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HEARING TITLED
BRIDGING THE GAP: AN UPDATE ON THE NATION'S WEATHER SATELLITE PROGRAMS

BEFORE THE
SUBCOMMITTEE ON ENVIRONMENT AND
SUBCOMMITTEE ON OVERSIGHT
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
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Chairmen Bridenstine and Loudermilk, Ranking Members, and Members of the Committee, I am Dr. Stephen Volz, the Assistant Administrator of NOAA's National Environmental Satellite, Data, and Information Service (NESDIS). Thank you for the opportunity to join Mr. David Powner from the Government Accountability Office (GAO), and Mr. Steven Clarke from the National Aeronautics and Space Administration (NASA) at today's hearing.

My testimony today will focus on the recent GAO reviews of NOAA's Joint Polar Satellite System (JPSS) and Geostationary Operational Environmental Satellite-R (GOES-R) Series Programs, and on the progress that NOAA is making to develop the Nation's next generation geostationary and polar-orbiting satellite systems. We are confident that with NASA, as our acquisition agent, and with our industry and academic partners, we can meet our development milestones in order to deliver the essential data that these satellites provide to the nation's weather enterprise. These programs are being developed using proven acquisition processes for large aerospace missions and NOAA is confident based on the successes that the GOES-R Series and JPSS Programs have achieved to-date is based on implementing these processes.

Meeting the Nation's Space-based Operational Weather Data Requirements
NOAA's mission to provide science, service, and stewardship to the Nation is fundamentally dependent on observations of our environment. These observations are the backbone of NOAA's predictive capabilities, of which NOAA satellites provide the majority of data required. NOAA ensures that operational weather, ocean, climate, and space weather information are available 24 hours-a-day, seven days-a-week to address our nation's critical civil and military needs for timely and accurate forecasts and warnings of solar storms, extreme weather, and environmental phenomena, such as hurricanes, tornadoes, thunderstorms, winter storms, floods, wildfires, volcanic ash, fog, and sea ice.

NESDIS has managed the operation of polar-orbiting operational environmental satellites since 1966 and geostationary operational environmental satellites since 1974. Over the decades, these systems have supported weather and environmental monitoring programs that are relied upon by users in the United States (U.S.) and around the world. Satellites provide more than 95 percent of the data assimilated into NOAA's National Weather Service (NWS) numerical weather prediction models (NWP). These NWP models are used to forecast the weather seven or more days ahead, and, in particular, the NWP models are essential to forecasting the development of extreme weather events, including hurricanes and blizzards. Of those satellite observations, more than 80 percent are from polar-orbiting satellites, including the NOAA/NASA Suomi National Polar-orbiting Partnership (Suomi NPP) satellite, which is the primary satellite for weather observations in the afternoon orbit. Older secondary satellites, such as NOAA's Polar-orbiting Operational Environmental Satellite (POES) and NASA's Earth Observing Satellites (EOS), supplement Suomi NPP. NOAA's NWP models also rely on data from the European Metop satellites that fly in the mid-morning orbit.

GOES satellites, along with ground-based Doppler Radar, provide near real-time situational awareness, which is vital for "nowcasting" and short-term operational weather forecasting. This capability is especially important for tracking hurricanes and severe weather warnings and forecasts, where a few hours or even minutes matter. GOES satellites also provide some of the data that are used by the NWS Space Weather Prediction Center, the center responsible for issuing space weather forecasts, assessments, and warnings.

The American public depends on accurate, reliable, and timely weather information from NWS upon which to base their actions and decisions to protect themselves, their families, and their property. The growing private weather sector, which delivers specialized weather information, also relies on full, open, and timely receipt of NOAA's data and information. NOAA's satellites are an integral part of the nation's observational infrastructure that supports these NWS and private sector forecasting capabilities.

Data Accessibility

The primary requirement for NOAA's satellite systems is to provide the observations necessary to meet NOAA's environmental monitoring mission and support the needs of the nation's weather enterprise. Satellite data continuity is critical to many activities, including: the operational requirements of NOAA and other weather forecasting agencies around the world; research that enhances weather prediction capabilities; and the commercial weather sector's products and services. NOAA leverages data through a variety of means to augment and enhance data from its geostationary and polar-orbiting systems with other data sources. Much of these data are ingested into the NWS NWP models, or are used by forecast meteorologists to develop blended products that enhance their services to the public. To access additional non-NOAA data, NOAA:

- Leverages data from research satellites, such as NASA EOS and the Advanced Composition Explorer (ACE);
- Uses data from Department of Defense satellites, such as the Defense Meteorological Satellite Program;

- Purchases data from the commercial sector, such as ground-based lightning data and space-based Synthetic Aperture Radar data;
- Implements international agreements to ingest data from partner organizations, such as EUMETSAT) Metop satellites, Taiwan's Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC) data, and Japanese Aerospace Exploration Agency's Global Climate Observing Mission – Water1 (GCOM-W1) data);
- Jointly procures satellite systems through domestic partnerships, such as refurbishment of the Deep Space Climate Observatory (DSCOVR), and international partnerships, such as Jason-3 and COSMIC-2; and
- Collaborates with other Federal agencies as well as Canadian, French, and European partners to fly the Argos-Data Collection System and the Satellite-assisted Search and Rescue (SARSAT) instruments.

Over the coming five years, NOAA and its partners will launch a number of missions that will provide continuity and enhanced capability of some of these important data streams. The DSCOVR satellite will provide solar winds data to support the NWS Space Weather Prediction Center mission. Later this year, the Jason-3 satellite will be launched, followed by the first set of COSMIC-2 satellites and GOES-R in FY 2016, and JPSS-1 in FY 2017. NOAA will ensure that its domestic and international users have access to all the relevant data needed to develop weather forecasts and warnings.

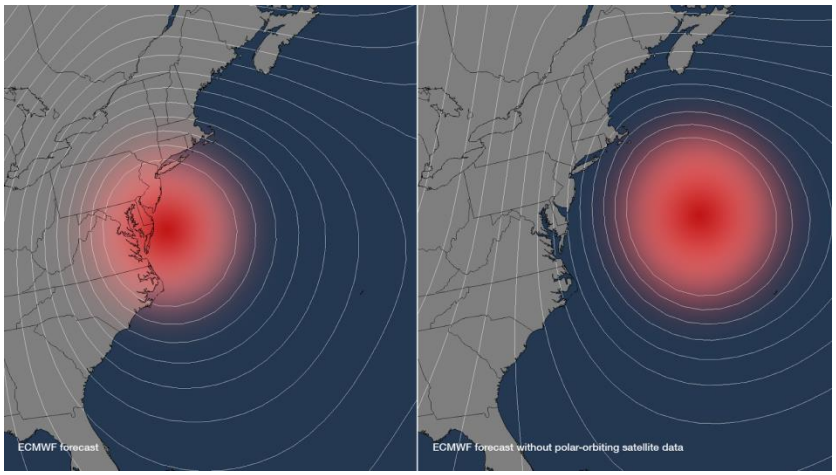

Figure 1. European Centre for Medium-Range Weather Forecasts (ECMWF) forecasts showing the progress of Hurricane Sandy with (left) and without (right) the use of polar satellite data

Downstream Benefits of NOAA's Satellite Data for Weather Forecasts and Warnings

As previously stated, the observations provided by NOAA's satellites are the backbone to NOAA's operational mission of protecting lives and property, along with many other downstream benefits to this information. The U.S. Forest Service, the U.S. Department of Homeland Security, the U.S. Department of Defense, and the Federal Aviation Administration are examples of the many agencies that rely on NOAA's three day and beyond forecasts in advance of severe weather to perform a wide variety of mission needs such as: determine forest

fire trajectories, where evacuations should occur, what kinds of relief supplies can be prepositioned, and what travel delays to expect.

Benefits Provided by NOAA and the External Research Community: One of the downstream benefits to increasing the quantity and resolution of future satellite data is continued improvement of global and regional weather models. NOAA's Office of Oceanic and Atmospheric Research (OAR), NWS, and the Joint Center for Satellite Data Assimilation, which includes NASA, Department of Defense, and NOAA, and NOAA's research partners are working to develop additional ways to use the new sensors on NOAA's satellites, including the Cross-track Infrared Sounder (CrIS) and Advanced Technology Microwave Sounder (ATMS) that currently fly on Suomi NPP and will fly on JPSS-1 and JPSS-2, and the Advanced Baseline Imager (ABI) that will fly on the GOES-R Series satellites, to improve operational global weather models. We expect these collaborative efforts to improve our forecasts and warnings of extreme events, including hurricanes, floods, winter storms, and severe weather. Improved forecasts and warnings will ensure that emergency managers are better prepared to deal with extreme weather conditions and will ultimately have a positive impact on the economy as private companies make their business decisions based on NOAA data and information products that are provided to the entire weather enterprise. NOAA's full-and-open data policy encourages and supports these activities.

NOAA also works with academic and external research communities to develop and transition proven research results into the operational environment using NOAA's satellite data and the relevant leveraged non-NOAA data to improve operational processes. These partnerships with the external research community are integral to realizing downstream benefits of NOAA's satellite data.

Achieving Downstream Benefits: Using U.S. and international forecast models, we can realize downstream benefits by issuing warnings that extreme weather is approaching three to seven days in advance. This supports decisions made by Federal, State, and local officials that save lives and property.

Superstorm Sandy serves as an excellent example of where U.S. models (and others) were used by NWS forecasters to issue the weather and water forecasts and warnings that were used by government officials to make preparations (e.g., closing New York mass transit and interstate highways), evacuate people to move out of harm's way in vulnerable coastal areas, and prepare for the heavy snow that fell in the Appalachian Mountains of West Virginia and western Maryland. Sometimes as important as warnings can be, not warning for a location can be equally important to emergency managers. Hurricane Arthur, that hit North Carolina July 3-4, 2014, was extremely well forecast by U.S. models, accurately predicting both track and intensity. This excellent forecast and our forecaster confidence in the model predictions allowed emergency managers to evacuate only those areas actually impacted by the storm, and not areas in past years that would have been evacuated as a "precaution" due to uncertainty of the track and intensity. These improved models are a result of improved computing capacity and observations, including satellite data.

Benefits to the Commercial Weather Sector: NOAA provides access to a wide range of products and services to all its users, from its raw satellite data to highly analyzed data products through NWS's dedicated communications networks, the internet, or social media. In fact, NOAA recognizes that these data allow the commercial sector to play its important role to help us more widely disseminate NWS forecasts and warnings, supplement and tailor forecasts for the general public and to develop on their own, specialized value-added products for use by unique industries and sectors. These collaborative partnerships have proven to be a huge benefit to U.S. and international weather communities.

Furthermore, there is active outreach and interaction with the nation's weather community, through NOAA's Technology, Planning and Integration for Observation (TPIO) Program, to document their basic data requirements and to ensure the satellite systems that we are acquiring will deliver the needed data and products. This outreach is supported by the Office of Federal Coordination for Meteorology, NOAA's Cooperative Institutes, and the academic community, along with our federal agency customers and partners that are actively involved in this process. NOAA will continue these activities to ensure that we are capturing the data requirements of our customers and users to ensure their sustained access to this rich and collaborative environment.

Government Accountability Office Reviews

Over the past year, NOAA's JPSS and GOES-R Series Programs were reviewed by the GAO's Information Technology Team. The reviewers were mindful of the devastating impacts to the nation that a gap in satellite data coverage could bring, starting with the likelihood of degraded forecast quality and skill of severe weather events, which could place lives and property at risk. While many specific areas of concern were examined, all reviews urged NOAA to remain focused on maintaining the continuity of our observational capability and improving the robustness of the constellations, and provided NOAA with focused recommendations. We share their concerns and concur with these recommendations and we are working to ensure the GOES-R Series and JPSS satellite developments continue on schedule and within budget.

The GAO was concerned enough to add NOAA's satellite acquisition of the GOES-R Series and JPSS Programs to the 2013 Biennial High Risk List due to the risk of gaps in weather observations. NOAA has been taking steps over recent years to implement the GAO recommendations, through strategic investments made using funding from the *Disaster Relief Appropriations Act of 2013*, organizational realignments, and specific satellite acquisition activities that will make the polar-orbiting and geostationary constellations more robust. We believe that these actions will address many of the root causes that the GAO High Risk report emphasized and realize the goal of delivering satellite data to its customers and users without interruption.

Progress on the GOES-R Series Program

The GOES-R Series Program is NOAA's next-generation geostationary environmental satellite constellation. Geostationary environmental satellites are our observational sentinels in space, providing constant watch for severe weather such as hurricanes, severe thunderstorms, flash floods, and wildland fires in the Western Hemisphere. With two geostationary satellites always in operation (GOES-East and GOES-West) and an on-orbit spare, available as a backup, we are

able to track severe weather from the west coast of Africa through most of the Pacific basin. The GOES satellites complement *in situ* observational systems, such as NOAA's Doppler Radar network, NOAA's Hurricane Hunters, and ocean buoys, to provide NWS forecasters with near real-time data used to support operational weather forecasts. Additionally, NOAA maintains a partnership agreement with EUMETSAT, through which each agency provides additional backup to the other in the event of the loss of a satellite.

GOES-R Series Program Content: The GOES-R Series Program content remains unchanged since the Congressional Baseline report was submitted in February 2013. The Program consists of four spacecraft (GOES-R, -S, -T, and -U) and associated instruments and the ground system antennas, mission management, product generation and distribution and enterprise management capabilities. The GOES-R series capabilities will provide GOES continuity and needed enhancements of required weather and space weather data. The enhanced GOES-R series capabilities are the result of the new instrument suite that includes:

- Advanced Baseline Imager (ABI)
- Geostationary Lightning Mapper (GLM)
- Space Environmental In Situ Suite (SEISS)
- Extreme Ultra Violet / X-Ray Irradiance Sensor (EXIS)
- Solar Ultra Violet Imager (SUVI), and
- Magnetometer

GOES-R Series Program Progress: The GOES-R Series Program has made significant progress in its development of both the ground and the flight segments.

Flight segment:

- Delivery and integration of all GOES-R instruments onto the GOES-R spacecraft.
- Pre-environmental testing of the GOES-R satellite and instruments is underway.
- Development of GOES-S, -T, and -U instruments well underway with the GOES-S flight set expected to be completed by this summer.
- Build up and integration of GOES-S spacecraft elements has been started in Denver, Colorado.

Ground segment:

- All Core Ground System equipment has been delivered to operational locations (Wallops, Virginia; Fairmont, West Virginia; and Suitland, Maryland) with completion of verification testing on schedule for spring 2015.
- Completed site acceptance testing for three of four antenna upgrades at NOAA's Satellite Operations Facility in Suitland, Maryland.
- Successfully completed the first Data Operations Exercise with 24-hours of simulated data delivered to NWS.
- Completed first spacecraft to ground system end-to-end test.
- Continued progress on the GOES-R Proving Ground, which is designed to accelerate NWS utilization of data from GOES-R data once on orbit.

GOES-R Series Program Cost: The GOES-R Series Program remains on cost within its life cycle cost of $10.8 billion.

GOES-R Series Schedule: The GOES-R satellite is on track for a March 2016 launch, followed by GOES-S in the third quarter of FY 2017. Work on GOES-T and –U is also ongoing and on schedule to support launches in the third quarter of FY 2019, and first quarter of FY 2025, respectively.

2015 GAO Review of the GOES-R Series Program
NOAA reviewed the GAO's report and concurred with all the recommendations:

1. Investigate and address inconsistencies in monthly earned value data reporting for the GLM and ABI instruments;
2. Address shortfalls in defect management identified in this report, including the lack of clear guidance on defect definitions, what defect metrics should be collected and reported, and how to establish a defect's priority or severity;
3. Reduce the number of unresolved defects on the GOES ground system and spacecraft; and
4. Add information to the GOES satellite contingency plan on steps planned or underway to mitigate potential launch delays, the potential impact of failure scenarios in the plan, and the minimum performance levels expected under such scenarios.

Discussion of the Actions to Date to Address these Recommendations
For the first recommendation, the GOES-R Series Program validates all of the earned value management (EVM) data received and has an underlying process to insure that data calculations are correct and that valid data are being reported. We will identify the root causes of the inconsistencies identified and rectify any process escapements. From a management perspective, we also use other data, such as milestones completed and contractor staffing profiles, to ensure our management oversight is based on an integrated view of many metrics or indicators, including EVM.

With regard to the second recommendation, NOAA acknowledges that there are some differences between the various contractors' defect management software and internal definitions. Allowing the contractors to use their own defect management systems, rather than dictating a common system for all contractors, minimizes program cost and the potential technical risk to the program if those companies were forced to use a unique system for us that was different from the systems they use for their other work. We will review defect definitions, defect metrics, and defect priority/severity management to ensure the best overall defect management controls are in place.

For recommendation three, the GOES-R Series Program is actively working to reduce the number of unresolved defects. As mentioned above, we will revise our processes to ensure maximum effectiveness. Note that all defects are reviewed on a bi-weekly basis. This review, which contains a constraints list, enforces timely closure of the defects in order to facilitate advancing through the Integration and Test phase.

For recommendation four, NOAA is working to update and augment its GOES satellite contingency plan. We expect to have it ready by Summer 2015.

An action plan to incorporate these recommendations into our standard operating procedures is under development. We appreciate the review that the GAO has conducted and NOAA remains confident that the GOES-R Series Program development is occurring in an effective manner and using the appropriate management tools and systems for a large satellite acquisition mission. We recognize this is a complex satellite system, and are actively managing the development risks. With timely receipt of sufficient appropriations in FY 2016 and beyond, we will be able to maintain development schedules and launch these next generation GOES satellites to meet the needs of our customers and users.

Progress on the JPSS Program

NOAA's polar-orbiting operational environmental satellites provide full global coverage for a broad range of weather and environmental applications. Placed in the afternoon orbit, these satellites are crucial for NOAA's operational three to seven day weather forecasts and environmental modeling efforts. In addition to the critical role JPSS sounders play in numerical modelling, the imager – the Visible Infrared Imaging Radiometer Suite (VIIRS) – provides observations of the northern latitudes where geostationary satellites cannot see. VIIRS provides additional critical support to NWS forecasters, including cloud and ice coverage data for watches and warnings in northern latitudes (i.e. Alaska) that cannot be covered by NOAA's geostationary satellites. It also supports many government and private interests in the Arctic region. The Suomi NPP satellite, which was launched in October 2011 with a design life lasting until the first quarter of FY 2017, is NOAA's primary afternoon orbit satellite, its ATMS and CrIS instruments provide operational data to the NOAA's operational numerical weather forecast models. NOAA POES and NASA EOS satellites are currently providing backup coverage for the afternoon orbit. The European Metop satellite constellation (Metop A and Metop B), which flies in the mid-morning orbit, also provides observations that NOAA assimilates into its operational numerical weather prediction models.

JPSS Program Content: The JPSS Program consists of: three satellites, Suomi NPP, JPSS-1 and JPSS-2; associated instruments, the ground system, mission management and operations, product generation and distribution, and management. The JPSS Program is focused to support the weather mission and will fly the following core instruments:

- Advanced Technology Microwave Sounder (ATMS)
- Cross-track Infrared Sounder (CrIS)
- Visible Infrared Imaging Radiometer Suite (VIIRS)
- Ozone Mapping and Profile Suite (OMPS)-Nadir
- Clouds and the Earth's Radiant Energy System (CERES), only on Suomi NPP and JPSS-1 and accommodations for a NASA-provided Radiation Budget Instrument (RBI) on JPSS-2

JPSS Program Progress: Over the past year, the JPSS Program has achieved the following successes in both the flight and ground segments and operations:

Flight segment:

- Made significant progress in developing and integrating the JPSS-1 spacecraft including the integration of two instruments, OMPS and CERES, onto the JPSS-1 spacecraft.
- Initiated development of all instruments for the JPSS-2 mission, which is targeted to launch FY 2022.

Ground segment and operations:

- Continued successful operation of the Suomi NPP satellite, which is exceeding its data availability and data latency requirements.
- Completed the design and development of an upgraded ground segment, which is required to support the launch of JPSS-1 and will improve Suomi NPP operations.
- Continued activities to rebuild robustness in the polar-orbiting constellation to ensure uninterrupted data availability.

JPSS Program Cost: The JPSS Program remains within the life cycle cost of $11.3 billion.

JPSS Schedule: The launch commitment date for the JPSS-1 satellite in the second quarter of FY 2017 remains unchanged since the Congressional Baseline report was submitted in November 2014. With respect to the JPSS-2, all instruments are under contract and an award of the JPSS-2 spacecraft bus is expected in April. The JPSS Program is working towards an accelerated JPSS-2 launch to the fourth quarter of FY 2021, a date earlier than the current launch commitment date of the first quarter of FY 2022.

2015 GAO Review of the JPSS Program

NOAA reviewed the GAO's report and concurred with the recommendations:

1. Track completion dates for all risk mitigation activities;
2. Update the program's assessment of potential polar satellite data gaps to include more accurate assumptions about launch dates and the length of the data calibration period, as well as key risks such as the potential effect of space debris on JPSS and other polar satellites' expected lifetimes;
3. Revise the comprehensive contingency plan for potential satellite data gaps in the polar orbit that is consistent with contingency planning best practices to address the shortfalls such as identifying DOD's and Japan's plans to continue weather satellite observations, including recovery time objectives for key products, completing the contingency plan with selected strategies, identifying opportunities for accelerating calibration and validation of products, providing an assessment of available alternatives based on their costs and potential impacts, establishing a schedule with meaningful timelines and linkages among mitigation activities, and defining completion dates for testing and validating the alternatives;
4. Investigate ways to prioritize mitigation projects with the greatest potential benefit to weather forecasting in the event of a gap in JPSS satellite data and report recommendations to the NOAA program management council; and

5. Ensure that the relevant entities provide monthly and quarterly updates on the progress of all mitigation projects and activities during existing monthly and quarterly management meetings.

We also note the GAO discussion of the threat of space debris on these satellites. Continued cooperation amongst all space agencies is required and expected as all space agency satellites are equally at risk and contribute to the generation of space debris. As noted, the JPSS Program satellites are designed to undertake maneuvers to avoid collisions, and critical components are shielded.

Discussion of NOAA's Actions to Date to Address these JPSS Recommendations
NOAA has already started to implement activities in response to the GAO recommendations.

- For the first recommendation, JPSS is reviewing its risk management processes to further ensure critical steps required to mitigate risks are tracked to completion.
- For recommendation two, the JPSS program conducts an annual assessment of satellite data availability. The 2014 assessment report is being finalized, including accurate assumptions about launch dates and length of the data calibration period. The 2015 assessment was already planned to include the impact of orbital debris.
- For recommendation three, NOAA is also reviewing its gap mitigation plan to identify improvements for the next revision, including addressing the shortfalls identified by GAO.
- For recommendation four, NOAA will establish a process to prioritize mitigation projects.
- For recommendation five, NOAA will assess current reporting and implement improvements to assure progress is reported on all gap mitigation activities at normal monthly and quarterly management meetings.

Preparation and contingency planning for the occurrence of a satellite data gap is essential to good enterprise risk management. The JPSS Program's gap mitigation assessment and plan will be updated and reviewed as needed, and we will fold the GAO recommendations into our standard operating procedures. As noted above, we appreciate the review that the GAO has conducted. NOAA remains confident that JPSS development is occurring in a cost-efficient manner, using the most appropriate management tools and systems for a large and complex satellite acquisition mission, and with resources applied appropriately, to mitigate risks and to maintain the second quarter of FY 2017 launch commitment date for JPSS-1. With sufficient appropriations, as noted above, we will launch these next generation polar-orbiting satellites to meet the needs of our customers and users without interruption.

Activities to Re-build Geostationary and Polar-Orbiting Constellation Robustness.
Over the past four years, NOAA has been strategically working to build and strengthen robustness of the geostationary and polar-orbiting constellations. We have been monitoring the current GOES-N Series operating satellites and ensuring that we maximize our ability to use these satellites to support our 24x7 operational needs. We believe that the progress we are making in the development of the GOES-R satellite will provide enhanced and continued coverage in the geostationary orbit when it is needed as the current GOES satellites are retired. We are on target for a second quarter of FY 2016 launch of GOES-R, with continued development towards launch of GOES-S and –T and –U as planned. Through the GOES-R Proving Ground, we have been working with operational and research meteorologists to

demonstrate the utility of the enhanced products and services that the GOES-R Series satellites will provide, and to ensure a rapid utilization of the GOES-R products when they become available. Funds requested in the President's Budget reflect the amount that is critical for us to maintain the momentum as we make the geostationary orbit more robust and as we retain our "two operational satellites with an on-orbit spare" operational posture.

There are a number of activities underway to re-build robustness in the polar-orbiting constellation. We continue to maximize the ability of the Suomi NPP satellite to meet our current data requirements for use in NWS NWP models. We are making tremendous progress on the development of the JPSS-1 satellite and remain on target for launch in the second quarter of FY 2017. We are ramping up development of the JPSS-2 satellite; the instruments are underway and a decision on the JPSS-2 spacecraft bus contractor will be made shortly. We are also working with our European partner, EUMETSAT, to ensure that Metop-C is successfully launched and will provide data for U.S. and European use in our respective weather forecast operations, and we continue to operate and utilize data from the other legacy satellites in the afternoon orbit, NASA's EOS, and NOAA's POES satellites.

The Joint Center for Satellite Data Assimilation is working to accelerate the optimal use of CrIS, ATMS, and VIIRS data from the Suomi NPP satellite, to be ready for use of JPSS-1 data on "day one" to ensure the JPSS-1 data is ready for use within NOAA's global and regional NWP models as early as possible.

We rely on continued Congressional appropriations support to accomplish these activities to ensure that the national weather enterprise has the space-based data needed to provide early warning to the American public that severe weather is approaching.

Conclusion

The nation's weather satellite programs are proceeding well through this final integrated systems test phase leading to the launch of GOES-R in March 2016 and JPSS-1 no later than March 2017. This progress is only possible with the close coordination between NOAA and NASA. We are confident in the technical expertise of NASA and our aerospace partners, and the proven acquisition processes that have supported the successes of the GOES-R Series and JPSS Programs. Continued funding at the requested level in FY 2016 and beyond is critical for meeting developmental milestones that will allow these programs to meet their launch dates. NOAA has been working steadily to rebuild the robustness of the geostationary and polar-orbiting satellite constellations, while taking maximum advantage of existing orbital assets to provide robustness and redundancy today.

Both the GOES-R Series and JPSS Programs are at critical junctures as they prepare for launches in FY 2016 and FY 2017, respectively. We are grateful for the continued support from Congress over the past five years and appreciate your efforts to bring stability to the appropriations that fund these programs and the missions that supplement and provide enhancements to the NOAA geostationary and polar-orbiting data.

Mr. Powner and his team's recommendations offer us recommendations for continuous improvement as we move forward to develop the operational environmental satellites that are so

crucial to protecting American lives and property, and the nation's economic security. We accept their recommendations and will be responsive to them, as noted.

Finally, NOAA values the long-standing interest by the Committee and its staff in NOAA's satellite program. We understand the difficult fiscal environment that we find ourselves in and appreciate the Congressional support to ensure that these critical national programs are supported to the maximum extent possible.