



# GOES-R BASELINE INSTRUMENTS

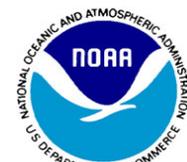


Figure courtesy of ITT Industries



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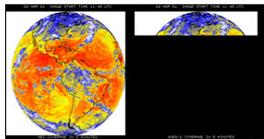
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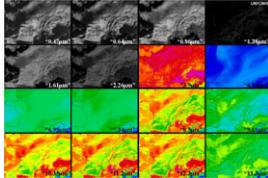
CIMSS

(Cooperative Institute for Meteorological Satellite Studies)

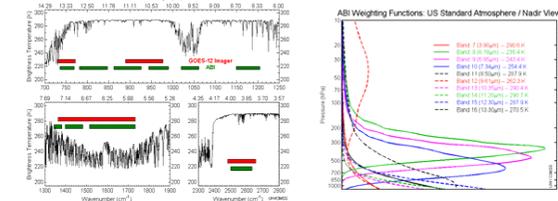
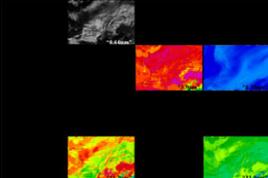
## ABI -- Advanced Baseline Imager



Simulated "ABI" Spectral Bands:



Corresponding Simulated GOES Imager Spectral Bands:



## GOES-R baseline instruments:

### Payload key:

- ABI** Advanced Baseline Imager
- GLM** Geostationary Lightning Mapper
- SIS** Solar Imaging Suite
- SEISS** Space Environment In-Situ Suite
- MAG** Magnetometer
- AUX** Auxiliary Services

- LRIT--Low Rate Information transmission
- EMWIN--Emergency Managers Weather Information Network
- DCS--Data Collection System
- SAR-- Search and Rescue

Parameter	Current GOES Imager	Future GOES Imager	Comments
Number of Visible bands	1	3	Cloud cover, plant health and surface features during the day, etc.
Number of Near IR bands	0	3	Circle clouds, Low clouding and fire detection, etc.
Number of Infrared bands	4	10	Upper-level water vapor, clouds, SO <sub>2</sub> , SST, etc.
Coverage Rate	25 minutes for full disk	15 minutes for full disk, plus CONUS imager every 5 minutes, plus medium-scale scans.	ABI is approximately five times faster
Spatial resolution of the 0.5 um visible bands	Approximately 1 km	0.5 km	At the sub-satellite point
Spatial resolution of the infrared bands	Approximately 4-8 km	2 km	At the sub-satellite point
On-orbit visible calibration	No	Yes	

## AUX -- Auxiliary Services

- LRIT--Low Rate Information transmission
- EMWIN--Emergency Managers Wx Information Network
- DCS--Data Collection System
- SAR-- Search and Rescue



Figure courtesy of Thomas M. Whitehead

Additional capabilities include an improved user services, such as GOES-R ReBroadcast (GRB), Search and Rescue (SAR), Data Collection System (DCS), Emergency Managers Weather Information Network and Low Rate Information Transmission (LRIT).



Figure courtesy of Thomas M. Whitehead

Cougar Ace incident off of Alaska (24 rescued) was detected by GOES-11 at 830z (and NOAA-17 at 831z while it was within view of Hawaii).

## GOES-R Observational Requirements: Alternative 1 (no sounder)

Atmospheric Detection	Cloud/Aerosol*	Surface Albedo
Aerosol Particle Size	Probability of Rainfall	Surface Emittance**
Stratospheric Water	Rainfall Potential	Vegetation Fraction
Volcanic Ash*	Rainfall Rate	Vegetation Index
Aerosol Living Threat	Clouded Surface Irradiance	Coastline
Cloud Imagery	Total Precipitable Water*	Sea & Lake Ice / Displacement & Direction
Cloud & Moisture Imagery	Lower Water Content*	Sea & Lake Ice / Age
Cloud Lower / Height & Thickness*	Clear Sky Beams	Sea & Lake Ice / Concentration
Cloud Top Water Path*	Radiance**	Sea & Lake Ice / Emission & Characterization
Cloud Top Water	Absorbed Shortwave Radiation	Sea & Lake Ice / Emission & Range
Cloud Optical Depth	Downward Longwave Radiation	Sea & Lake Ice / Surface Temp
Cloud Particle Size Distribution	Downward Shortwave Radiation	Sea & Lake Ice / Thickness
Cloud Top Pressure	Reflected Solar Irradiance	Snow Cover
Cloud Top Pressure*	Upward Longwave Radiation*	Ice Cover / Landlocked
Cloud Top Temperature*	Cloud Top†	Soil Cover
Cloud Type	SO <sub>2</sub> Detection	Soil Depth
Cloud Top Temperature Variation	Helium Meteor Winds*	Sea Surface Temperature
Helium** / Wavelength Top Detection	Fine / Hot Spot Imagery	Emergent Heavy Ions
Radiance Intensity	Floral / Spreading Water	Mag Electrons & Protons, Low Energy
Imagery: All Weather / Day - Night	Land Surface (Snow) Temperature	Mag Electrons & Protons, High & High Energy
Lightning Detection		Solar & Galactic Protons
Low Cloud & Fog		Solar Flux: EUV
Visibility		Solar Flux: X-Ray
Management Field		Solar Flux: Gamma

- ABI -- Advanced Baseline Imager
- SEISS -- Space Env. In-Situ Suite
- SIS -- Solar Imaging Suite
- GLM -- Geostationary Lightning Mapper
- Magnetometer

\*D1 - Degraded from original GOES-R requirements in Alternative 1 (no Sounding). The HES (Hyperspectral Environmental Suite) was de-manifested from GOES-R.

## NOAA Goals

Protect, restore, and manage the use of coastal and ocean resources through ecosystem-based management

Serve society's needs for weather and water information

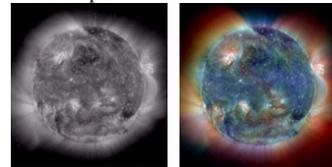
Understand climate variability and change to enhance society's ability to plan and respond

Support the Nation's commerce with information for safe, efficient, and environmentally sound transportation

GOES-R measurements can help fulfill each goal

## SIS -- Solar Imaging Suite

## SEISS -- Space Environment In-Situ Suite



Simulated SXI (Solar X-ray Imager) images: GOES R will produce multi-band "color" images at the same rate as GOES N/P produces single band images. (Images courtesy of SOHO EIT, a joint NASA/ESA program; and Steve Hill/NOAA SEC).

## GOES-R Space Weather Instruments

- Space Environmental In Situ Suite (SEISS)
  - proton, electron, and heavy ion fluxes
- Solar Imaging Suite (SIS)
  - solar X-ray flux magnitude; solar EUV flux from 5 to 129 nm; coronal holes locations; solar flares; coronal mass ejections
- Magnetometers

## GOES-R Improvements

- Solar X-ray image dynamic range, resolution, and sensitivity
- EUV measurements for improved modeling of ionosphere and thermosphere
- Medium energy radiation environment responsible for spacecraft charging

## GLM -- Geostationary Lightning Mapper

- Detects Total Strikes: In Cloud, Cloud To Cloud, And Cloud To Ground

Complements Today's Land Based Systems That Only Measures Cloud To Ground (About 15% Of The Total Lightning)

- Increased Coverage Over Oceans And Lands
  - Currently No Ocean Coverage, and Limited Land Coverage In Dead Zones

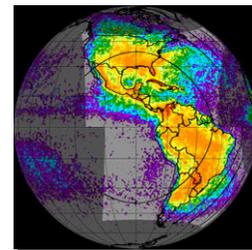


Figure from NASA.

The great amount of information from the GOES-R series will both offer a continuation of current product and services, but also allow for improved or new capabilities. These products will cover a wide range of phenomena. This includes applications relating to: weather, climate, ocean, land, hazards, solar and space. The Advanced Baseline Imager (ABI), the Geostationary Lightning Mapper (GLM), the space and solar instrument suites (Solar Imaging Suite (SIS) and the Space Environment In-Situ Suite (SEISS), as well as the auxiliary services on GOES-R will enable much improved monitoring compared to current capabilities.