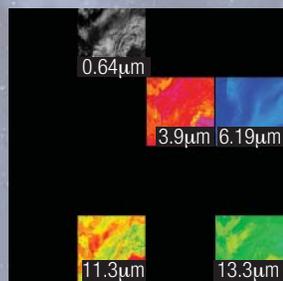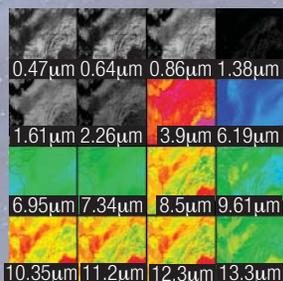## GOES-R Capabilities

- Spectral, spatial, and temporal resolution improved by factors of 3, 4, and 5
- Lightning detection with real-time maps of all lightning activity in the Western Hemisphere
- Increased dynamic range, resolution, and sensitivity in monitoring solar X-ray flux improves models of the ionosphere
- Real-time solar extreme ultraviolet movies in 6 channels improves models of flares and coronal mass ejections
- Monitoring of low energy ionizing responsible for spacecraft charging
- Re-broadcast provides 10 times more data than the current GOES Variable Format

Current GOES (5 Channels)

0.64μm
3.9μm 6.19μm
11.3μm   13.3μm

Future GOES-R (16 Channels)

0.47μm 0.64μm 0.86μm 1.38μm
1.61μm 2.26μm 3.9μm 6.19μm
6.95μm 7.34μm 8.5μm 9.61μm
10.35μm 11.2μm 12.3μm 13.3μm

Images courtesy of the Cooperative Institute for Meteorological Satellite Studies (CIMSS)

Mass < 2800kg, **Size** ~ 5.5 meters, **Power** > 4000W
Image courtesy of Lockheed Martin

GOES-R Communications Mission:

Remote environmental sensing instruments are only part of the payload on the GOES-R Series satellites. In addition, there are several GOES-unique communications capabilities upon which thousands of users depend. These special-purpose "transponders" relay data directly to users to meet critical needs. They include:

HRIT/EMWIN

High Rate Information Transmission/Emergency Managers Weather Information Network (HRIT/EMWIN). HRIT is a new high data rate (400 Kbps) combination of today's LRIT (Low Rate Information Transmission) and EMWIN services; delivering selected imagery, charts, other environmental data products, and text messages (NWS Watches and Warnings) to hemispheric users.

DCS

Data Collection System (DCS). GOES-R spacecraft relay data transmissions for nearly 30,000 in-situ environmental data platforms from across the hemisphere. GOES-R will support 300 bps, 1200 bps, and CDMA platforms.

SARSAT

All GOES-R satellites support the Search and Rescue Satellite Aided Tracking (SARSAT) service by relaying distress signals from in-situ Emergency Position Indicating Radio Beacons (EPIRBs) and other transmitting devices.

GRB

GOES-R Re-Broadcast (GRB). GRB will contain the Level 1b data from each of the GOES-R instruments and is the GOES-R version of today's GOES Variable Format (GVAR).

Contact Information:

GOES-R is a collaborative development and acquisition effort between NOAA and NASA.

GOES-R Program Office
Code 417
NASA Goddard Space Flight Center
Greenbelt, MD 20771
301-286-1355

Or contact us through our website:
www.GOES-R.gov

the next generation
GOES-R
the nation's weather satellite

The Geostationary Operational Environmental Satellite "R" series (GOES-R) program is a key element to meeting the National Oceanic and Atmospheric Administration's (NOAA) mission. The advanced spacecraft and instrument technology used on the GOES-R series will result in more timely and accurate weather forecasts. It will improve support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The first launch of the GOES-R series satellite is scheduled for 2015.


Photo: Bob Blankenship

GOES-R Instruments: Earth, Solar, & Space Weather

ABI

The GOES-R Advanced Baseline Imager (ABI), a sixteen channel imager with two visible channels, four near-infrared channels, and ten infrared channels, will provide three times more spectral information, four times the spatial resolution, and more than five times faster temporal coverage, than the current system.

ABI covers the Earth approximately 5 times faster than the current imager.

Current GOES 5 minute Capability

Future GOES-R 5 minute Capability
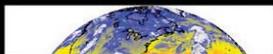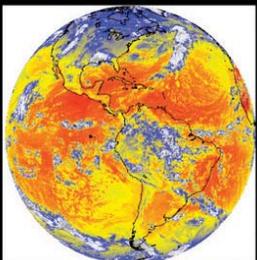
ABI Band data for 2005 June 04:22:00 UTC

GLM

The Geostationary Lightning Mapper (GLM) is an optical transient detector and imager operating in the near-IR that maps all (in-cloud and cloud-to-ground) lightning flashes with near uniform spatial resolution of 8-12 km continuously day and night over the Americas and adjacent oceanic regions.

GLM will provide:

• Early indication of storm intensification and severe weather events
• Tornado warning lead time of 20 minutes or more
• Data for long-term climate variability studies

Imaging Capabilities

Parameter	Current Imager	ABI	Comments
Number of Visible Bands	1	2	Cloud cover, plant health and surface features during the day
Number of Near IR Bands	0	4	Cirrus clouds, low cloud/fog and fire detection
Number of IR Bands	4	10	Upper-level water vapor, clouds, sulfur dioxide (SO_2), sea surface temperature (SST)
Coverage Rate	25 min for Full Disk	5 min for Full Disk	5 times faster
Spatial Resolution of 0.6 μm Band	1 km	0.5 km	At the sub-satellite point
Spatial Resolution of the IR Bands	4-8 km	2 km	At the sub-satellite point
On-Orbit Visible Calibration	No	Yes	Improved composite images

Mean Annual Lightning Flash Density
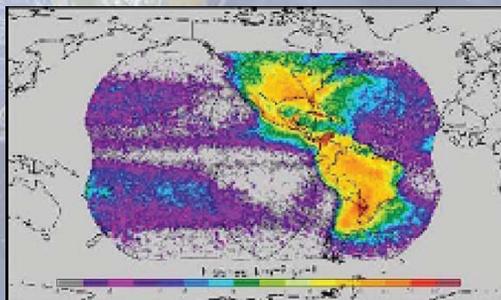
Lightning Imaging Sensor (LIS)/Optical Transient Detector (OTD) observations within the GOES-R System Field of view courtesy of NASA LIS Science Team, Huntsville Alabama

SEISS

Space Environmental In-Situ Suite (SEISS) is an ensemble of electron, proton and heavy ion detecting sensors. SEISS data drives the Solar Radiation Storm portion of NOAA's Space Weather Scales and other NOAA operational Alerts and Warnings.

EXIS

Extreme UV/X-ray Irradiance Sensor (EXIS) detects solar soft X-ray irradiance (XRS) and solar Extreme UltraViolet (EUVS) spectral irradiance in the 5-127 nm range. XRS monitors solar flares (and helps predict proton events) that can disrupt communications and degrade navigational accuracy. EUVS monitors solar variations that directly affect satellite drag/tracking and ionospheric changes, which impact communication and navigation operations.

SUVI

Solar UV Imager (SUVI) locates coronal holes, flares and coronal mass ejection source regions. SUVI data characterizes active region complexity, enabling improved forecasting of space weather and early warnings of possible impacts to the Earth environment.

Magnetometer

The magnetometer measures the time-varying field in the magnetosphere. It provides the only operational measure of the impact of geomagnetic storms at geosynchronous orbit, and it is key for interpreting solar radiation storm measurements by SEISS.

GOES-R produces multi-band "color" images at the same rate as GOES N/P produces single bands.

Current GOES
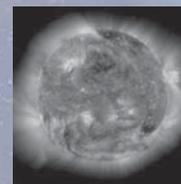
Future GOES-R

Images courtesy of Solar and Heliospheric Observatory Extreme Ultraviolet Imaging Telescope, a joint NASA/ESA program, and NOAA Space Weather Prediction Center