION AND COMMUNICATION

- Would like to see study/teachers workshops during satellite launches
    - Paul Ruscher (FSU)

- Need more educational opportunities for students

- Need for an annual meeting with Central American Countries to share experiences and problems

- More educational presentation at the DRO conferences
    - Meleny Funes (Miami area student or teacher)

- Would like to see interactive presentations accessible to students in public schools on weather and climate
    - Johan Bonilla (Miami area student or teacher)

2008 DRO Conference Survey Questions (54 RESPONDANTS)

(xx%) = % of the total number of responses for hat question

	DISSATISFIED	***NOT SATISFIED***	***NO OPINION***	***SATISFIED***	***EXTREMELY SATISFIED***	***N \ A***
Question1			2 (4%)	24 (44%)	26 (48%)	2 (4%)
Question2			2 (4%)	25 (46%)	24 (44%)	2 (4%)
Question3			5 (9%)	21 (39%)	18 (33%)	7 (13%)
Question4			1 (2%)	11 (20%)	37 (69%)	4 (7%)
Question5			2 (4%)	11 (20%)	36 (67%)	4 (7%)
Question6			1 (2%)	24 (44%)	26 (48%)	3 (6%)
Question7		1 (2%)	2 (4%)	23 (43%)	16 (30%)	11 (20%)
Question8		1 (2%)	1 (2%)	19 (35%)	19 (35%)	12 (22%)
Question9		2 (4%)	2 (4%)	25 (46%)	15 (28%)	6 (11%)
Question10			4 (7%)	21 (39%)	26 (48%)	3 (6%)
Question11	1 (2%)	3 (6%)	4 (7%)	18 (33%)	20 (37%)	4 (7%)
Question12		3 (6%)	6 (11%)	22 (41%)	17 (31%)	6 (11%)
Question13	1 (2%)	1 (2%)	5 (9%)	29 (54%)	18 (33%)	1 (2%)
Question14			2 (4%)	21 (39%)	29 (54%)	1 (2%)
Question15			2 (4%)	14 (26%)	20 (37%)	13 (24%)
Question16		1(2%)	5 (9%)	17 (31%)	19 (35%)	11 (20%)

Question 1. Quality of the product or service received
Question 2. Quality of data received
Question 3. Timeliness of response to request

Question 4. Courtesy of staff who dealt with you
Question 5. Expertise of staff in dealing with your needs
Question 6. Degree that product/service met your needs
Question 7. Clarity and accuracy of responses from staff to your questions prior to receipt
Question 8. Clarity and accuracy of responses from staff to your questions after receipt
Question 9. Ease in reaching correct NOAA office to deal with your request
Question 10. Format of data received
Question 11. Documentation of data received
Question 12. Descriptions of data in catalogs and directories
Question 13. Accessibility of data desired
Question 14. Overall satisfaction with service received
Question 15. Overall satisfaction compared with services/data obtained from private sector
Question 16. Overall satisfaction compared with services/data obtained from other Federal agencies

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Conference Report
Exhibits
Nina Jackson and Leesha Saunders

Fourteen organizations participated as exhibitors during the DRO conference. The exhibitors arrived at the conference location as scheduled and positioned their exhibits within the set-up times. During the conference, the exhibitor displays were located outside of the session rooms in the hallway making for easy access and visitation by conference attendees during session breaks. The exhibitors were professional and well versed on their products and services: exhibitors engaged conference attendees in industrious conversation on satellite products and services.

The Continental Room housed NESDIS, NPOESS, and NASA/GSFC exhibits. Limited space in the hallway made it necessary to place some exhibits in the overflow location. Unfortunately, because the Continental Room was located behind the registration area, many attendees were unaware of the additional exhibitors. To address this concern, several session speakers announced the location of the additional exhibits and encouraged visitation.

Although there was strong participation, the number of 2008 exhibitors remains at the 2004 level. Therefore, NESDIS will continue to seek and invite new companies in the area of satellite remote sensing and related technologies to participate in upcoming DRO conferences.

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Conference Report
Identified Participant Feedback and Recurring Themes

Feedback Themes

A number of excellent ideas, suggestions and recommendations emerged from the conference plenary sessions, dialog sessions and breakouts. These ideas, suggestions and recommendations were grouped in four overall theme areas:

- Improve customer service and on-line information access including: help desk, web services, archives and training resources.
- Continue and expand outreach including: conferences, meetings, training sessions, opportunities for education, and suggestions for multi-language support.
- Improve direct readout and re-broadcast services including: LRIT, GOES DCS, Argos DCS, EMWIN, NOAAPORT, RANET and GEONETCast Americas.
- Expand outreach to and information resources for users on the transition of current Direct Readout and Re-Broadcast Services to the new generation of GOES-R and NPOESS series of satellites.

Below is the complete list of user ideas, suggestions, and recommendations.

Customer Support/Information Access:

1. Establish a prominent link (in Spanish) on the front page of the NOAA web site to a special page (in Spanish) detailing how to navigate the NOAA pages, especially to locate products and services.
2. Consider hiring at least one Spanish speaking NOAA technical representative for the Help Desk.
3. Explore offering documentation, specifically technical documents and messages, in additional languages.
4. Continue to encourage the COMET ® Program to translate their training modules into Spanish and other languages.
5. Encourage the COMET ® Program to develop training modules on the NOAA direct readout and re-broadcast satellite services.
6. Improve the satellite product suite documentation.
7. Increase the availability of products in a spatial data format that can be used in a Geographic Information Systems (GIS). Consider leveraging NESDIS and EOS Cooperative Institutes to assist.
8. Improve the CLASS user interfaces to acquire and use the data contained in the system.
9. Explore alternative data distribution methods to the Internet, which is not reliable in many countries.
10. For Polar Data, enable near real-time access to safety-net down-linked imagery through re-broadcast, CLASS, or other method.
11. Create a one-stop-shopping information portal for polar data and information to include real-time polar imagery and associated algorithms.
12. For Geostationary data, create a one-stop-shopping portal for GOES data to include: real-time imagery, archives, “special events’, messages and status charts including real time status pages.

Outreach - User Conferences/Meetings:

13. Give high priority to annual and bi-annual satellite user conferences involving Central and South American countries including regional outreach and technical meetings coordinated with the National Weather Service.
14. Provide translation support at any scheduled regional meetings in cooperation with the WMO where appropriate.
15. Work with the GEOSS Americas to also have regional meetings with translation support.
16. Expand the role and participation of secondary, High School and collegiate students and educators at the next Direct Readout Satellite Conference.

Direct Re-broadcast Services: LRIT, DCS, Argos, EMWIN, NOAAPORT, RANET

17. Develop an inventory of stations and services for all direct readout and broadcast programs most importantly for the GOES DCS Service.
18. Identify direct broadcast service requirements for all the services and most importantly for LRIT and GEONETCast.
19. Assess whether LRIT and EMWIN data are meeting user needs.
20. Expand LRIT information on the NESDIS website for those who are using or are contemplating using LRIT.
21. Develop and make available software to extract the EMWIN information from LRIT.
22. Consider including some EOS and NPP data on NOAAPORT.
23. Include MTSAT imagery on GOES-West LRIT broadcast.
24. Include additional Pacific related graphical products on GOES-West LRIT broadcast.
25. Expand EMWIN coverage to the Western Pacific.
26. Identify direct broadcast service requirements and options for the Pacific Region.
27. Investigate whether GEONETCast can help cover the Pacific Region with a re-broadcast of satellite information and environmental products.
28. Investigate the feasibility of acquiring a FUNGYUNCast receiver for Pacific Region
29. Initiate action, through the GEONETCast Implementation Group, with the Chinese Meteorological Agency (CMA) to determine their FUNGYUNCast coverage and relay the information to the Pacific Region.
30. Acquire the FENGYUNCast ground station specifications and relay these to the Pacific region.
31. Work with partners to locate a FENGYUNG Cast demonstration station in the Pacific Region.
32. Identify future CMA plans for FENGYUNCast.
33. Develop options for improving satellite data for the Central/South Pacific.
34. Investigate whether older satellites can be used as communications satellites similar to GOES-7.
35. Identify direct broadcast service requirements and options for the Caribbean Region.
36. Improve the capacity in Central America to use the products that are provided in BUFR format.
37. Aid in the acquisition of GEONETCast Americas receive stations to help in the exchange of data
38. Continue to foster participation in GEOSS in the Americas.
39. Investigate whether the EUMETSAT's EUMETCast Americas broadcast could be used to distribute a more frequent suite of imagery (better than the current 3 hour periodicity).
40. Focus on issues relating to the transition of the services to the GOES-R era
41. Provide specifications on the ground equipment for GOES-R services (especially for DCS) so that users can make funding decision for the transition to GOES-R.
42. Provide guidance to users about DCS frequencies on GOES-R.
43. Provide information on other changes in user systems due to changing bandwidth and future

DCP two-way enhancements.

44. Address user concern that, as currently planned, there is not enough expansion of DCS capacity in the GOES-R program.
45. Proceed quickly with DCS upgrades in technology and capacity.
46. NOAA to provide estimated costs for DCS conversion to users in the GOES-R era.
47. Ensure GOES DCS Bandwidth is adequate to meet forecasts of increasing system usage.
48. Consider permanent archiving for DCS data
49. Work with Pacific Region to get some DCS frequencies allocated to the Pacific region.
50. Provide a database of DCS stations that will assist users in systems' performance evaluation.
51. Publish how to route DCS observations using the WMO routing headers.

Direct Re-broadcast Services Related Breakout – HRIT/EMWIN Software Defined Radio Prototype Receiver for Transition to GOES-R

52. As soon as available, provide the HRIT/EMWIN Software Defined Receiver information for GOES-R.
53. Ensure that the GOES-R Program notifies stakeholders when the HRIT/EMWIN Software Defined Receiver Information is posted on the GOES-R WWW Site and work with users to demonstrate capability.
54. Explore the feasibility of setting up a HRIT/EMWIN Software Defined Receiver test site with small user group's perspective in mind. (ex. Remote Imaging Group and EXLORES!)
55. Define restrictions and regulations regarding use of the HRIT/EMWIN Software Defined Receiver software, receiver, and applications.
56. Provide information to the user community, including vendors, on the prototype HRIT/EMWIN Software Defined Receiver through a wide variety of sources such as: 1) Federal register, 2) WMO space programme, 3) Group for Earth Observation (user group) (GEO), 4) the Remote Imaging Group (RIG) and 5) others.

Direct Readout: Current and Future, Geostationary and Polar, Satellite Systems Including GVAR and E-GVAR

Geostationary Satellites

57. Explore the possibility of a replacement for the WEFAX System that is 1) low cost, 2) uses a small antenna and is analogue based without the need for specialized technology.
58. Put a high priority on finding a replacement for GOES-10 support over South America.
59. Recommend a review of NOAA internal (NESDIS/NWS) procedures for calling Rapid Scanning Operations (RSO)
60. Need for outreach on the transition from GOES-N/O/P to GOES-R.
61. Consider a shift in the focus of user conferences from requirements to actual technical aspects of GOES-R.
62. Continue to have workshops/conferences on the technical aspects of and transition to GOES-R including a special session or breakout group topic for direct readout users at the next GOES-R Users Conference (November, 2009).
63. Publish contingency plans in the case of a GOES-R series failure, including how users would shift back to GOES-N/O/P.
64. Plan a topic for the GOES Users Conference on contingencies for 1) possible GOES-R failures, 2) how to shift back to GOES-N/O/P if there is a failure, and 3) how to upgrade receive stations to GOES-R and downgrade them back to GOES N-P if necessary.

65. During the next GOES-R Users Conference address the GOES-R related questions and recommendations from the 2008 Direct Readout Conference.
66. Request to extend the post launch evaluation period of GOES-R up to a year and make the test data and procedures available.
67. Inform the user community as soon as possible if NOAA will make GOES-R available immediately after initial testing or put it in on-orbit storage as planned.
68. Continue outreach efforts to the user community in order to promote a smooth transition from GVAR to E-GVAR and GOES-R GRB.
69. Include the NOAA National Hurricane Center as a GOES-R proving ground site.

Polar Orbiting Satellites:

70. Provide training on new polar direct readout systems (LRD and HRD).
71. Provide an equivalent capability for Polar imagery reception to inexpensive direct readout ground station similar to that used for Automatic Picture Transmission (APT) reception.
72. Consider implementing an equivalent capability to inexpensive, direct readout ground station similar to that used for the reception of Automatic Picture Transmission (APT).
73. Consider assisting APT users to find alternate solution options for receiving low resolution images to include the possible solutions of: Rebroadcast through re-broadcast services (GEONETCast, LRIT or EMWIN, Internet delivery or other methods).
74. While realizing that there would be an impact to satellite design, consider a redesigned broadcast system or add a helical transmitter.
75. Work with EUMETSAT to see if there is still a possibility of fixing the LRPT broadcast as there is some possibility that HIRS instrument will not be used (Perceived as the reason for HRPT not being deployed).
76. Inform users on what IPOPP data are available and who is receiving and/or distributing possibly via a graphic chart.

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Conference Report
Summary and Conclusions

The 2008 Satellite Direct Readout Conference reaffirmed the value of targeted, user meetings and substantiated the need for continuing these types of conferences on a regular basis. Participants unanimously agreed that the conference was a success. Both NOAA managers and participants each took away a large volume of information that will benefit them and their organizations in preparing for satellite service transitions and new technologies. Overall, participants displayed a spirit of willingness to overcome obstacles and challenges in order to collaborate for the common good. The conference further helped identify common needs and areas for possible future cooperation as well as opening up idea-sharing for action planning. There was a general agreement that improved communications and information sharing among countries is an area that NOAA and the user community need to continue to address.

The future GOES-R series of geostationary satellites, the National Polar-orbiting Operational Environmental Satellite System (NPOESS), and European Space Agency's Metop series of polar-orbiting satellites represent major developmental efforts for NOAA and its partners. As such, user feedback to assist NOAA in its planning efforts is critical. Through feedback from this conference, many areas for improved coordination and cooperation have been identified such as gathering new requirements for broadcast systems, identifying potentially disenfranchised users, and technology sharing to aid in transition, as seen in the EMWIN/LRIT software-defined radio demonstration.

An important element of the Direct Readout Conference was the tremendous international participation generated. This was one of the key strengths of the conference. It provided a unique opportunity to bring together the users of environmental satellite data from around the world to work together. It is this spirit of international cooperation that enabled several important projects to become a reality. Examples include: GOES-10 support to South America, GEOSS in Americas, and training symposiums held over the past two years in Argentina and Brazil. In the 2008 conference, NOAA managers clearly heard about the success of the GOES-10 move and how the region has benefited. There is a strong desire in the region to continue the program once GOES-10 is decommissioned in December 2009. Because of this feedback, NOAA will carefully examine the recommendations gathered during the 2008 conference and will report back to the user community over the next few months.

Several vendors displayed and demonstrated their products and services at the conference. Many of them made productive connections with the user community they support. Participants also experienced a live demonstration of the Envirocast Vision® TouchTable™ interactive satellite display system – a system NOAA helped develop and is currently using at its National Centers.

As NOAA moves closer towards significant changes in its satellite programs over the next decade, the need for interaction with Direct Readout users becomes ever greater.
Ongoing Direct Readout Conferences are a critical part of that effort and reflect NOAA's ongoing commitment to prepare the user community for these changes.

2008 NOAA Satellite Direct Readout Conference: Transitioning into the Future
December 8 -12, 2008 Miami, Florida
Conference Report
Appendix I: Agenda

Monday, December 8, 2008, (12:45 p.m. – 5:30 p.m.)
Session 1: Welcome and Keynote
Co-Chairs: Kathy Kelly and Paul Seymour

Presentation	Time	Session or Event
	8:00 a.m. – 12:45 p.m.	**Registration**
1.1	12:45 p.m. – 1:05 p.m.	**Welcome and Logistics** Paul Seymour, NOAA Satellite and Information Service
1.2	1:05 p.m. – 1:20 p.m.	**Conference Opening Remarks and Introductions** Kathy Kelly, Director of Office of Satellite Data Processing and Distribution, NOAA Satellite and Information Service
1.3	1:20 p.m. – 1:50 p.m.	**Keynote Address: NOAA Satellite Programs** Mary M. Glackin, Deputy Under Secretary for Oceans and Atmosphere, NOAA
1.4	1:50 p.m. – 2:10 p.m.	**National Environmental Satellite, Data, and Information Service Welcome** Mary E. Kicza, Assistant Administrator, NOAA Satellite and Information Services
1.5	2:10 p.m. – 2:30 p.m.	**National Weather Service Welcome** Dr. Louis W. Uccellini, Director, National Centers for Environmental Prediction (NCEP), NOAA National Weather Service
1.6	2:30 p.m. – 2:50 p.m.	**National Aeronautics and Space Administration Welcome** Dr. Shahid Habib, Chief, Office of Applied Sciences
	2:50 p.m. – 3:20 p.m.	**Break: Refreshments in Exhibits Area**
1.7	3:20 p.m. – 3:40 p.m.	**World Meteorological Organization (WMO) Space Program** Jerome Lafeuille, Chief of Space-based Observing Division, World Meteorological Organization (WMO) Observing and Information Systems Department
1.8	3:40 p.m. – 4:00 p.m.	**Global Earth Observation System of Systems (GEOSS) Overview** David Grimes, Assistant Deputy Minister, MSC/EC (Canada)
1.9	4:00 p.m. – 5:30 p.m.	**Panel: GEOSS in the Americas** **Moderator:** David Grimes, Assistant Deputy Minister, Meteorological Services of Canada, Environment Canada **Panel Members**: Mary Glackin, Deputy Under Secretary for Oceans and Atmosphere David Grimes, Assistant Deputy Minister, MSC/EC (Canada) Jerome Lafeuille, Chief, Space-based Observing Division, WMO Luiz Machado, INPE/CPTEC (Brazil) (Instituto Nacional de Pesquisas Espaciais, Centro de Previsão de Tempo e Estudos Climáticos, Divisão de Satélites e Sistemas Ambientais) Albert Jones, WMO RA IV (North America, Central America and the Caribbean)
	6:00 p.m. – 7:30 p.m.	**Conference "Icebreaker" – Hilton Miami Airport Hotel –** To Be Announced

Tuesday, December 9, 2008, (8:30 a.m. – 12:00 p.m.)
Session 2: Current Satellite Systems/Instruments
Chair: Kathy Kelly

Presentation	Time	Session or Event
	8:00 a.m. – 8:30 a.m.	**Registration/Coffee**
2.0	8:30 a.m. – 8:35 a.m.	**Introduction** Kathy Kelly, Director of Office of Satellite Data Processing and Distribution, NOAA Satellite and Information Service
2.1	8:35 a.m. – 9:00 a.m.	**Keynote** Albert Jones, WMO RA IV (North America, Central America and the Caribbean)
2.2	9:00 a.m. – 9:20 a.m.	**NOAA Geostationary Operational Environmental Satellite (GOES) Overview** Chris Wheeler, NOAA Satellite and Information Service
2.3	9:20 a.m. – 9:40 a.m.	**European Organization for the Exploitation of Meteorological Satellites (EUMETSAT): Geostationary Satellite Systems** Michael Williams, Head of Control Centre Division, EUMETSAT
2.4	9:40 a.m. – 10:00 a.m.	**Status of the Japan Meteorological Agency Multi-functional Transport Satellite (MTSAT) Series** Mark Mulholland, Deputy Director, Office of Systems Development, NOAA Satellite and Information Service
	10:00 a.m. – 10:20 a.m.	**Break: Refreshments in Exhibits Area**
2.5	10:20 a.m. – 10:40 a.m.	**Polar-orbiting Operational Environmental Satellite (POES) Overview** Cindy Hampton, NOAA Satellite and Information Service
2.6	10:40 a.m. – 11:00 a.m.	**European Organization for the Exploitation of Meteorological Satellites (EUMETSAT):** **Polar-orbiting Satellite Systems** Michael Williams, Head of Control Centre Division, EUMETSAT
2.7	11:00 a.m. – 11:20 a.m.	**Status of the National Aeronautics and Space Administration (NASA) Earth Observing System (EOS)** Patrick Coronado, NASA Direct Readout Laboratory
2.8	11:20 a.m. – 11:40 a.m.	**Update form the Coordination Group for Meteorological Satellites (CGMS)** Michael Williams, Head of Control Centre Division, EUMETSAT
2.9	11:40 a.m. – 12:00 p.m.	**Satellite Operations Control Center (SOCC) and Wallops Island and Fairbanks Command and Data Acquisition (CDA) Overview** Chris Wheeler and Cindy Hampton, NOAA Satellite and Information Service
	12:00 p.m. – 1:30 p.m.	**Lunch**

Tuesday, December 9, 2008, (1:30 p.m. – 8:00 p.m.)
Session 3: Current Direct Readout Workshop
Chair: Dave Benner

Presentation	Time	Session or Event
3.1	1:30 p.m. – 2:00 p.m.	**Showcase Overview** Tim Schmit, NOAA Satellite and Information Service
3.2	2:00 p.m. – 4:00 p.m.	**Direct Services Showcase Panel** Moderator: Dane Clark, Short and Associates, Incorporated
		Panel Members:
3.2.1		LRIT – Paul Seymour, Jamie Kibler
3.2.2		EMWIN – Rob Wagner, Santos Rodriguez
3.2.3		GOES DCS – Kay Metcalf, Letecia Reeves
3.2.4		Argos – Bill Woodward, Jim Wydick
3.2.5		GVAR – Chris Wheeler, Brian Hughes, Tim Schmit
3.2.6		EGVAR/GRB (GOES-R) – Andrew Royle, Bill Mazur, Jim Gurka
3.2.7		HRPT/APT – Marlin Perkins, Cindy Hampton
3.2.8		HRD, IPOPP Featuring Simulcast – John Overton, Patrick Coronado
3.2.9		GEONETCast Americas – Chris O'Connors, Alfreda Alexander
3.2.10		RANET – Kelly Sponberg, Jennifer Lewis
3.2.11		NOAAPORT – Brian Gockel, Jim Heil
	4:00 p.m. – 4:20 p.m.	**Break: Refreshments in Exhibits Area**
3.3	4:20 p.m. – 5:30 p.m.	**Direct Services Showcase Panel: Feedback/Questions and Answers** **Moderator:** Dave Benner, NOAA Satellite and Information Service
		Panel Members:
		LRIT – Paul Seymour
		EMWIN – Santos Rodriguez
		GOES DCS – Kay Metcalf
		Argos – Bill Woodward
		GVAR – Chris Wheeler
		EGVAR/GRB (GOES R) – Bill Mazur
		HRPT/APT - Marlin Perkins
		HRD, Simulcast/IPOPP - John Overton
		GEONETCast Americas – Chris O'Connors
		RANET – Kelly Sponberg
		NOAAPORT – Brian Gockel
3.4	6:30 p.m. – 8:00 p.m.	**EMWIN/HRIT Prototype Software Defined Receiver: Demonstration Session**
		Paul Seymour, NOAA Satellite and Information Service
		Rob Wagner/Santos Rodriguez, EMWIN Team, NOAA National Weather Service, Office of the CIO
		Bill Mazur, GOES-R Program Office
		Jeremy L. Roberson, Aerospace Corporation

Wednesday, December 10, 2008, (8:30 a.m. – 12:00 p.m.)
Session 4: Applications and Training
Co-Chairs: Tim Schmit and Tony Mostek

Presentation	Time	Session or Event
	8:00 a.m. – 8:30 a.m.	**Registration/Coffee**
4.0	8:30 a.m. – 8:35 a.m.	**Introduction** Tim Schmit, NOAA Satellite and Information Service
4.1	8:35 a.m. –9:00 a.m.	**Keynote** Arona Ngari (Cook Islands), President, WMO RA V (South-West Pacific)
4.2	9:00 a.m. – 9:15 a.m.	**COMET Program: Satellite Meteorology Training Resources for the Atmospheric Science Community** Tim Spangler, University Corporation for Atmospheric Research (UCAR) Cooperative Program for Operational Meteorology, Education, and Training (COMET®)
4.3	9:15 a.m. – 9:30 a.m.	**Cooperative Institute for Meteorological Satellite Studies (CIMSS) VISITview** Scott Bachmeier, CIMSS
4.4	9:30 a.m. – 9:45 a.m.	**Satellite Training Activities: Cooperative Institute for Research in the Atmosphere (CIRA)** Bernadette Connell, CIRA
4.5	9:45 a.m. – 10:00 a.m.	**Satellite HydroMeteorology (SHyMet) NOAA Distance Training Course** Tony Mostek, NOAA National Weather Service
4.6	10:00 a.m. – 10:15 a.m.	**Satellite Training and Education and Naval Research Lab Monterey, California** Arunas Kuciauskas, Tom Lee, F. Joseph Turk, K. Richardson, and J. Hawkins, Naval Research Laboratory
	10:15 a.m. – 10:45 a.m.	**Break: Refreshments in Exhibits Area**
4.7	10:45 a.m. – 11:00 a.m.	**McIDAS-V: A Powerful Data Analysis and Visualization Tool for Multi- and Hyperspectral Environmental Satellite Data** Dave Santek, University of Wisconsin Space Science and Engineering Center
4.8	11:00 a.m. – 11:15 a.m.	**NCEP Direct Readout Usage: Current and Future Satellite Applications at NCEP's Aviation Weather (AWC) and Storm Prediction Center (SPC)** Jim Heil, NOAA National Weather Service
4.9	11:15 a.m. – 11:30 a.m.	**NCEP Use for Forecast Models** Lars Riishojgaard, Joint Center for Satellite Data Assimilation
4.10	11:30 a.m. – 11:45 a.m.	**Current and Near-term GOES Operations and Applications** Tim Schmit, NOAA Satellite and Information Service
4.11	11:45 a.m. – 12:00 p.m.	**From Data to Products to Weather Forecasting and Air Quality Monitoring: Direct Broadcast at Its Best** Allen Huang, Cooperative Institute for Meteorological Satellite Studies (CIMSS)
	12:00 p.m. – 1:30 p.m.	**Lunch**

Wednesday, December 10, 2008, (1:30 p.m. – 5:30 p.m.)
Session 4 Continued: Applications and Training
Co-Chairs: Tim Schmit and Tony Mostek

Presentation	Time	Session or Event
4.12	1:30 p.m. – 1:45 p.m.	**EOS Direct Broadcast Products Used In Operations** Kathy Strabala, Cooperative Institute for Meteorological Satellite Studies (CIMSS)
4.13	1:45 p.m. - 2:00 p.m.	**Geoscience Educations Utilizing Satellite Imagery: A Direct Readout Experience from the EXLORES! Perspective** Paul Ruscher, Florida State University
4.14	2:00 p.m. – 2:15 p.m.	**Evolution of the EUMETSAT Advanced Retransmission Service (EARS)** Christelle Ponsard, European Organization for the Exploitation of Meteorological Satellites
4.15	2:15 p.m. – 2:30 p.m.	**Use of RARS data in the UK Met Office** Richard Francis, Satellite Data Processing System Group, Meteorological Office, United Kingdom
4.16	2:30 p.m. – 2:45 p.m.	**National Weather Service Requirements for Real-time Satellite Data** Gary Hufford, NOAA National Weather Service
4.17	2:45 p.m. – 3:00 p.m.	**GEONETCast Americas** Paul Seymour, NOAA Satellite and Information Service
	3:00 p.m. – 3:30 p.m.	**Break: Refreshments in Exhibits Area**
4.18	3:30 p.m. – 3:45 p.m.	**Poster Session Overview** Tim Schmit, NOAA Satellite and Information Service
4.19	3:45 p.m. – 5:30 p.m.	**Direct Readout Conference Poster Session**

Thursday, December 11, 2008, (8:30 a.m. – 1:30 p.m.)
Session 5: Global User Perspective
Chair: Charles S. Baker

Presentation	Time	Session or Event
	8:00 a.m. – 8:30 a.m.	**Registration/Coffee**
5.0	8:30 a.m. – 8:35 a.m.	**Introduction** Charles S. Baker, Deputy Assistant Administrator, NOAA Satellite and Information Service
5.1	8:35 a.m. – 9:00 a.m.	**Keynote** Ramón J. Viñas García (Venezuela), President, WMO Region III
5.2	9:00 a.m. – 9:20 a.m.	**Group on Earth Observation** Francis Bell**,** Director, Group on Earth Observation (GEO)
5.3	9:20 a.m. – 9:40 a.m.	**Private Individual Users of Weather Satellites: The Future** Dave Cawley, Remote Imaging Group (RIG)
5.4	9:40 a.m. – 10:00 a.m.	**The Use of NOAA Data at the Costa Rican Meteorological Service** Werner Stolz, Instituto Meteorológico Nacional de Costa Rica
5.5	10:00 a.m. – 10:20 a.m.	**The Use of NOAA Data at the Chile National Meteorological Service** Alejandro Muñoz, Jefe Subdepartamento Pronósticos, Dirección Meteorológica de Chile
	10:20 a.m. – 10:50 a.m.	**Break: Refreshments in Exhibits Area**
5.6	10:50 a.m. – 11:10 a.m.	**Use of Satellite Direct Readout in the South Pacific** Colin Schultz, Pacific Regional Environment Program
5.7	11:10 a.m. – 11:30 a.m.	**The Role of Satellite Data in the Meteorological Service of Canada** David Bradley, Project Coordinator, Space-Based Monitoring, Meteorological Services of Canada
5.8	11:30 a.m. – 11:50 a.m.	**Comparative Evaluation of NOAA AVHRR, Feng Yun 1D, MODIS and LandSat TM5 Images Working as a Satellite Constellation for the Detection of Burned Areas in the Flooding Valley of the Parana River, Argentina** Carlos Cotlier, Universidad Nacional de Rosario, Facultad de Ciencias Exactas, Ingeniería y Agrimensura, Centro de Sensores Remotos, Argentina
5.9	11:50 a.m. – 12:10 p.m.	**Low Orbit Meteorological Satellite Products and Analysis Tools at INPE/CPTEC, Brazil** Carlos Angelis, INPE/CPTEC (Instituto Nacional de Pesquisas Espaciais, Centro de Previsão de Tempo e Estudos Climáticos, Divisão de Satélites e Sistemas Ambientais)
5.10	12:10 p.m. – 1:30 p.m.	**Luncheon Panel on GOES-10 Operations –** **Moderator:** Chris Wheeler**,** NOAA Satellite and Information Service **Panel Members:** Luiz Machado, INPE/CPTEC (Brazil) (Instituto Nacional de Pesquisas Espaciais, Centro de Previsão de Tempo e Estudos Climáticos, Divisão de Satélites e Sistemas Ambientais) Tim Schmit, NOAA Satellite and Information Service Chris Wheeler, NOAA Satellite and Information Service

Thursday, December 11, 2008, (1:30 p.m. – 5:20 p.m.)
Session 6: Future Direct Readout
Co-Chairs: Hal Bloom and Dan Stockton

Presentation	Time	Session or Event
		Future of Direct Readout and Satellite Systems
6.1	1:30 p.m. – 1:50 p.m.	Abigail Harper, Deputy Assistant Administrator, Systems, NOAA Satellite and Information Service
6.2	1:50 p.m. – 2:10 p.m.	**GOES-R Satellite and Program Review** Hal Bloom, NOAA Satellite and Information Service, GOES-R Program Office
6.3	2:10 p.m. – 2:30 p.m.	**GOES-R Instruments and Products** Tim Schmit, NOAA Satellite and Information Service
6.4	2:30 p.m. – 2:50 p.m.	**GOES-R Direct Readout Implications** Bill Mazur, NOAA Satellite and Information Service, GOES-R Program Office
6.5	2:50 p.m. – 3:10 p.m.	**GOES-R Outreach Activities** Jim Gurka, NOAA Satellite and Information Service, GOES-R Program Office
	3:10 p.m. – 3:40 p.m.	**Break: Refreshments in Exhibits Area**
6.6	3:40 p.m. – 4:00 p.m.	**NPOESS: Satellite and Program Review** Dan Stockton, Program Executive Officer for Environmental Satellites, NOAA Satellite and Information Service
6.7	4:00 p.m. – 4:20 p.m.	**NPOESS Direct Readout Mission** John Overton, NOAA Satellite and Information Service, NPOESS Integrated Program Office
6.8	4:20 p.m. – 4:40 p.m.	**NPOESS Direct Readout Operational Enhancements Model for Future Polar-orbiting Systems** John van de Wouw, Northrop Grumman Space Technology
6.9	4:40 p.m. – 5:00 p.m.	**NPOESS Preparatory Project Calibration and Validation Supporting Direct Readout Users** Heather Kilcoyne, NOAA Satellite and Information Service, NPOESS Integrated Program Office
6.10	5:00 p.m. – 5:20 p.m.	**Transitioning from POES AVHRR to NPOESS VIIRS: Understanding the Relationships Between POES and NPOESS Data Products** Bonnie Reed, NOAA Satellite and Information Service, NPOESS Integrated Program Office
	6:30 p.m. – 8:30 p.m.	**Conference Banquet – Hilton Miami Airport Hotel – Room To Be Announced**
		"Satellites and Their Utility in Communicating: Extreme Weather, Climate Change and Their Impacts in a Collaborative Environment" Speaker: Dave Jones, Founder, President & CEO, Storm Center Communications, Incorporated

Friday, December 12, 2008, (8:00 a.m. – 12:00 p.m.)
Session 7: User Services and Impacts
Co-Chairs: Mark Mulholland and Brian Hughes

Presentation	Time	Session or Event
7.1	8:00 a.m. – 8:20 a.m.	**User Services** Brian Hughes, NOAA Satellite and Information Service
7.2	8:20 a.m. – 8:40 a.m.	**The Importance of Geostationary Weather Satellites in Hurricane Forecasting: A Perspective** Jack Bevin, NOAA National Weather Service, National Hurricane Center
7.3	8:40a.m. – 11:50 a.m.	**Facilitated Discussion**
7.31	8:40 a.m. – 9:00 a.m.	**Breakout Moderator (Transition to Breakout Areas)** Mark Mulholland, Deputy Director, Office of Systems Development, NOAA Satellite and Information Service
7.32	9:00 a.m. – 10:30 a.m.	**Structured Breakouts** • User Needs from GOES Current & Future Satellite: GVAR, e-GVAR, GRB • User Needs from POES Current & Future Satellites: HRPT, IPOPP, LRD, HRD • User Needs from Satellite Services: LRIT, EMWIN, GOES DCS, ARGOS, GEONETCast, RANET, and NOAAPORT • Other topics of interest or an additional group
	10:30 a.m. – 10:50 a.m.	**Break: Refreshments (Transition to Plenary Area)**
7.33	10:50 a.m. – 11:35 a.m.	**Feedback from Breakout Groups** Mark Mulholland, Deputy Director, Office of Systems Development, NOAA Satellite and Information Service
7.34	11:35 a.m. – 11:50 a.m.	**Session Wrap-up and Final Discussion** Abigail Harper, Deputy Assistant Administrator, Systems, NOAA Satellite and Information Service
7.4	11:50 a.m. – 12:00 p.m.	**Closing Remarks** Abigail Harper, Deputy Assistant Administrator, Systems, NOAA Satellite and Information Service
		Conference Closes

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Appendix II: Attendee List - Name and Country

Cotlier, Carlos	Argentina	La Rosa, Jorge Chira	Peru
Lopez, Diego	Argentina	Lafeuille, Jerome	Switzerland
Schulz, Colin	Australia	Cummings, Aldric	Tobago
Bain, Byron	Bahamas	Francis, Richard	UK
Gibson, Gregory	Bahamas	Alexander, Alfreda	USA
Burnside, Godfrey	Bahamas	Ameller, Rafael	USA
Jones, Albert	Belize	Anstett, Richard	USA
Imana, Edgar	Bolivia	Asmus, Michael	USA
Machado, Luiz	Brazil	Bachmeier, Scott	USA
Angelis, Carlos	Brazil	Baker, Charles	USA
Dayre-Musetti, Jean-Francois	Canada	Baldauf, Brian	USA
Ouellet, Pierre	Canada	Baptiste, Eric	USA
Williams, Darryl	Canada	Behnke, Dana	USA
Bradley, David	Canada	Benner, Dave	USA
Alfheim, Arne	Canada	Beven, Jack	USA
Cawley, Dave	Canada	Block, James	USA
Munoz, Alejandro	Chile	Bloom, Hal	USA
Nabona Naranjo, Javier	Chile	Bonilla, Johan	USA
Sarmiento, Diego	Colombia	Botting, Tye	USA
Soto, Jorge	Colombia	Bradley, Joseph	USA
Munoz, Gustavo	Colombia	Brentzel, Kelvin	USA
Correa, Mauricio	Colombia	Bushnell, Mark	USA
Ngari, Arona	Cook Islands	Cheng, Zhaohui	USA
Stolz, Werner	Costa Rica	Clark, Dane	USA
Espin, Gerardo	Ecuador	Connell, Bernadette	USA
Ceron, Roberto	El Salvador	Coronado, Patrick	USA
Escobar, Edwin	El Salvador	Day, Derrick	USA
Garcia, Luis	El Salvador	Dilldine, Debbie	USA
Bell, Francis	England	Dubey, Karen	USA
Scheidgen, Dr. Peter	Germany	Fallek, Hank	USA
Ponsard, Christelle	Germany	Fesenger, Gordon	USA
Williams, Michael	Germany	Finta, Lt. Col. Chris	USA
Navas, Sergio	Guatamala	Fontaine, Kathy	USA
Castro Lizardo, Jose Nilson	Honduras	Funes, Melany	USA
Lopez, Gerardo	Mexico	Furgerson, John	USA
Dania, Arthur	Netherlands Antilles	Gerth, Jordan	USA
		Glackin, Mary	USA
Pieter, Haime	Netherlands Antilles	Gockel, Brian	USA
		Green, Russ	USA
Oynes, Frank	Norway	Grimes, David	USA
Aguilar, Emmanuel	Panama	Guberek, Michael	USA
Cherrington, Emil	Panama	Gumley, Liam	USA
Espinosa, Jorge	Panama	Gurka, James	USA

Habib, Dr. Shadid	USA
Hampton, Cynthia	USA
Harper, Abigail	USA
Heil, James	USA
Hellstern, Brandt	USA
Hertzog, Eric	USA
Hodge, Hoover	USA
Holloway, Fred	USA
Huang, Allen	USA
Huff, Patricia	USA
Hughes, Brian	USA
Jackson, Nina	USA
Jarmin, Adilson	USA
Jones, Dave	USA
Juckins, Christopher	USA
Kannenberg, Robert	USA
Kelly, Kathy	USA
Kibler, Jaime	USA
Kicza, Mary	USA
Kilcoyne, Heather	USA
King, Thomas	USA
Kuciauskas, Arunas	USA
Lauer, Christopher	USA
Lee, Hathcock	USA
Letsinger, Robert	USA
Lewis, Jennifer	USA
Leyva, Salim	USA
Linn, John	USA
Louis, Wasson	USA
Madsen, Eric	USA
Marston, Robert	USA
Maxfield, Brad	USA
Mazur, Wilfred	USA
McMillen, Capt. John	USA
McNaughton, Bob	USA
McWilliams, Gary	USA
Metcalf, Kay	USA
Milligan, Michael	USA
Model, Joshua	USA
Mooney, Margaret	USA
Morris, Tim	USA
Mostek, Anthony	USA
Mulholland, Mark	USA
Nahorniak, Jasmine	USA
O'Connors, Chris	USA
Ohlemacher, Richard	USA
Overton, John	USA
Padar, Stephen	USA
Parks, John	USA
Perkins, Marlin	USA
Peters, Robert	USA
Pitter, Shanna	USA
Plante, Robert	USA
Poucher, Dean Jay	USA
Preble, Duane	USA
Randall, Valerie	USA
Reed, Bonnie	USA
Reeves, Letecia	USA
Reynolds, Richard	USA
Richards, Michael	USA
Riishojgaard, Lars	USA
Roberson, Jeremy	USA
Rodriguez, Santos	USA
Royle, Andrew	USA
Ruggles, Michael	USA
Santek, Dave	USA
Saunders, Leesha	USA
Schmit, Timothy	USA
Schoeneberger, Carl	USA
Seifert, Paul	USA
Seymour, Paul	USA
Shanks, Adam	USA
Shaw, Brent	USA
Shin, Hae-Yong	USA
Sisko, Christopher	USA
Sjoberg, William	USA
Smith, Mark	USA
Soto, Ted	USA
Spain, Leslie	USA
Spangenberg, Douglas	USA
Spangler, Timothy	USA
Sponberg, Kelly	USA
Stedronsky, Richard	USA
Stockton, Dan	USA
Strabala, Kathleen	USA
Suekawa, Carl	USA
Taylor, John	USA
Tehranian, Shahram	USA
Thebaud, Holly	USA
Thomas, William	USA
Thompson, Dan	USA
Uccillini, Dr. Louis	USA
Ullman, Richard	USA
Valles, Esteban	USA
van de Wouw, John	USA
VandeCastle, John	USA
Vant-Hull, Brian	USA
Wade, Givens	USA

Wagner, Robert	USA
Walisch, Michael	USA
Weiner, Allan	USA
Wezalis, Robert	USA
Wheeler, Christopher	USA
Whitcomb, Jane	USA
Wilczynski, Pete	USA
Winter, Donald	USA
Wydick, James	USA
Yapur, Martin	USA
Zavodnik, Donald	USA
Zhou, Lihang	USA

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2008 NOAA Satellite Direct Readout Conference: Transitioning into the Future
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Conference Report
Appendix IV: Acronym List

AAPP	ATOVS and AVHRR Pre-processing Package
AATSR	Advanced Along Track Scanning Radiometer
ABBA	Automated Biomass Burning Algorithm
ABI	Advanced Baseline Imager
ABS	Advanced Baseline Sounder
ACARS	Aircraft Communications and Reporting System
ACE	Advanced Composition Explorer (NASA)
AE	Auto-Estimator
AIRS	Atmospheric Infrared Sounder
ALADIN	Atmospheric Laser Doppler Instrument
ALOS	Advanced Land Observing Satellite
AMSR	Advanced Microwave Scanning Radiometer
AMSR-E	Advanced Microwave Scanning Radiometer - EOS
AMSU	Advanced Microwave Sounding Unit
AMSU-A	Advanced Microwave Sounding Unit-A
AMW	Atmospheric Motion Vectors
AOD	Aerosol Optical Depth
APS	Aerosol Polarimeter Sensor
APT	Automatic Picture Transmission
ARAD	Atmospheric Research and Applications Division
ArcGP	Arctic Gravity Project
ASADA	Automated Smoke and Aerosol Detection Algorithm
ASAR	Advanced Synthetic Aperture Radar
ASCAT	Advanced Wind Scatterometer
ASOS	Automated Surface Observing System
ASPB	Advanced Satellite Products Branch
ATMS	Advanced Technology Microwave Sounder
ATOVS	Advanced TIROS Operational Vertical Sounder
AUTEC	Atlantic Undersea Test and Evaluation Center
AVHRR	Advanced Very High Resolution Radiometer
AWIPS	Advanced Weather Information Display System
CALIPSO	Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation
Cal/Val	Calibration & Validation
CCRI	Climate Change Research Initiative
CCRS	Canada Center for Remote Sensing
CDR	Climate Data Record
CEO	Coasts, Estuaries, and Oceans
CERES	Clouds and the Earth's Radiant Energy System
CDA	Command and Data Acquisition
CGMS	Committee on Geostationary Meteorological Satellites
CHAMP	Challenging Mini Satellite Payload
CICS	Cooperative Institute for Climate Studies
CIORS	Cooperative Institute for Ocean Remote Sensing
CIOSS	Cooperative Institute for Oceanographic Satellite Studies

CIMSS	Cooperative Institute for Meteorological Satellite Studies
CIRA	Cooperative Institute for Research in the Atmosphere
CLASS	Combined Large Array Storage System
CLAVR	Clouds from AVHRR
CMA	Chinese Meteorological Agency
CMDL	Climate Monitoring and Diagnostics Laboratory
CMIS	Conically Scanning Microwave Image/Sounder
CMOD4	C-Band Model Function
CNES	French Space Agency
COMET	Cooperative Program for Operational Meteorology
CONUS	Continental United States
CORL	Consolidated Observations Requirements List
CoRP	Cooperative Research Program
COSMIC	Constellation Observing Satellites for Meteorology, Ionosphere, and Climate
CPC	Climate Prediction Center
CPUE	Catch Per Unit Effort
CREIOS	Coral Reef Ecosystem Integrated Observing System
CrIS	Cross-track Infrared Sounder (NPOESS)
CRAD	Climate Research and Applications Division
CREST	Cooperative Remote Sensing Science and Technology Center
CRW	Coral Reef Watch
CSA	Canadian Space Agency
CSTARS	University of Miami Center for Southeastern Tropical Advanced Remote Sensing
CSU	Colorado State University
CUNY	City University of New York
CW/OW	CoastWatch/OceanWatch
DAAC	Distributed Active Archives Center
DAO	Data Assimilation Office
DADDS	DCS Advanced Data Distribution System
DAPS	DCS Automated Processing System
DCPI	Data Collection Platform/Interrogate
DCS	Data Collection System
DHW	Degree Heating Weeks
DMSP	Defense Meteorological Satellite Program
DOC	Department of Commerce
DoD	Department of Defense
DORIS	Doppler Orbitography and Radiopositioning Integrated by Satellite
DRL	Direct Readout Laboratory (NASA)
DRO	Direct Readout
DVB-S	Digital Video Broadcasting - Satellite
DWL	Doppler Wind Lidar
EDC	EROS Data Center
EDR	Environmental Data Record
EDS	Edit and Decommutation System
eGVAR/GRB	Emulated GVAR/Goes Rebroadcast (GOES R)
EMC	Electromagnetic Compatibility
EMWIN	Emergency Manager’s Weather Information Network
ENSO	El Nino Southern Oscillation

EOS	Earth Observation System/Satellite
EPA	Environmental Protection Agency
ERB	Earth Radiation Budget
ERBS	Earth Radiation Budget Sensor
EROS	Earth Resources Observation System
ERS	European Remote Sensing
ESA	European Space Agency
ESPC	Environmental Satellite Processing Center
ESRO	European Space Research Organization
ESSIC	Earth System Science Interdisciplinary Center
ETL	Environmental Technology Laboratory
EUMETCast	European Meteorological Satellite Rebroadcast
EUMETSAT	European Meteorological Satellite
EXLORES	EXPloring and Learning the Operations and Resources of Environmental Satellites!
FAA	Federal Aviation Administration
FCI	Flexible Combined Imager
FEMA	Federal Emergency Management Agency
FRP	Federal Response Plan
FSU	Florida State University
FTP	File Transfer Protocol
GDAS	Global Data Assimilation System
GDR	Geophysical Data Record
GEO	Group on Earth Observations
GEO BON	GEO Biodiversity Observation Network
GEOCAT	Geostationary Cloud Algorithm Testbed
GEOLAB	Geometry Laboratory
GEONETCast	Geostrationary Satellite Rebroadcast (not an acronym)
GEOSAR	Geostationary Search and Rescue
GEOSS	Global Environment Observation System of Systems
GEST	Goddard Earth Sciences and Technology Center
GEWEX	Global Energy and Water Cycle Experiment
GFO	GeoSAT Follow-On
GFS	Global Forecasting System
GIS	Geographical Information System
GLAS	Geoscience Laser Altimeter System
GMSRA	GOES Multi-Spectral Rainfall Algorithm
GNC-A	GEONETCAST Americas
GOES	Geostationary Operational Environmental Satellite
GOES-R	Geostationary Operational Environmental Satellite - R
GOES-R3	GOES-R Risk Reduction
GOME	Global Ozone Monitoring Experiment
GOME-2	Global Ozone Monitoring Experiment
GOOS	Global Ocean Observing System
GMS	Geostationary Meteorological Satellite
GPCP	Global Precipitation Climatology Project
GPSOS	GPS Occultation Sensor
GPS/RO	Global Positioning System/Radio Occultation
GRAS	GPS Radio Atmospheric Sounder

GRB	GOES Rebroadcast Service
GRIB/BUFR	Gridded Binary/Binary Universal For the Representation of meteorological data
GSC	Geological Survey of Canada
GSFC	Goddard Space Flight Center
GSICS	Global Space-Based Inter-Calibration System
GSIP	GOES Surface and Insolation Project
GSLR	Global Sea Level Rise
GTS	Global Telecommunications System
GUC	GOES User Conference
GVAR	GOES VARiable Format
GVI	Global Vegetation Index
GVF	Global Vegetation Fraction
H-E	Hydro-Estimator
HAB	Harmful Algal Bloom
HADS	Hydrometeorological Automated Data System
HDFS	Hadoop Distributed File System
HES	Hyperspectral Environmental Suite
HIRS	High-Resolution Infrared Radiation Sounder
HRD	High-resolution Data
HRIT	High Rate Information Transmission
IASI	Infrared Atmospheric Sounding Interferometer
ICD	Interface Control Document
IFCT	Instrument Functional Chain Team
IFFA	Interactive Flash Flood Analyzer
IGAP	International Global Aerosol Program
IGBP	International Geosphere Biosphere Programme
IGDDS	Integrated Global Data Dissemination Service (or) International Global Biosphere Program
IGOS	Integrated Global Observing Strategy
IIA	Interagency and International Affairs
IJPS	Initial Joint Polar System
IMI	Irish Marine Institute
InSAR	Interferometric SAR
INPE/CPTEC	National Institute for Space Research (Brazil)/Centro De Previsao de Tempo e Estudos Climaticos (Center For the Provision of Time and Climate Studies)
INSAT	Indian National Satellite
IOCCG	International Ocean Color Coordinating Group
IOOS	Integrated Ocean Observing System
IORD	Integrated Operational Requirements Document
IPO	Integrated Program Office
IPOPP	International Polar Orbiter Processing Package
IR	Infrared
IRS	InfraRed Sounder
IT	Information Technology
ITT	Information Technology Team (new name for TST)
JAXA	Japan Aerospace Exploration Agency
JCSDA	Joint Center for Satellite Data Assimilation
JPEG	Joint Photgraphic Experts Group (who developed the data

	Compression standard by the same name)
JTWC	Joint Typhoon Warning Center
LEO	Low Earth Orbit
LI	Lightning Imager
JMA	Japanese Meteorological Agency
JPL	Jet Propulsion Laboratory
LaRC	Langley Research Center
LDAS	Land Data Assimilation System
LEOCAT	Low Earth Orbiting Cloud Algorithm Testbed
LRC	Lesser Regional Contingency
LRD	Low Resolution Data
LRGS	Local Readout Ground System (DCS)
LRIT	Low Rate Information Transmission
LSA	Laboratory for Satellite Altimetry
LTAN	Local Time Ascending Node
MAS	MODIS Airborne Simulator
McIDAS	Man computer Interactive Data Access System
MECB	Marine Ecosystems and Climate Branch
MERIS	Medium Resolution Imaging Spectrometer
Meteosat	European Geostationary Meteorological Satellite
METOP	Meteorological Operations Platform
MHS	Microwave Humidity Sounder
MIRS	Microwave Integrated Retrieval System
MOBY	Marine Optical Buoy
MOCE	Marine Optical Characterization Experiment
MODIS	Moderate Resolution Imaging Spectro-Radiometer
MOU/MOA	Memorandums of Understanding and Agreement
MSC/EC	Meteorological Service of Canada/Environment Canada
MSG	METEOSAT Second Generation
MSG-S	Meteosat Second Generation - S
MSMR	Multi-frequency Scanning Microwave Radiometer
MSU	Microwave Sounding Unit
MTG	METEOSAT Third Generation
MTSAT	Multifunctional Transport Satellite (Japanese geostationary)
MW	Microwave
NAAPS	Navy Aerosol Analysis and Prediction System
NASA	National Aeronautics and Space Administration
NASDA	National Space Development Agency of Japan
NAVOCEANO	Naval Oceanographic Office
NCAR	National Center for Atmospheric Research
NCCOS	National Centers for Coastal Ocean Science
NCDC	National Climatic Data Center
NCEP	National Centers for Environmental Prediction
NCEP/NCAR	National Centers for Environmental Prediction/National Center for Atmospheric Research
NDE	NPOESS Data Exploitation
NDVI	Normalized Difference Vegetation Index
NESDIS	National Environmental Satellite, Data, and Information Service
NGA	National Geospatial Agency

NGDC	National Geophysical Data Center
NHC	National Hurricane Center
NIC	NOAA National Ice Center
NIMA	National Imagery and Mapping Agency
NIST	National Institute of Science and Technology
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAASIS	NOAA Satellite Information System
NODC	National Oceanographic Data Center
NOS	National Ocean Service
NPOESS	National Polar-orbiting Operational Environmental Satellite System
NPP	NPOESS Preparatory Program
NRC	National Research Council
NRCS	Normalized Radar Cross-Section
NRL	Naval Research Laboratory
NRT	Near-Real-Time
NSF	National Science Foundation
NWP	National Weather Prediction
NWS	National Weather Service
OAR	Office of Oceanic and Atmospheric Research
OCM	Ocean Color Monitor
OCONUS	Outside the Continental United States
ODDAB	Ocean Dynamics and data Assimilation Branch
OH	Office of Hydrology
OHC	Ocean Heat Content
OLR	Outgoing Longwave Radiation
OLS	Optical Linescan System
OMI	Ozone Monitoring Instrument
OMPS	Ozone Mapping and Profiler Suite
OPDB	Operational Products Development Branch
OPT	Ozone Processing Team
ORA	Office of Research and Applications
ORAD	Oceanic Research and Applications Division
OSCAR	Ocean Surface Current Analysis Real-time
OSD	Office of Systems Development
OSO	Office of Satellite Operations
OSDPD	Office of Satellite Data Processing and Distribution
OSSE	Observing System (Simulation) Experiment
PALSAR	Japanese Phased Array L-band Synthetic Aperture Radar
PATMOS	Pathfinder Atmosphere
PEFL	NOAA Pacific Fisheries Environmental Laboratory
PMEL	Pacific Marine Environmental Laboratory
POES	Polar-orbiting Operational Environmental Satellites
POP	Product Oversight Panel
PPBES	Project, Planning, Budgeting and Execution System
QPE	Quantitative Precipitation Estimation
QPF	Quantitative Precipitation Forecasts
RADS	Radar Altimetry Database System

RAMMB	Regional and Mesoscale Meteorology Branch
RAMSDIS	Regional and Mesoscale Meteorology Team Advanced Meteorological Satellite Demonstration and Interpretation System
RANET	Radio and Internet for the Communication of Hydro-Meteorological and Climate Related Information
RARS	Regional ATOVS Retransmission Services Project
R&D	Research and Development
RFI	Radio Frequency Interference
RIG	Remote Imaging Group
RPP	Research Project Plan
RSO	(GOES) Rapid Scan Operation
RT	Radiative Transfer
RTTOV	Radiative Transfer for TOVS
SAGE	Stratospheric Aerosol and Gas Experiment
SAR	Synthetic Aperture Radar
SARP	Search and Rescue Processor
SARSAT	Search and Rescue Satellite Aided Tracking
SBA	Satellite Bleaching Alert
SBN	Satellite Broadcast Network
SBUV/2	Solar Backscatter Ultraviolet Spectral Radiometer, MOD 2
SCaMPR	Self-Calibrating Multivariate Precipitation Retrieval
SDS	Scientific Data Stewardship
SECW	Southeast CoastWatch Program
SERVIR	Spanish for “To Serve” - a Regional Visualization and Monitoring System for the Latin America and the Caribbean region
SEVIRI	Spinning Enhanced Visible & InfraRed Imager
SMCD	Satellite Meteorological and Climatology Division
SNO	Simultaneous Nadir Overpass
SOCC	Satellite Operations Control Center
SOCD	Satellite Oceanography and Climatology Division
SOSB	Satellite Ocean Sensors Branch
SPB	Sensor Physics Branch
SPC	Storm Prediction Center
SPS	Science Project Summaries
SRSO	Super-Rapid Scan Operations
SSD	Satellite Services Division (of NOAA)
SSF	Single Scanner Footprint TOA/Surface Fluxes and Clouds
SSM/I	Special Sensor Microwave Imager
SSMIS	Special Sensor Microwave Imager/Sounder
SSR	Sea Surface Roughness
SST	Sea Surface Temperature
STAR	Center for Satellite Applications and Research
TARFOX	Tropospheric Aerosol Radiative Forcing Observational Experiment
TCFP	Tropical Cyclone Formation Probability
TCHP	Tropical Cyclone Heat Potential
TIROS	Television and Infrared Observation Satellite
TIROS N	Television InfraRed Observation Satellite - N
TOMS	Total Ozone Mapping Spectrometer
TOPEX	Ocean Topography Experiment (A Sensor)

TOVS	TIROS Operational Vertical Sounder
TRMM	Tropical Rainfall Measuring Mission
TST	Technical Support Team
UCAR	University Corporation for Atmospheric Research
UDP	User Datagram Protocol
UKMO	United Kingdom Meteorological Office
UMBC	University of Maryland, Baltimore County
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USGCRP	U.S. Carbon Cycle Science Plan
USWRP	United States Weather Research Program
UVN	Ultra-violet Visible Near-infrared (UVN) Sounder
VCI	Vegetation Condition Index
VHF	Very High Frequency
VIIRS	Visible/Infrared Imager/Radiometer Suite
VIRS	Visible Infrared Scanner
VIS	Visual Imaging System
VISIT	Virtual Institute for Satellite Integration Training
VISSR	Visible and Infrared Spin-Scan Radiometer
WCRP	World Climate Research program
WEFAX	Weather Facsimile
WF_ABBA	Wildfire Automated Biomass Burning Algorithm
WINDEX	Wind Experiment
WIPE	World-Wide Web Image Processing Environment
WMSI	Wet Microburst Severity Index
WMO	World Meteorological Organization
WRF	Weather Research & Forecasting