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Report on the Status of Future Geostationary Meteorological Satellite Systems

NOAA-WP-08 provides a status and an overview of the future GOES satellite system. GOES-P was launched on March 4, 2010 and reached geostationary orbit and was renamed GOES-15. The first visible image from GOES-15 arrived on April 6, 2010 and the first Infrared arrived on April 26, 2010. GOES-15 completed Post Launch Testing (PLT) and is in on-orbit storage mode at 89.5° W as a standby spacecraft for the operational GOES satellites.

Steady progress continued on the development of the GOES-R program throughout 2011. The spacecraft and ground segment are in their design phase and each of the instruments are in the first flight model fabrication phase. The new GOES-R instruments will advance operational environmental remote sensing technology by several decades. The technological advances will provide environmental information over a greater geographical location in less time, at higher resolutions, and with higher spectral content.



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1. GOES-I Series

GOES-11, launched May 30, 2000, continues operations as GOES-West at 135° W. GOES-12, launched July 23, 2001, began providing data coverage for South America at 60° W on May 10, 2010.

2. GOES-N Series

The GOES-13 satellite was successfully launched May 24, 2006 and began operations as GOES-East at 75° W on April 14, 2010. GOES-14 was launched on 27 June 2009 and is in on-orbit storage at GOES-14 located at 104.5° W. GOES-15 was successfully on March 4, 2010 and is in on-orbit storage mode at 89.5° W as a standby spacecraft for the operational GOES satellites. The GOES-N series utilizes an advanced attitude control system using star trackers, a spacecraft optical bench, and improved Imager and Sounder mountings provides enhanced instrument pointing performance for improved image navigation and registration to better locate severe storms and other events important to the NOAA National Weather Service. NASA Goddard Space Flight Center (GSFC) and the NOAA National Environmental Satellite, Data and Information Service (NESDIS) have set a higher standard of location accuracy for the GOES-N series, including data picture element (pixel) location to approximately two kilometers from geosynchronous orbit of 33,900 km (22,300 miles) above the Earth's surface.

3. GOES-R Series

The next generation of GOES satellites – the GOES-R series – and the new instruments, improved spacecraft, and ground segment will allow for a host of new environmental products and services, while improving most of the products and services that are currently provided. The new observations will contribute to dramatically improved weather, water, and space environmental services in the next decades, enhancing public safety and providing economic benefits to the U.S. and our international partners.

Steady progress on the development of the GOES-R system continued throughout 2011. All the GOES-R instruments have completed their critical design and are in the first flight model fabrication phase. ITT Corporation also completed development of a prototype model of the Advanced Baseline Imager (ABI). The ABI will improve hurricane monitoring and severe weather warning capability by scanning the earth nearly five times faster with a four-fold improvement in spatial resolution over the current GOES.

Lockheed Martin is designing and developing a new instrument for GOES-R, the Geostationary Lightning Mapper (GLM). The GLM instrument will detect all lightning flashes occurring anytime and anywhere in the Western Hemisphere, including the cloud-to-ground, in-cloud lightning, and lightning flash patterns that are early indicators of severe



thunderstorms and tornadoes., Lightning is the second highest storm-related killer in the United States, causing \$4 to \$5 billion in losses each year, including \$2 billion annually in airline operating expenses and passenger delays.

GOES-R's space weather and solar imaging instruments are also progressing well in their fabrication phase. The Space Environment In-Situ Suite (SEISS), the Solar Ultra Violet Imager (SUVI), and the Extreme Ultraviolet and X-Ray Irradiance Sensor (EXIS) will significantly improve NOAA's ability to detect space phenomena and provide warning to affected earth systems such as communications systems, GPS navigation, aviation routing and power grids.

Additional capabilities on GOES-R include improved direct services, such as GOES-R Re-Broadcast (GRB), Search and Rescue (SAR), Data Collection System (DCS), Emergency Managers Weather Information Network (EMWIN) and High Rate Information Transmission (HRIT). Each of these systems are also progressing well in their design phases.

In addition to progress on the instruments, the GOES-R Program successfully completed a number of important Preliminary Design Reviews (PDRs) in 2011, including the Spacecraft PDR, the Core Ground Segment PDR, the Antenna PDR, the Ground Segment PDR, and the technical portion of the Mission PDR.

Throughout 2011, the GOES-R Program continued its efforts with transitioning users from the current GOES system to GOES-R. The GOES-R Program is committed to ensuring that the user community is prepared for the new types of satellite imagery and data that will be available from the GOES-R satellite. The intended outcomes of the user readiness planning are day one readiness, maximum utilization of GOES-R products, and an effective transition to operations. GOES-R is engaging users early in the process particularly through the Proving Ground project in which simulated GOES-R products are being tested and evaluated by the National Weather Service (NWS) and other partner forecast and warning communities before the GOES-R satellite is even launched. The simulated GOES-R products are generated using combinations of currently available GOES data, along with higher resolution data provided by instruments on polar-orbiting satellites such as MODIS on NASA's Aqua and Terra satellites as well as model synthetic satellite data.

In addition, GOES-R continues to engage users in other NOAA Test Bed activities, simulated data sets, other communication and outreach efforts, and through active participation in scientific and user conferences such as the GOES Users Conference which GOES-R is co-hosting with the National Weather Association (NWA) from October 19-21, 2011 in Birmingham, Alabama.

In 2012, the program will continue development of the instruments, spacecraft, and ground system. First flight models of the instruments will near completion, and Critical Design Reviews (CDRs) for the spacecraft and ground system will be completed, in preparation for the planned launch readiness of the first satellite in the series, GOES-R, in 2015. The GOES-S planned launch readiness is 2017. The GOES-R program also expects to initiate procurement of the instruments to support launch readiness of GOES-T in 2019 and GOES-U in 2024.

Continuity of NOAA's Geostationary Operational Satellite Programs

