GOES-R ABI Fact Sheet Band 2 (“Red” visible)

The “need to know” Advanced Baseline Imager reference guide for the NWS forecaster

Above: Simulated image of ABI Band 2 for Hurricane Katrina. This image was simulated via a combination of high spatial resolution numerical model runs and advanced forward radiative transfer models. Credit: CIMSS

In a nutshell

GOES-R ABI Band 2 (approximately: 0.64 µm central, 0.60 µm to 0.68 µm)

Also similar to the Suomi NPP VIIRS Band I1

Similar band available on current GOES imager

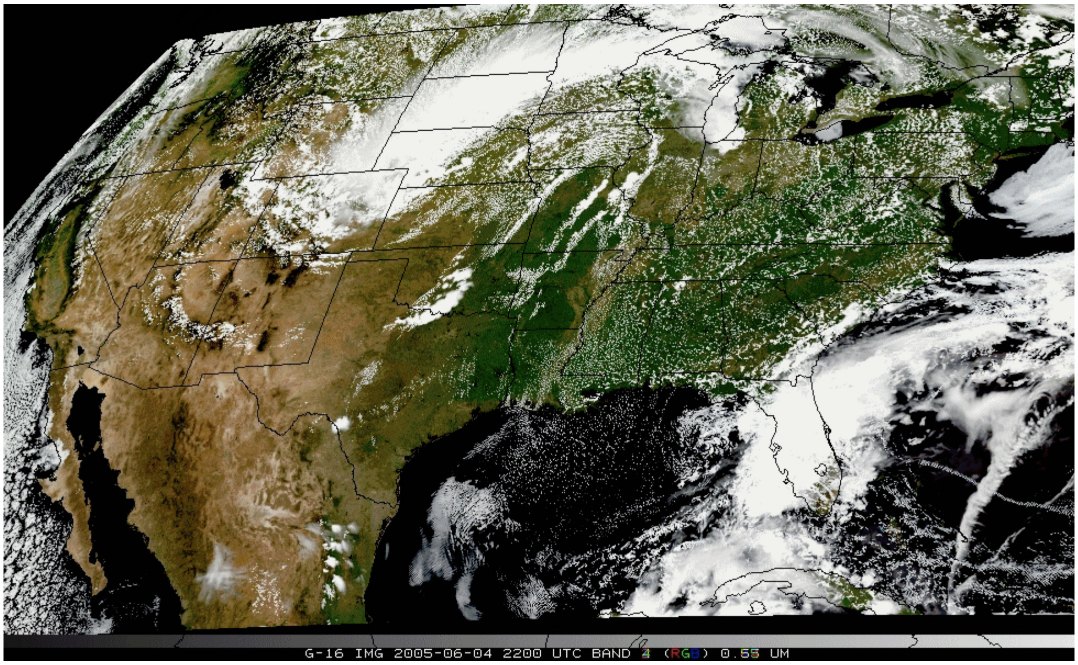
Nickname:
“Red” visible band

Availability:
Daytime only

Primary purpose:
Clouds

Uses similar to:
GOES-R ABI Band 1

The second ABI visible band is the 0.6 µm (or “red” band). During the daytime, it will assist in the detection of fog, estimation of solar insolation and depiction of diurnal aspects of clouds. It is called the red band because the center frequency of this band is near the red part of the visible spectrum. The 0.6 µm visible band is also used for daytime snow and ice cover, detection of severe weather, low-level cloud-drift winds, smoke, volcanic ash, hurricane analysis, and winter storm analysis. A similar band on the current GOES imager has demonstrated many of these applications, although the ABI will offer improved spatial and temporal resolutions. This band is essential for a natural color RGB. Since there is no ”green” ABI band on the GOES-R series, this band will be approximated from other spectral bands for use in generating “true color” imagery. In the case of the ABI, this approach will be a look-up table using the “blue” (0.47 µm), red (0.64 µm) and “veggie” (0.86 µm) bands. Source: *Schmit et al., 2005 in BAMS, Miller et al. 2012 and the ABI Weather Event Simulator (WES) Guide by CIMSS.*



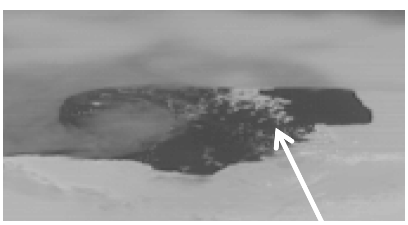
True color with blue, synthetic green and red bands from ABI simulated data (from CIMSS). Image from Don Hillger, RAMMB.

Did You Know?

While many think that the visible band on the first geostationary imager on ATS-1 in December 1966 was a band centered at 0.64 µm, the band on ATS-1 actually peaked at approximately 0.52 µm. The approximate resolution for this sensor was between 3 and 4 km. It was this imager that took the first full-disk Earth images from geosynchronous orbit and the first image of Earth and the moon together.

Baseline Products by Band

Wavelength Micrometers	0.64
Band number	2
Baseline Products	
Aerosol Detection	√
Aerosol Optical Depth	√
Clear Sky Masks	√
Cloud & Moisture Imagery	√
Cloud Optical Depth	√
Cloud Particle Size Distribution	√
Cloud Top Phase	
Cloud Top Height	
Cloud Top Pressure	
Cloud Top Temperature	
Hurricane Intensity	
Rainfall Rate/QPE	
Legacy Vertical Moisture Profile	
Legacy Vertical Temp Profile	
Derived Stability Indices	
Total Precipitable Water	
Downward Shortwave Radiation: Surface	√
Reflected Shortwave Radiation: TOA	√
Derived Motion Winds	√
Fire Hot Spot Characterization	√
Land Surface Temperature	
Snow Cover	√
Sea Surface Temperature	
Volcanic Ash: Detection/Height	
Radiances	√



Advanced Himawari Imager (AHI) Band 3 (0.64 µm) image from 02:30 UTC on January 25, 2015 showing icebergs off the coast of Antarctica, near 67 degrees South. Credit: Japan Meteorological Agency (JMA) and CIMSS

Carven's Corner

Operational meteorologists have long used geostationary visible satellite imagery. In addition, visible imagery contributes to the creation of atmospheric motion vectors that feed numerical weather prediction models, and these satellite-derived winds, especially when computed over otherwise data sparse regions of the globe, have a positive impact on both regional and global models.

With the better spatial resolution of the ABI visible band, visual identification and classification of convective clouds will improve, especially when paired with more frequent imagery. Visible imagery will best characterize the maturity of convective clouds, from agitated to towering cumulus in the developing phase, to overshooting tops in the mature phase.

Higher latitudes will also benefit. While current GOES imager visible imagery is at approximately 3 km resolution in the vicinity of Anchorage, the ABI will provide visible imagery with a resolution of approximately 1.5 km over portions of far southern Alaska. These finer resolutions will improve monitoring of snow and ice pack with better temporal resolution to complement the existing network of polar-orbiting satellites that provide higher resolution imagery over the poles.

Carven Scott is the ESSD Chief in NWS Alaska Region and a former SOO.

Tim's Topics

During parts of 2012, 2013 and 2014, the GOES-14 imager has been operated in the SRSOR (Super Rapid Scan Operations for GOES-R) mode. Many phenomena were observed: convection, hurricanes, fires smoke, etc. This mode allows images as often as every one minute and hence emulates the one-minute imagery from mesoscale sectors possible from the ABI. These unique data are being used to better prepare for the ABI on the GOES-R series.

The 0.64 µm on the ABI has the finest spatial resolution of any of the ABI bands. The sub-point resolution is 0.5 km, as compared to approximately 1 km for today's GOES imager visible band. In fact, the data volume from this one ABI band is comparable to that from all the infrared bands on the ABI. ABI will also be unique for U.S. geostationary imagers in that the data will be remapped for a "fixed grid" before sending out to users.

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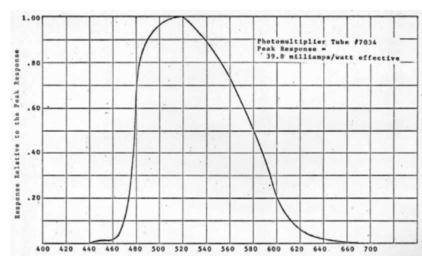

Overall Relative Spectral Response of the ATS-I Spin-Scan Cloud Camera from Thomsen, R., Parent, R., and Suomi, V. ATS-1 spin-scan cloud camera (1968).

ABI Band	Approximate Central Wavelength (µm)	Band Nickname	Type	Nominal sub satellite pixel spacing (km)
1	0.47	"Blue" visible band	Visible	1
2	0.64	"Red" visible band	Visible	0.5

Further reading

ABI Bands Quick Information Guides: http://www.goes-r.gov/education/ABI-bands-quick-info.html
Imagery fact sheet: http://www.goes-r.gov/education/docs/fs_imagery.pdf
GOES-14 SRSOR: http://cimss.ssec.wisc.edu/goes/srsor2014/GOES-14_SRSOR.html
GOES-14 SRSOR JARS article: http://spie.org/Publications/Journal/10.1117/1.JRS.7.073462
Natural Color Imagery: http://www.goes-r.gov/resources/Scipubs/docs/2012/01431161.2011.pdf
GOES-R acronyms: http://www.goes-r.gov/resources/acronyms.html