

In the cleanroom with game-changing GOES-R next-gen weather satellite

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The NASA/NOAA GOES-R (Geostationary Operational Environmental Satellite - R Series) being processed at Astrotech Space Operations, in Titusville, FL, in advance of planned launch on a ULA Atlas V slated for Nov. 19, 2016. GOES-R will be America's most advanced weather satellite. Credit: Ken Kremer/kenkremer.com

After an ironic detour due to Hurricane Matthew, liftoff of the game

changing NASA/NOAA next generation GOES-R geostationary weather observation satellite offering a "dramatic leap in capability" is finally on track for this weekend on Nov. 19 from the Florida Space Coast.

And Universe Today recently got an up close look and briefing about the massive probe inside the cleanroom processing facility at the Astrotech Space Operations facility in Titusville, Fl.

"We are bringing the nation a new capability .. that's a dramatic leap .. to scan the entire hemisphere in about 5 minutes," said Greg Mandt, NOAA GOES-R program manager during a briefing in the Astrotech cleanroom.

Astrotech is located just a few miles down the road from NASA's Kennedy Space Center and the KSC Visitor Complex housing the finest exhibits of numerous spaceships, hardware items and space artifacts.

GOES-R, which stands for Geostationary Operational Environmental Satellite – R Series – is a new and advanced transformational weather satellite that will vastly enhance the quality, speed and accuracy of weather forecasting available to forecasters for Earth's Western Hemisphere.

The impact of deadly Cat 4 Hurricane Matthew on the Florida Space Coast on October 7, forced the closure of the vital Cape Canaveral Air Force Station (CCAFS) and the Kennedy Space Center (KSC) launch and processing vital facilities that ultimately resulted in a two week launch delay due to storm related effects and facilities damage.

Liftoff of the NASA/NOAA GOES-R weather satellite atop a United Launch Alliance (ULA) Atlas V rocket is now scheduled for Saturday, Nov. 19 at 5:42 p.m. from Space Launch Complex 41 (SLC-41) on Cape Canaveral Air Force Station, shortly after sunset.

The launch window extends for an hour from 5:42-6:42 p.m. EST.

GOES-R is the first in a new series of American's most powerful and most advanced next generation weather observation satellites. It is designed to last for a 15 year orbital lifetime.

Once in orbit it will be known as GOES-16. TV viewers are presently accustomed to seeing daily streams of imagery from the GOES-East and GOES-West weather observation satellites currently in orbit.

But they will notice big changes from GOES-R once it becomes operational because it will provide images of weather patterns and severe storms as regularly as every five minutes or as frequently as every 30 seconds.

What's the big deal about GOES-R?

"These images can be used to aid in weather forecasts, severe weather outlooks, watches and warnings, lightning conditions, maritime forecasts and aviation forecasts.



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"It also will assist in longer term forecasting, such as in seasonal predictions and drought outlooks. In addition, space weather conditions will be monitored constantly, including the effects of solar flares to provide advance notice of potential communication and navigation disruptions. It also will assist researchers in understanding the interactions between land, oceans, the atmosphere and climate."

GOES-R was built by prime contractor Lockheed Martin and is the first of a four satellite series – comprising GOES-R, S, T, and U that will be keep the GOES satellite system operational through 2036.

"This is a very exciting time," explained Greg Mandt, the NOAA GOES-R program manager during the Astrotech cleanroom briefing.

"This is the culmination of about 15 years of intense work for the great team of NOAA and NASA and our contractors Lockheed Martin and Harris."

"We are bringing the nation a new capability. The GOES program has been around for about 40 years and most every American sees it every night on the weather broadcasts when they see go to the satellite imagery. And what's really exciting is that for the first time in that 40 years we are really end to end replacing the entire GOES system. The weather community is really excited about what we are bringing."

"It's a dramatic leap in capability – like moving from black and white TV to HDTV."

"We will be able to scan the entire hemisphere in about 5 minutes and do things so much faster with double the resolution."

It was built in facilities in Bucks County, Pennsylvania and Denver, Colorado. It arrived at Astrotech in August for final processing and checkouts of the spacecraft and instruments.

The gigantic school bus sized satellite is equipped with a suite of six instruments or sensors that are the most advanced of their kind. They will be used for three types of observations: Earth sensing, solar imaging, and space environment measuring. They will point to the Earth, the Sun and the in-situ environment of the spacecraft.

The suite includes the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), Extreme Ultraviolet and X-Ray Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS), and the Magnetometer (MAG).

The two Earth-pointing instruments are on the top of the spacecraft – namely ABI and GLM.

"ABI is the premier instrument on the spacecraft. When you turn on the news and see a severe storm picture, that's the one it comes from. It takes pictures in the visible as well as the infrared (IR), near infrared (IR)," Tim Gasparrini, GOES-R program manager for Lockheed Martin, told Universe Today during a cleanroom interview.

"It is looking for things like moisture, vegetation, aerosols and fire. So it looks across a broad spectrum to determine the environmental conditions on Earth."



The NASA/NOAA/Lockheed Martin/Harris GOES-R team gives a big thumbs up for the dramatic leap in capability this next gen weather observation satellite will provide – during media briefing at Astrotech Space Operations, in Titusville, FL. Launch is set for Nov. 19, 2016. Credit: Ken Kremer/kenkremer.com

ABI offers 3 times more spectral channels with 4 times greater resolution and scans 5 times faster than ever before, compared to the current GOES satellites.

It will also carry the first operational lightning mapper ever flown in space – GLM – built by Lockheed Martin.

"GLM takes a picture of a scene on the Earth 500 times per second. And

it compares those images for a change in the scene that can detect lightning, using an algorithm," Gasparrini told me.

"The importance of that is lightning is a precursor to severe weather. So they are hoping that GLM will up to double the tornado warning time. So instead of 10 minutes warning you get 20 minutes warning."

The gigantic school bus sized satellite measures 6.1 m x 5.6 m x 3.9 m (20.0 ft x 18.4 ft x 12.8 ft) with a three-axis stabilized spacecraft bus.

It has a dry mass of 2,857 kg (6,299 lbs) and a fueled mass of 5,192 kg (11,446 lbs) at launch.

The instruments are very sensitive to contamination and the team is taking great care to limit particulate and molecular contaminants in the cleanroom. Some of the instruments have contamination budget limits of less than 10 angstroms – smaller than the diameter of a typical molecule. So there can't even be a single layer of molecules on the instruments surface after 15 years on orbit.

GOES-R can also multitask according to a NASA/NOAA factsheet.

"It can scan the Western Hemisphere every 15 minutes, the Continental U.S. every 5 minutes and areas of [severe weather](#) every 30-60 seconds. All at the same time!"

GOES-R will blastoff on a ULA Atlas V in the very powerful 541 configuration, augmented by four solid rocket booster on the first stage. The payload fairing 5 meters (16.4 feet) in diameter and the upper stage is powered by a single-engine Centaur.

It will be launched to a Geostationary orbit some 22,300 miles above Earth.

The Atlas V booster has been assembled inside the Vertical Integration Facility (VIF) at SLC-41 and will be rolled out to the launch pad Friday morning, Nov. 18 with the GOES-R weather satellite encapsulated inside the nose cone.

The weather forecast shows a 80 percent chance of favorable [weather](#) conditions for Saturday's sunset blastoff.

Source: [Universe Today](#)

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