



GOES-R

GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE R-SERIES

QUARTERLY NEWSLETTER ■ JULY-SEPTEMBER 2018 ■ ISSUE 23

A Note from Pam Sullivan, GOES-R System Program Director:

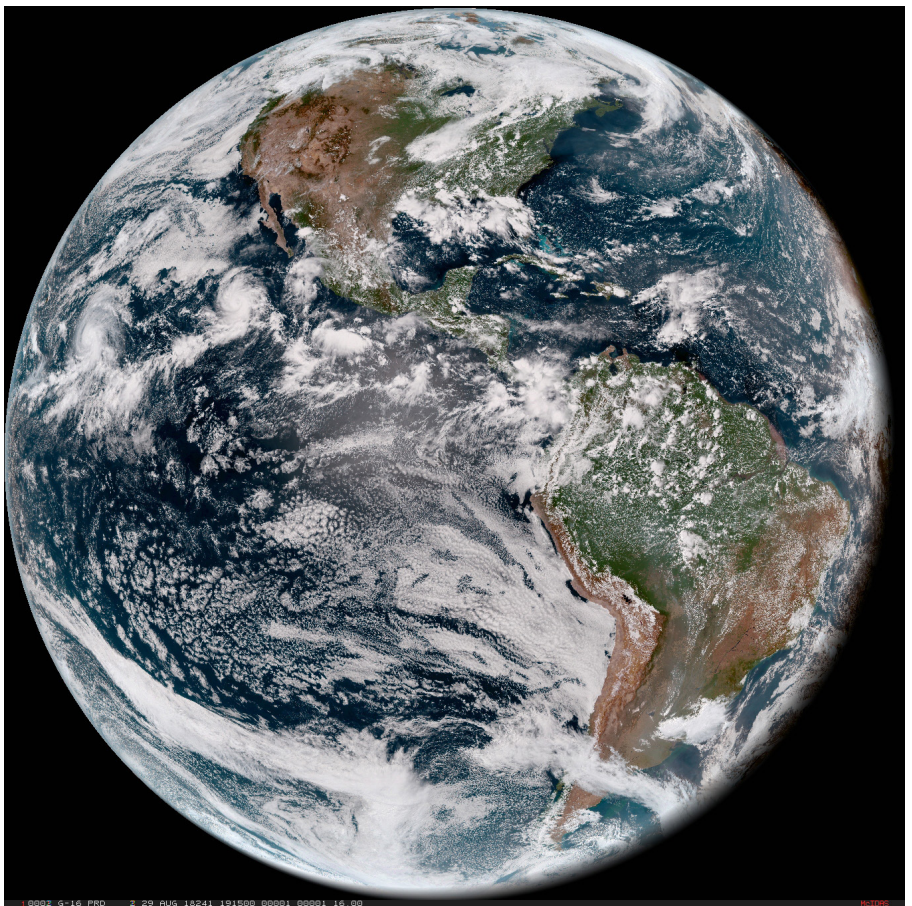


GOES-17 has nearly completed post-launch testing and preparations are underway for the Handover Readiness Review and transitioning

the satellite to operations as GOES West in December. The team of experts addressing the Advanced Baseline Imager (ABI) cooling system issue has made excellent progress. As a result of efforts to optimize its performance, the GOES-17 ABI is now projected to deliver >97% of the data it was designed to provide, a truly remarkable recovery. In parallel, the independent investigation team has isolated the likely root causes to help us understand the issue and how to avoid it. Redesign efforts are underway for the GOES-T and GOES-U ABI radiators based on their recommendations. I would like to commend the efforts of the many people involved in understanding and recovering from this issue. Our partners at the National Weather Service are amazed at the capability our scientists and engineers were able to recover from GOES-17 and I echo their praise for this great work.

GOES-17 HIGHLIGHTS

GOES-17 has nearly completed post-launch testing and is preparing for handover to NOAA. Data from all six instruments are now validated “beta” mature. The Magnetometer, Space Environment In-Situ Suite (SEISS), Solar Ultraviolet Imager (SUVI), and Advanced Baseline Imager (ABI) cloud and moisture imagery science products completed their beta Peer-Stakeholder Product Validation Reviews in August. Geostationary Lightning Mapper (GLM) data reached beta maturity in early October. Beta data is



GOES-17 full disk GeoColor imagery from the GOES-17 ABI on August 29, after the data started flowing through GRB. Credit: NOAA/NASA

DID YOU KNOW?

Stereoscopic, three-dimensional views of weather events can be produced with GOES-16 and GOES-17 visible imagery, due to their current close proximity longitudinally. [See for yourself in this view of severe weather over the Tennessee River Valley on July 11.](#)

GOES-17 HIGHLIGHTS (CONTINUED)

that which is still preliminary and not ready for operational use. Once data is beta-validated, it is available to users who have a GOES Rebroadcast (GRB) antenna or Product Distribution and Access (PDA) subscription. On August 27, NOAA Satellite and Information Service and the GOES-R Program issued a [feature story on the upcoming August 28 release of GOES-17 ABI beta data](#).

After evaluating data during the hottest orbital conditions, the latest assessment of GOES-17 ABI channel availability indicates the instrument will deliver >97% of the data it was designed to provide.

The optimization team is now projecting that nine of 16 channels will be available 24 hours per day, all year. The other seven channels will experience data outages overnight during the warmest parts of the year (before and after the vernal and autumnal equinox, when the instrument absorbs the highest amount of solar radiation). Full details on the GOES-17 cooling system issue, including status, estimated channel availability, impact to data products, and data access can be found on the [GOES-17 Post-Launch Testing and Transition to Operations webpage](#).

The GOES-17 ABI cooling system mishap investigation was initiated on September 24. This is standard procedure whenever a satellite or system-based mishap occurs that results in injury or significant property damage. Mishap investigations allow NASA to understand the

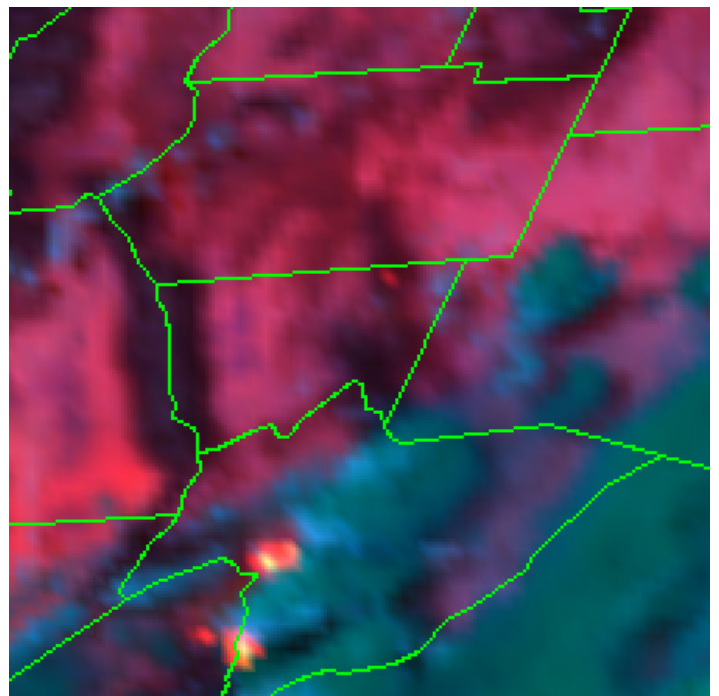
root cause of incidents and make adjustments to prevent recurrence. [NASA and NESDIS selected David McGowan, chief engineer at NASA Langley Research Center, to chair the Mishap Investigation Board.](#)

Pending a successful Handover Readiness Review on October 19, GOES-17 is expected to begin drifting from its checkout position to its operational location, at 137 degrees west longitude in late October. During the drift period, five instruments (ABI, GLM, SUVI, SEISS, and EXIS) will not be capturing or transmitting data. After arriving at 137 west, GOES-17 will undergo calibration activity before data distribution resumes in mid-November. GOES-17 will remain non-operational for an additional three weeks to allow for operational testing at the 137 degrees west position. After successful test completion, the satellite will go into operations as NOAA's GOES West satellite sometime after December 10. GOES-15 will move from its current location of 135 degrees west longitude to 128 west to eliminate radio frequency interference with GOES-17. GOES-15 will arrive at 128 west in early November. All of GOES-15's instruments and services will remain on during the drift. GOES-15 and GOES-17 will operate in tandem for at least six months to allow for assessment of the performance of GOES-17 as the GOES West operational satellite. [Details of the drift and transition are available on the GOES-R Program website.](#)

GOES-16 HIGHLIGHTS

GOES-16 has “changed everything” with respect to wildfire detection, according to National Weather Service (NWS) Director Dr. Louis Uccellini. “From the spatial and temporal resolution to the post-processing algorithms, GOES 16 is driving the ‘hot spot’ calls for initial deployment, observing the evolution of the fire and related smoke, monitoring the burn scars, and accounting for that impact on runoff during rain events. The incident does not end with the fire and GOES-16 is the observing system that is now serving as a basis for service across the spectrum,” Uccellini observed. On July 2, the Pueblo County emergency management office in Colorado called the NWS Weather Forecast Office (WFO) in Pueblo for assistance in pinpointing the location of smoke reported near Custer/Fremont/Pueblo County lines. [GOES-16 picked up a hot spot in northeast Custer County](#), 5 miles west of Wetmore and the Pueblo WFO provided the latitude and longitude of

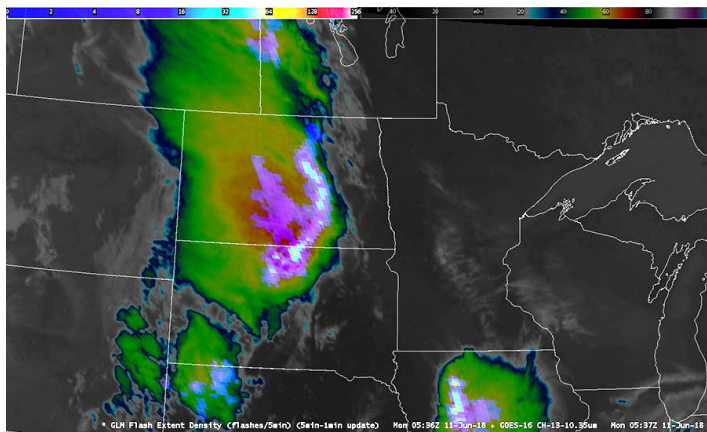
GOES-16 fire temperature imagery of the Adobe Fire in Colorado on July 2. Fire temperature RGB (red-green-blue) imagery is used to detect fire hot spots. This imagery is created using three shortwave and near-infrared ABI bands. Active hot spots show up as red, yellow and white as the fire grows increasingly hotter. Credit: CIRA



GOES-16 HIGHLIGHTS (CONTINUED)

the hot spot. Being in a remote and wooded area, the early and more precise geolocation of what became known as the Adobe Fire was helpful for getting crews on scene quickly.

On July 16, a new tool from the GOES East GLM was rolled out to NWS forecast offices across the nation, giving forecasters valuable new information for tracking severe thunderstorms. Until that point, GLM data hadn't been used in operational weather forecasts. [The new GLM "Flash Extent Density" product allows the National Weather Service to see how frequently lightning is occurring over a certain area.](#) When forecasters see the number of lightning strikes rapidly increasing, it's a sign that a storm is intensifying and becoming more dangerous. This information gives forecasters better confidence when issuing weather warnings that ultimately improve public safety.



GOES East GLM imagery shows a high concentration of lightning flashes over the Northern Plains on June 11. Credit: NOAA Virtual Lab.

Planetary defense has a new tool in the Geostationary Lightning Mapper. [While designed for mapping lightning flashes, GLM can observe large meteors anywhere throughout its coverage area.](#) The instrument takes 500 images of Earth every second, allowing it to measure the shape of a meteor's "light curve," or the change in brightness of a meteor with time, with millisecond precision. This data contributes to the NASA Ames Asteroid Threat Assessment Program, which helps improve information for impact prediction warnings by studying how asteroids fragment as they travel through the atmosphere. [A new scientific paper on the topic was published online in the journal Meteoritics and Planetary Science in July.](#)

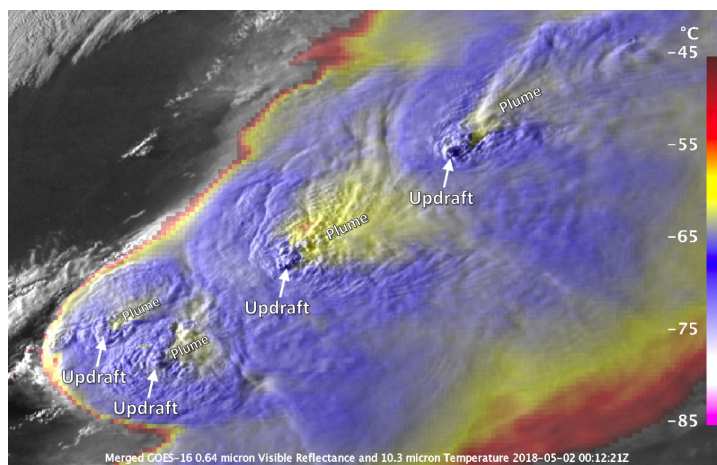
GOES-16 captured the first major Atlantic hurricane of 2018. Hurricane Florence intensified to a Category 4 hurricane on September 10, as it moved toward the U.S. East Coast. Florence made landfall near Wrightsville Beach, North Carolina, on September 14 as a Category 1 hurricane. The storm caused widespread catastrophic

flooding in North and South Carolina. A post-storm analysis from the NWS Hydrometeorological Design Studies Center showed that over a wide area, three-day rainfall totals from Florence had a 0.1 percent chance of occurring in any given year, making Florence a 1,000-year rainfall event. The historic rains caused many river and stream gauges to peak at their highest levels on record, submerging entire roads and damaging tens of thousands of homes, according to the U.S. Geological Survey.



GOES East sees Hurricane Florence make landfall near Wrightsville Beach, North Carolina, at 7:15 a.m. ET on September 14. Credit: NOAA/CIRA

New research delves into a distinctive cloud formation that often signals damaging storms below. The Above Anvil Cirrus Plume (AAP) is a complex cloud phenomenon that looks like a plume of smoke emanating out from the top of a storm. [Researchers at NASA Langley identified hundreds of plumed storms over the U.S. using high-resolution imagery from GOES-16.](#) By linking that satellite data to radar and lightning data from the same storms, they learned that identifying the presence of an AAP can add 10-30 minutes of lead time for storm warnings. [The research findings were published in the October 2018 issue of the American Meteorological Society's Weather and Forecasting journal.](#)



In May, these plumed storms captured by GOES-16 over northeast Kansas and southern Nebraska produced numerous tornadoes, baseball-sized hail and 80 mph straight-line winds. Credit: NOAA/NASA

GOES-16 HIGHLIGHTS (CONTINUED)

GOES-16 product validation continues, with several products achieving provisional validation. In July, the SEISS Solar and Galactic Protons and ABI Volcanic Ash products reached provisional status. The Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS) X-Ray Irradiance and Magnetometer Geomagnetic Field products

were provisionally validated in August. The ABI Aerosol Optical Depth product was declared provisionally mature in September. Now that these products are provisionally validated, they are ready for operational use but are not yet fully validated. Twenty-five of 34 GOES-16 data products are now provisionally validated.

GOES-T AND U PROGRESS

Redesign efforts are underway for the ABI radiators for GOES-T and GOES-U. Due to the anomaly experienced with the GOES-17 ABI cooling system, the independent review team recommended changes to the ABI for GOES-T and GOES-U. The new radiators will use heritage ammonia loop heat pipes instead of propylene. The Critical Design Review for the design change is scheduled to take place in December.

Plans are underway for the GOES-U spacecraft to carry an additional space weather instrument, a Compact Coronagraph (CCOR). CCOR would help detect and characterize coronal mass ejections. The CCOR Preliminary Design Review (PDR) was held September 27-28. The PDR determined the instrument's preliminary design meets all requirements with acceptable risk and within cost and schedule constraints. The review established the basis for proceeding with detailed design. Inclusion of CCOR on GOES-U is pending congressional approval.

CONFERENCES AND EVENTS



GOES-16 Workshop at Mexico's National University in July. Credit: Jim McNitt

Two GOES-16 workshops were held in conjunction with GEONETCast Americas workshops in July and August. The first was held at Mexico's National University in Mexico City July 23-25 and the second took place in São Paulo, Brazil, August 9-10. These hands-on workshops were held for experienced users of GOES satellite data and products. The workshops provided working knowledge of all 16 channels on the ABI, data and products from all six instruments on the satellite, and methods to access GOES East data and products. Participants also gained competency in using GOES East data and products for forecasting, prediction, monitoring and research through hands-on exercises and case studies.

CONFERENCES AND EVENTS (CONTINUED)

The [National Weather Association's annual meeting](#) was held August 25-30 in St. Louis, Missouri.

The theme of the meeting was "Diversity in People, Models, and Methods." There were several talks and posters focused on operational uses of GOES-16, products, and training resources as well as a status on the GOES-R Series Program and an update on the GOES-17 cooling system issue.



GLM Science Team Meeting participants. Credit: NASA



EUMETSAT Meteorological Conference attendees from left to right: Taimar Ala, (Director-General of Estonian Environment Agency), Alain Ratier (Director-General at EUMETSAT), Cristian Bank (Director of Programme Preparation and Development at EUMETSAT), Pam Sullivan (GOES-R System Program Director), Kenneth Holmlund, (Chief Scientist at EUMETSAT), Wei Caiying (Deputy Director General of NSMC, China Meteorological Administration, China), Seonghoon Cheong (Director of Satellite Development Division, Korea Meteorological Administration, South Korea) and Kotaro Bessho (Senior Coordinator for Satellite Systems, Japan Meteorological Agency, Japan). Credit: EUMETSAT

The annual [Geostationary Lightning Mapper \(GLM\) Science Team meeting](#) was held September 11-13 in Huntsville, Alabama. Topics included GOES-16 data, visualizations, products, validation, operations and research usage, data access, comparisons to ground-based lightning networks, training, and an update on GOES-17 GLM post-launch testing and status.

The [2018 EUMETSAT \(European Organisation for the Exploitation of Meteorological Satellites\) Meteorological Satellite Conference](#) was held September 17-21 in Tallinn, Estonia. There were several presentations related to the GOES-R Series including instruments, products, operational usage, and a status on GOES-16 and GOES-17.

CONFERENCES AND EVENTS (CONTINUED)

NASA's Marshall Space Flight Center (MSFC) in Huntsville, Alabama, installed a new receiving station to obtain data from GOES-16 and GOES-17. [MSFC held a ribbon-cutting ceremony for the new antennas on September 21.](#) Officials from NASA Headquarters and MSFC spoke about the partnership between NASA and NOAA and how data from the GOES-R Series satellites are used by forecasters and emergency managers. MSFC held a Facebook Live event the same day featuring NASA MSFC Earth Science Branch Chief Gary Jedlovec and NWS Huntsville Science and Operations Officer Brian Carcione. They explained the importance of real-time satellite data to study Earth's weather and deliver new forecasting, warning and disaster response tools and took questions from viewers.



Ribbon-cutting ceremony at NASA MSFC to unveil new antennas for receiving GOES data. Credit: NASA

MEET THE TEAM



In this issue, meet systems engineer Joe Criscione. Joe supports the GOES-R Program systems engineering team, working on ABI image navigation and registration (INR) and trade studies for auxiliary communications payloads on future satellites. Joe recently won a program “unsung hero” award for his work devising methods to reduce measurement uncertainty, which enabled ABI ground processing parameters to achieve in-specification performance for all ABI INR metrics.

Joe started working on GOES-N/O/P in 2001 and transitioned to the GOES-R Series during ABI formulation. The best part of his job is working with on-orbit data. “Once you light the fuse, what you launched is what you get. You now have a closed set of what you can and can’t do. You need to put the pieces together to figure it out,” said Joe.

Joe credits two GOES legends with shaping his career. “Marty Davis was an outstanding leader and role model and working GOES was being part of a badgeless team that was getting results,” he said. Marv Maxwell was a mentor who taught him how to be data-driven and the importance of humility. According to Marv, “in the space business, it’s always better to be lucky than smart.”

Joe holds a Bachelor of Science in physics from St. Louis University and master’s and doctorate degrees in material science and engineering from Cornell University. He enjoys canoeing, hiking, mountain biking and gardening.

UPCOMING EVENTS

**GOES-17 Handover
Readiness Review**
October 19, 2018

**American Geophysical Union
Annual Fall Meeting**
December 10-14, 2018
Washington, D.C.

**GOES-17 Operational
as GOES West**
December 2018

**American Meteorological
Society 99th Annual Meeting**
January 6-10, 2019
Phoenix, Arizona

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