GOES-R
GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE R-SERIES

QUARTERLY NEWSLETTER ■ JANUARY– MARCH 2020 ■ ISSUE 29

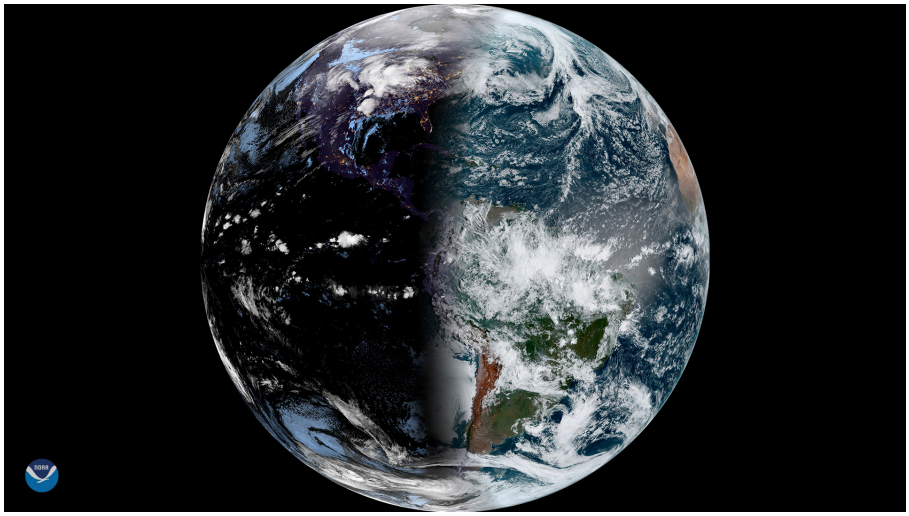
A Note from Pam Sullivan, GOES-R System Program Director:

Our work environment changed dramatically in March with the arrival of COVID-19. With most personnel working remotely, and on-site work limited to mission-critical operations, we had to adapt how we accomplished our mission. No surprise that the GOES-R team rose to the challenge! Despite the uncertainty and changing work conditions, we continue to accomplish major program milestones. Thank you for your perseverance in keeping our critical work going during this very uncertain time, both personally and professionally. Please know that the safety and wellbeing of the workforce remains my number one priority. I am so proud of our team for staying positive, being compassionate, and meeting the unique challenges we face. We are all in this together and we will get through this together.

PROGRAM HIGHLIGHTS

This year's vernal equinox on March 19 was the earliest in 124 Years. The last time the vernal equinox occurred this early was in 1896 —and it will occur even earlier in the future. Why did it occur so early this year? It has to do with leap years, which *usually* occur every four years. But if a year is divisible by 100, it happens to skip a leap year. Thus, 1700, 1800, and 1900 did not have a February 29. However, if the year is divisible by 400, it will be a leap year anyway, which is why the year 2000 *did* have 29 days in February.

As each century wears on, the dates of the equinoxes and solstices slowly move earlier, but this "slippage" is rectified by the omission of a leap day during the next century year, like in 1700, 1800, and 1900. This pushes the first day of spring, summer, and winter back to the 21st and "resets" the system.



GOES-16 full disk image of Earth taken on March 19. Credit: NOAA

Because the year 2000 did have a leap day, the equinox, which had naturally been creeping back earlier from the 21st to the 20th (where it's been for a while), now falls on the 19th for U.S. time zones. Additionally, every coming leap year from now on (2024, 2028, etc.) will have a brand new "record

DID YOU KNOW?

It's NOAA's 50th birthday this year! Throughout 2020, we're celebrating 50 years of science, service and stewardship. See where we've been and where we're going.

earliest" spring. The "slippage" will continue to occur throughout 2100, 2200, 2300, until the next "reset" occurs in 2400.

This year, the equinox occurred at 11:49 p.m. EDT, March 19, signifying the start of spring in the Northern Hemisphere and autumn in the Southern Hemisphere. During the precise moment of the equinox, daytime and nighttime were nearly equal across the entire planet. From that point on, the Northern Hemisphere experiences earlier sunrises and longer daytimes, and the Southern Hemisphere experiences later sunrises and earlier sunsets.

The full validation Peer Stakeholder-Product Validation Review (PS-PVR) for the GOES-17 Advanced Baseline Imager (ABI) radiances and cloud and moisture imagery data products was completed February 19. The full validation PS-PVR for the GOES-16 Space Environment In-Situ Suite (SEISS) Solar and Galactic Proton Sensor data product was completed March 18. These products are now at full validation maturity and operational.

The NOAA Office of Satellite and Product Operations implemented the GOES-17 ABI mode 3 cooling timeline February 26 to March 1 to mitigate the number of saturated images resulting from the loop heat pipe (LHP) temperature regulation anomaly. Preliminary results show an approximately 3K improvement in the focal plane temperature and a corresponding improvement to ABI products as a result of executing the cooling timeline. In this timeline, ABI generates a single full disk once every 15 minutes and generates one mesoscale domain sector (MDS) each minute. Alternating MDS domains are collected one time each per two-minute period. The contiguous United States (CONUS) domain is not scanned during the timeline, as those periods are used for cooling. The same timeline will occur seasonally in operations for four periods each year. The next cooling timeline for the GOES-17 ABI is scheduled for April 9 to May 1.

Artist rendering of GOES-15 satellite in space. Credit: NOAA

GOES-15 supplemental operations to GOES-17 ended on March 2. GOES-15 was placed in on-orbit storage on March 9. The GOES-15 imager will return to temporary service August 9 – September 3, 2020, during the peak period for Eastern Pacific tropical cyclones. GOES-14 supplemental space weather operations ended on March 2 and GOES-14 was placed in on-orbit storage on March 4.

The redesigned ABI ammonia radiator that will fly on GOES-T completed thermal vacuum testing and a successful Pre-Shipment Review in February. It was shipped to the L3Harris Rochester, New York, facility and integrated with the sensor unit. During integration, the team discovered a connector orientation issue. What was initially a two-day operation turned into a full week of work, including the weekend, due to a shorted cable. They had to identify and isolate the cable disturbing the carefully configured flight hardware. The entire team worked with the radiator above their heads, in an uncomfortable set-up, painstakingly checking each cable. The technicians labored for hours to diagnose, troubleshoot and re-test the radiator cables. This was happening as the COVID-19 crisis was ramping up, and uncertainty about the situation and worry for their own safety and that of their families added to the stress of the operation. There were also travel restrictions and access limitations to the facility, making it difficult to get the correct personnel in to assist. However, the team expertly managed to get ABI back on track. A special note of gratitude goes out to the following people: Charles "Buddy" Sedgwick and Travion Hooper of Northrop Grumman Innovation Systems, and John Fahncke, Chris Haag, Kevin McClish, Travis Somerlott, and Dustin Stoudt of L3Harris.

Technician Chris Haag works to repair a connector in the ABI radiator at the L3Harris facility in Rochester, New York. Credit: L3Harris

The GOES-T ABI delta Pre-Environmental Review was successfully completed on March 10. Environmental testing will be conducted in April and May.

PROGRAM HIGHLIGHTS (CONTINUED)

The SEISS team celebrates a successful GOES-U Pre-Shipment Review with cakes shaped like SEISS sensors. Credit: Monica Todirita

The Pre-Shipment Review for the SEISS instrument that will fly on GOES-U was successfully completed on March 12. The GOES-U SEISS sensors will be stored until needed for installation onto the GOES-U spacecraft.

An exemplary
Team matched by no other is
De-SEISS-ively SEISS

-Cindy Merrow

PROGRAM HISTORY

Dave Zehr, GOES-R ground segment contracting officer, recalls the origins of the GOES-R program logo:

"In the 2004-2005 timeframe, I was a support contractor to the GOES-R program. I had multiple duties, one of which was assisting in the preparation of briefings. Having just retired from a position as a Staff Officer on the Air Staff in the Pentagon, it was a natural duty. But I immediately noticed that the program didn't have a definitive identity. There were all sorts of old GOES logos floating around that people were using in GOES-R briefings.

I floated the idea of developing a GOES-R Logo to Mike Crison, the GOES-R system program director at the time. He and Gary Davis, the director of the Office of Systems Development, both liked the idea, so I began creating drafts based on their input. The oval shape was necessitated since we needed room to spell out Geostationary Operational Environmental Satellite – R Series and show the interagency cooperation between NOAA and NASA. Thus, both NOAA and NASA logos were included. The font is U.S. Air Force (USAF) Amarillo as a shout out to space flight heritage of the USAF. The black background represents the space environment the satellite series would operate in. The full disk image of the Western Hemisphere represents the area of coverage at geostationary orbit. The sun peeking out from behind Earth represents the solar mission. The NOAA seagull was incorporated to show that the National Environmental Satellite, Data, and Information Service (NESDIS) operates the constellation.

There are five stars in the logo. Each filled in star represents the four previous completed GOES missions. The single unfilled star originally represented the GOES-R constellation and was intended to be filled in when GOES-16 became operational. Instead, it is now a memorial to Mike Crison.

After the NESDIS assistant administrator approved the final design of the logo, it debuted at a program review where Gary Davis spoke of the future of GOES-R and what benefits it would bring to the nation. I was truly excited when GOES-16 launched with the logo I helped develop."

GEO-XO

In March, the NESDIS memo requesting establishment of a joint agency Geostationary and Extended Orbits (GEO-XO) organization was signed and sent to NASA HQ. The NASA HQ Science Mission Directorate (SMD) memo authorizing Goddard Space Flight Center (GSFC) support for GEO-XO pre-formulation and formulation was also signed. In addition, the NASA HQ Partnerships Office approved GSFC proceeding with the development of the GEO-XO inter-agency agreement.

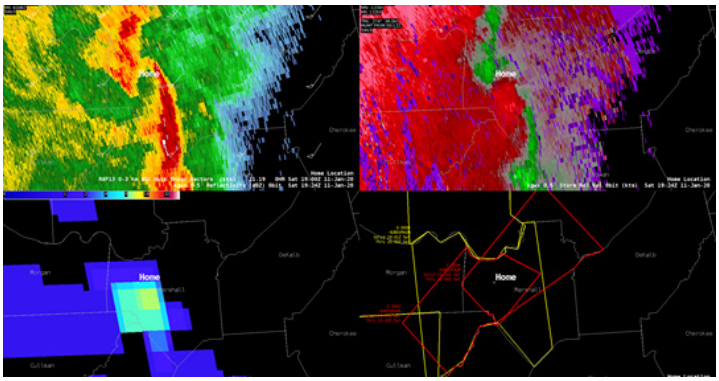
The GEO-XO team traveled to Tokyo for meeting on February 13-14 with the Japan Meteorological Agency (JMA) to discuss NOAA's latest next generation development status ahead of the JMA decision deadline for budget planning. Topics included GEO hyperspectral sounder Observing System Simulation Experiment studies, progress on the Broad Agency Announcement (BAA) studies, and ABI prototype model usage.

GEO-XO team members pose with colleagues at JMA. Credit: NASA

The team completed evaluation of the first round of Broad Agency Announcement (BAA) proposals in March and provided evaluations to the contracting officer to initiate negotiation. The contracts are expected to be awarded in early April. The second round of BAA proposals have been received and are under review. The third and final round of requests for proposals were issued in March.

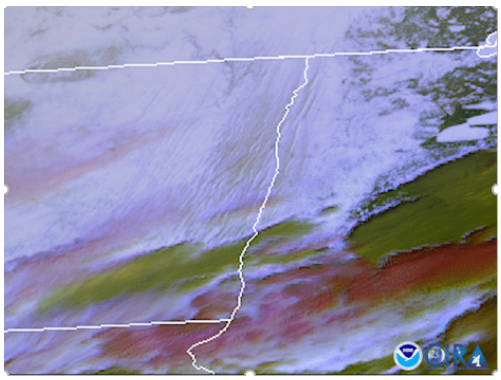
SCIENCE APPLICATIONS

GOES-16 Geostationary Lightning Mapper (GLM) data was critical for the National Weather Service (NWS) Huntsville forecast office warning decision-making process during a period of severe weather on January 11, when radar data were limited. GLM data helped forecasters decide to extend the location of a tornado warning after observing an increase in lightning activity. The first warning including Union Grove, Alabama, was issued 17 minutes before an EF-2 tornado hit Brindlee Mountain Primary School. GLM data also helped the forecasters communicate the urgency of the situation to Marshall County first responders as the Union Grove event unfolded.



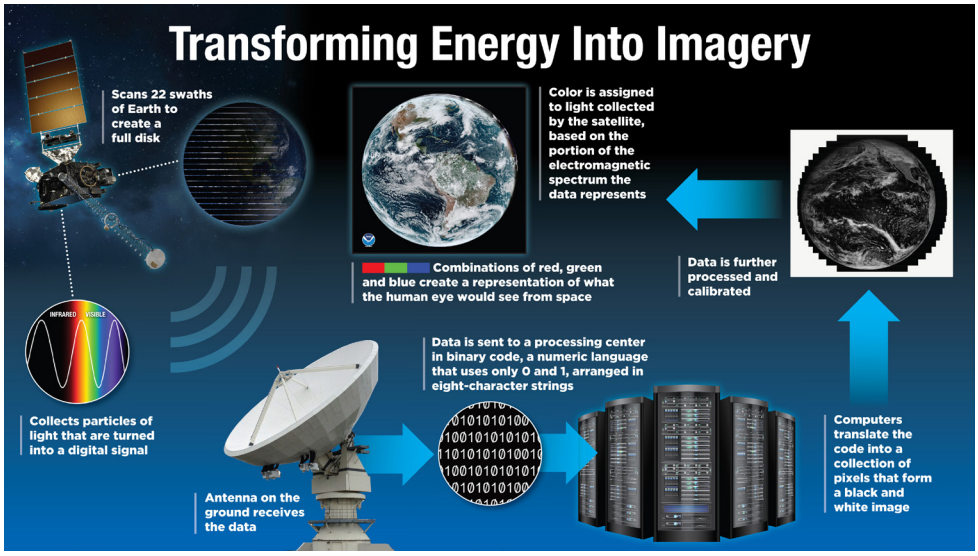
Upper left and upper right: Radar data during the January 11 storm. Lower left: GLM flash extent density data. Lower right: Severe weather warnings (yellow polygons) and tornado warnings (red polygons) issued by the Huntsville forecast office. Credit: NWS/NASA SPoRT

In February, GOES-16 imagery was used in NWS operations to anticipate, detect, and track blowing snow. On February 12, a very strong arctic cold front swept through the upper tier of the central U.S., bringing blizzard conditions, dangerous wind chills colder than -50 F, and wind gusts exceeding 60 mph to portions of the Dakotas, Minnesota, Iowa, and Nebraska. Despite little snowfall expected with this front, blowing snow and significant visibility reductions appeared likely. Analysis of a variety of GOES-16 imagery during this event provided precise tracking of the arctic cold front and blowing snow causing blizzard conditions behind the front. This information was used to help refine the boundary of blizzard warnings and winter weather advisories, in social media messaging, and to support core NWS partners.

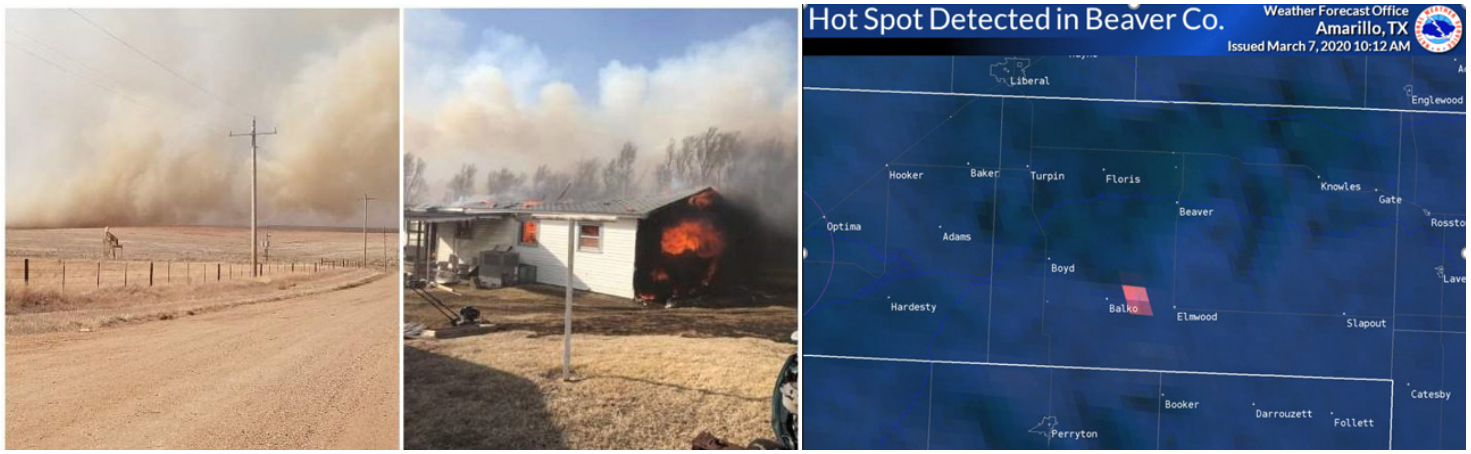


In this GOES-16 snow/cloud layers RGB (red-green-blue) imagery, snow and ice are shown as bluish-white, with the textured lines along the North Dakota/Minnesota border showing plumes of snow being lofted into the air and blown southward by strong winds. Credit: NOAA/Satellite Liaison Blog

GOES-16 and GOES-17 provide beautiful images of Earth. However, what you see on your television, computer, and mobile device are digital representations of the data these satellites capture, not actual photographs or videos. A lot goes on behind the scenes to create and deliver this colorful imagery, but these enhancements result in more than just a pretty picture. This vivid imagery conveys complex environmental information from large satellite datasets to highlight the presence and evolution of important meteorological phenomena. A new feature story explains how satellite data is translated into imagery.

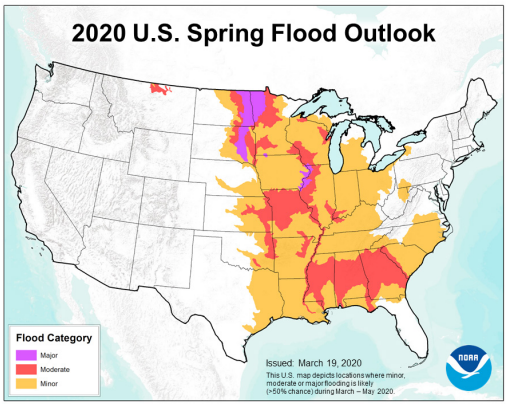


Process for translating GOES data into imagery. Credit: NOAA



Smoke from the Beaver County fire (left); flames engulf a dwelling (middle); and GOES-16 imagery showing the fire hot spot (right). Credit: NOAA NWS

On March 7, a grass fire was sparked in Beaver County, Oklahoma. Wind and humidity conditions caused the fire to rapidly spread, leading to evacuations. The fire was first detected by GOES-16 when forecasters identified a hot spot in one-minute fire temperature RGB imagery and was later confirmed by eyewitnesses. During this event, the NWS forecast office in Amarillo, Texas, was posting imagery and loops of the ABI fire temperature RGB on their Facebook and Twitter pages to warn residents in the path of this quickly spreading fire. Several homes were damaged in and around Beaver, but no lives were lost.



This map depicts the locations where there is a greater than 50-percent chance of major, moderate or minor flooding during the spring period of March through May 2020. Credit: NOAA

Thanks to NOAA satellites, we can see how Earth sheds its winter coat from space this time of year. From melting snow to greening vegetation, signs of spring are becoming apparent. Satellites also monitor the changing weather patterns that come with the transition from winter to spring. The potential for severe thunderstorms, hail, tornadoes, dangerous lightning, and flooding increases in the spring months. According to NOAA's 2020 Spring Flood and Climate Outlook, released on March 19, much of the country is looking at above-normal precipitation and an enhanced risk of flooding this spring. A new feature story explains how GOES-16 and GOES-17 are equipped to provide detailed information about the atmosphere and clouds in near real time to help forecasters provide early warnings of hazardous weather.

SCIENCE APPLICATIONS (CONTINUED)

Students from grades 6-14 are invited to participate in the GOES-R Education Proving Ground GOES-16/17 2020 Virtual Science Fair. Students will use data from the GOES-16 and GOES-17 satellites to investigate weather and natural hazards. Due to school closures from the COVID-19 pandemic, the process has been streamlined so students can participate and submit projects from home. There will be one winning team in each of three categories: middle school, high school and grades 13/14 (community college or university). Each team will consist of 2-4 students and 1 teacher/coach per entry. Entries will be accepted until May 22.

CONFERENCES AND EVENTS

The GOES-R/JPSS Environmental Satellites Short Course: From Satellite Data to Disaster Response: Every Decision Counts was held on January 12, preceding the 100th American Meteorological Society (AMS) Annual Meeting in Boston, Massachusetts. The course provided details on the end-to-end collaboration from satellite data and product providers to meet operational requirements. Participants were instructed on how to easily access satellite products and leverage them in their systems to make key decisions. Hands-on exercises were tailored to well-known environmental disasters. Instructors worked with participants to increase their understanding of how satellite capabilities can be used to support the evaluation of courses of action and make decisions that benefit society and safeguard the public. Short course materials are available online.

Short course participants collaborate on an exercise to use satellite data to create a short briefing for a stakeholder/customer on how a planned public outdoor event will evolve. They also answered direct questions from the stakeholder/customer to help make a specific high-impact decision. Credit: Scott Lindstrom

The 100th AMS Annual Meeting was held January 12-16 in Boston. This is the world's largest yearly gathering for the weather, water, and climate community. The theme for the 2020 meeting was "The AMS Past, Present and Future: Linking Information and Knowledge to Society." There were many GOES-R oral presentations and posters at the meeting and talks at the NOAA booth in the exhibit hall. The GOES-R system program director, Pam Sullivan, participated in the Town Hall Meeting: NOAA Satellites and the Future on January 15. In the town hall, NESDIS leadership provided an overview of its future commitment to maintaining continuity of core mission observations while augmenting new commercial and technological capability and took questions from the audience.

GOES-R Program senior scientific advisor Dan Lindsey shares imagery highlights from GOES-16 and GOES-17 at the NOAA booth during the exhibit hall opening night reception. Credit: NOAA

CONFERENCES AND EVENTS (CONTINUED)

GOES-R/JPSS Proving Ground/Risk Reduction Summit participants. Credit: NOAA

The GOES-R/JPSS Proving Ground /Risk Reduction Summit was held February 24-28 at the NOAA Center for Weather and Climate Prediction in College Park, Maryland. This meeting brought algorithm developers, users, and decision-makers together to offer insight and guidance for the future of the NESDIS flagship satellite programs. The meeting focused on delivering user-inspired science to maximize the utility of NESDIS operational and research products. Each meeting day featured individual sessions on various proving ground initiatives that use both GOES-R and JPSS data.

MEET THE TEAM

In this issue, meet Vanessa Escobar, user engagement scientist for the GEO-XO program and NESDIS. Vanessa joined the team on February 3 as the first person hired on the GEO-XO team. Vanessa joined us from NASA, where she was a user engagement scientist for 10 years. "There is something to be said about the first GEO-XO employee being a user engagement scientist," Vanessa said. "I find it to be a motivating and positive message that GEO-XO started with user engagement. To me this demonstrates NOAA's investment in the user community and further emphasizes the commitment to make the user assessment process a priority."

Vanessa said she looks forward to learning what we don't know and highlighting exciting opportunities to better connect NOAA scientists to product users. "Awareness of user community needs and sensitivities helps us develop a dialog that informs better products and allows us to share information in a way that is more impactful," she said.

Vanessa holds a Bachelor of Science degree in geology and chemistry and a Master of Science in geology. Between earning her BS and MS, Vanessa did an active duty tour with the U.S. Army after 9/11, helping find water for a future military installation in Iraq. She then worked as an Emergency Operations Sergeant in an Emergency Operations Center (EOC) for Arizona and Maryland. As an EOC operator, Vanessa helped translate and communicate critical information for flooding and other state emergency events. "I feel the combination of my schooling as a scientist, my field time as a hydrologist, and my military experiences have helped me develop a unique set of skills for communicating across different boundaries as a user engagement scientist," she said. "Having been a developer and an operational user of scientific tools and data definitely helps me relate to different user groups."

Vanessa is a triathlete who has completed an Ironman triathlon, raced several marathons, and swam Alcatraz, an open water swim from Alcatraz Island to the St. Francis Yacht Club in San Francisco. But she says her greatest accomplishment is her sons. "They keep me honest and keep me running!"