



# GOES-R

GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE R-SERIES

QUARTERLY NEWSLETTER ■ OCTOBER-DECEMBER 2015 ■ ISSUE 12

## HIGHLIGHTS

### A Note from Greg Mandt, GOES-R System Program Director



With 2015 now behind us, I want to thank everyone across the Program for their continued hard work and dedication. In the final quarter, we completed the flight operations review for GOES-R, confirming that the system is ready for operations and data processing after the satellite is launched. The satellite continued on its path toward launch by entering into mechanical testing. We also have successfully simulated GOES-R data flow to the National Weather Service, preparing users for day-one readiness. The GOES-S satellite is also coming together, with all instruments delivered and integration underway. 2016 will surely be an exciting year as we prepare to launch the GOES-R satellite in October!



On December 9, NOAA, NASA and the GOES-R Series Program issued a [feature story](#) announcing the **new launch date of October 2016** for the GOES-R satellite. Earlier this year, NOAA, NASA and Lockheed Martin conducted an extensive review and decided moving the launch date from March 2016 to October 2016 would best mitigate possible schedule risks. Engineering teams working on the spacecraft are making continued progress towards launch. The satellite began mechanical testing in December, including vibration testing which simulates the stresses experienced during launch and ensures there are no structural weaknesses, and shock testing, which simulates the shocks encountered during launch, such as during the separation and deployment of solar panels.



Fully assembled GOES-R spacecraft. Credit: Lockheed Martin

## DID YOU KNOW?

... the GOES-R series (GOES-R, S, T and U) will extend the availability of the operational GOES satellite system through 2036?

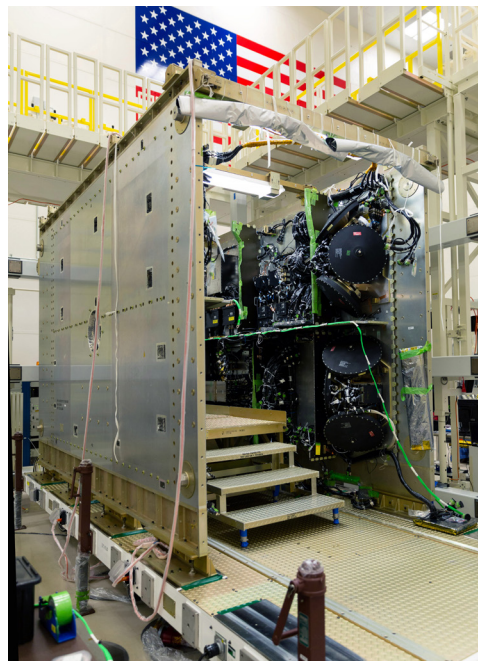


The GOES-R team at NOAA Satellite Operations Facility after a successful Flight Operations Review.  
Credit: GOES-R Series Program

In November, **GOES-R successfully completed its Flight Operations Review**, a milestone review in which the program demonstrated its readiness to execute mission operations, data processing, and analysis to an independent review team. All criteria were rated “green” by the review board, indicating the program is ready to execute operations and data processing after the satellite is launched.



GOES-S core module. Credit: Lockheed Martin



GOES-S system module. Credit: Lockheed Martin

**Considerable progress has been made on the GOES-S satellite.** All instruments that will fly aboard GOES-S have been delivered for integration with the satellite and the Solar Ultraviolet Imager (SUVI) and Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS) are installed on the sun-pointing platform. Integration and test of the spacecraft system module, the “brain” of the satellite, is complete. The “body” of the satellite, the core module comprising a majority of the structure and propulsion systems, was delivered in October. These modules were mated to form the spacecraft in December.

Also in December, **GOES-S completed its System Integration Review**, in which an independent team, spanning several engineering disciplines, determined that the flight and ground segment components are ready for integration with the overall GOES system. The review team also assessed the readiness of the facilities, support personnel, plans and procedures for integration of the GOES-S satellite.

**Development of GOES-T and GOES-U is also underway.** The GOES-T Space Environment In-Situ Suite (SEISS) and SUVI are undergoing environmental testing to ensure they are prepared to withstand the rigors of launch and operation in the extreme environment of space. The Advanced Baseline Imager (ABI) that will fly on GOES-T has completed environmental testing and will undergo its pre-shipment review in early 2016. The GOES-T EXIS is in storage, awaiting shipment in 2017. Assembly and integration of the GOES-T Geostationary Lightning Mapper (GLM) has begun. The GOES-U EXIS recently completed thermal vacuum testing and ABI thermal vacuum testing is underway. The GOES-U SUVI and components of the SEISS instrument are preparing for environmental testing in 2016.

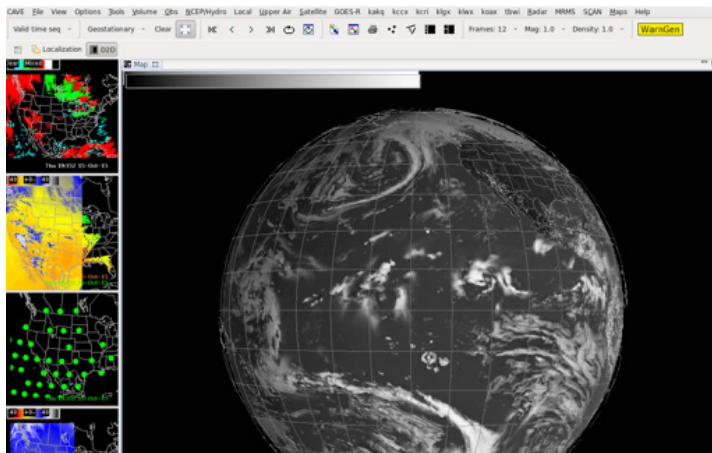
**The GOES-R mission operations team successfully conducted end-to-end (ETE) 4a testing** November 18–20. ETE4a was designed to build on the validation activities of previous GOES-R ETE tests and was conducted in two parts. Part one of the testing consisted primarily of spacecraft and instrument flight software and memory management operations. Part two was conducted in conjunction with a spacecraft system validation test. During part two, the spacecraft launch and ascent sequence was exercised followed by an orbit-raising maneuver sequence. The operations team monitored spacecraft telemetry during the ascent and separation portion of

the test. The command link was then handed over to the operations team and an orbit-raising maneuver sequence was successfully performed. ETE tests serve as a validation of

the compatibility of flight and ground hardware, software, and communications interfaces in a mission operations context.

### GOES-R ground and data operations preparation activities are progressing.

In October, the first ground readiness



NWS Advanced Weather Interactive Processing System (AWIPS) four-panel display of GOES-R cloud and moisture imagery from the October ground readiness exercise. Credit: NWS

exercise was successfully completed. This exercise included the generation and distribution of weather products to the National Weather Service (NWS) for comparison of GOES-R products to legacy GOES data. Procedures for handover to the backup sites and ground system were also exercised, ensuring those procedures are correct and complete when needed for operations.

### Deployment and testing of the GOES-R ground system is nearly complete.

The R-1 and R-2 antennas at the Consolidated Backup in Fairmont, West Virginia, completed System Certification Reviews in October. The antennas are now ready to support GOES-R system testing along with operations readiness and launch preparation activities. In November, ground segment integration and test 3-1 was conducted using the fully-integrated GOES-R ground system. In December, installation and checkout of all GOES-S processing and distribution hardware was completed.

## CONFERENCES AND EVENTS

### GOES-R Series Program science was represented in six sessions at the 48th Annual Fall Meeting of the American Geophysical Union held December 14–18 in San Francisco, California.

A special session: “Lightning and Meteorology” addressed science and applications relevant to the GOES-R GLM. The program senior scientist discussed the recent developments of [Google Earth Engine](#), a virtual platform for global-scale Earth science imagery and data analysis, with representatives at the Google exhibit booth. Google is interested in combining GOES-R ABI information with other datasets and models such as land surface properties. They have recently been ingesting imagery from Japan Meteorological Agency’s Himawari-8 satellite as part of their satellite data ingest. Google has agreed to present a webinar highlighting the earth engine and Himawari data in the spring at an upcoming GOES-R science seminar. The Himawari-8 Advanced Himawari Imager is very similar the GOES-R ABI and data from the imager is helping prepare users for the ABI.

## PROVING GROUND AND PROGRAM SCIENCE



ISS LIS principal investigator and GOES-R GLM team member Rich Blakeslee (at left) during end-to-end testing. Credit: Rich Blakeslee

**In December, a mission to measure global lightning from the International Space Station (ISS)** completed an important end-to-end test from NASA’s Marshall Space Flight Center to Kennedy Space Center from the ISS Lightning Imaging Sensor (LIS) payload Operations Control Center at the National Space Science and

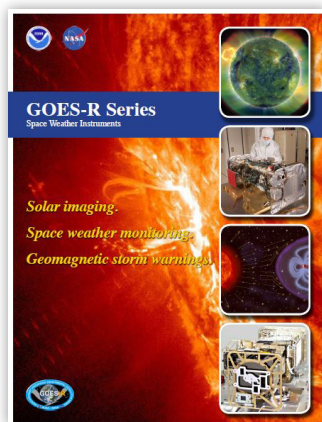
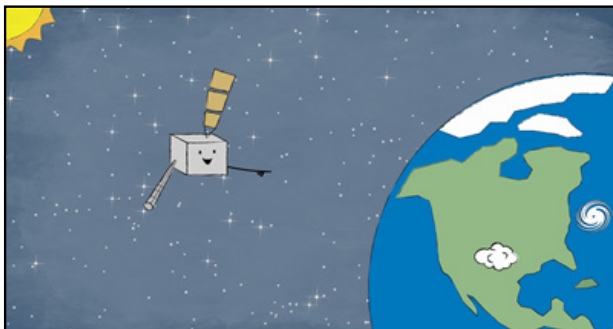
## PROVING GROUND AND PROGRAM SCIENCE (CONTINUED)

Technology Center at the University of Alabama, Huntsville. LIS is a hosted payload on the Department of Defense Space Test Program–Houston 5 mission with planned launch on a Space X rocket in August 2016. Near real-time LIS data will be used by the Algorithm Working Group and Calibration Working Group as a key reference dataset to be used in the post-launch testing of the GOES-R GLM.

## EDUCATION AND OUTREACH

**On December 9, the GOES-R Series Program released two new animated videos** that tell the story of GOES-R. From weather and hazards on Earth to search and rescue and bursts of energy from the sun, the GOES-R satellite will see it all from 22,000 miles above our planet.

Learn about all the new things GOES-R will do and follow the satellite's travels from construction to orbit in the [I'm GOES-R](#) and [Getting GOES-R to Orbit](#) videos.



Space weather affects us here on Earth. The GOES-R series of satellites will host a suite of instruments that provide significantly improved detection of approaching space weather hazards. A new **GOES-R Space Weather Instruments fact sheet** explains what space weather is and how observations from the GOES-R series satellites will enable NOAA's Space Weather Prediction Center to improve space weather forecasts and provide early warning of potentially disruptive events on the ground.

**The GOES-R/JPSS 2016 calendar is now available.** Featuring stunning imagery and satellite product examples, the calendar highlights the capabilities of NOAA's next generation of environmental satellites. [Download](#) yours today!



## MEET THE TEAM



**In this issue, meet Brent Motz, Quality Engineer with the GOES-R Safety and Mission Assurance team.**

Located at the Lockheed Martin facility in Littleton, Colorado, he conducts workmanship inspections and is directly involved in all critical operations and testing of the GOES-R and GOES-S satellites.

Brent has been working with the program since 2008, starting with EXIS at the Laboratory for Atmosphere and Space Physics in Boulder, Colorado. He worked with the integration team as the instrument was installed onto the GOES-R spacecraft and then transitioned to follow the spacecraft through the major integration and testing milestones.

Brent volunteers at a local high school giving presentations about aerospace to an Engineering Physics class. He also meets weekly with young engineering students to assist them in a national Science Olympiad competition. He finds nothing more rewarding than to share with students the capabilities of GOES-R and how it will become an integral part of our daily lives. He enjoys outdoor activities like skiing, backpacking, four-wheeling, fly fishing and rafting. He and his wife have also made several trips to Kenya, working with their church to build libraries and greenhouses, initiate water projects and sponsor medical camps for underprivileged schools.

Brent recently received a master's degree in Project Management and Quality Systems and looks forward to applying his new skillset to daily obstacles and challenges that may arise.

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