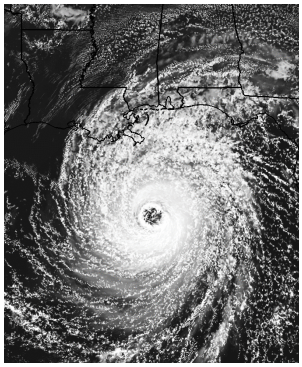
GOES-R ABI Fact Sheet Band 1 ("Blue" visible)

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



Above: Simulated image of ABI band 1 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 1 (0.47 µm central, 0.45 µm to 0.49 µm)

Also Himawari-8/9 AHI Band 1, Suomi NPP VIIRS Band M2

New for GOES-R Series, not available on current GOES

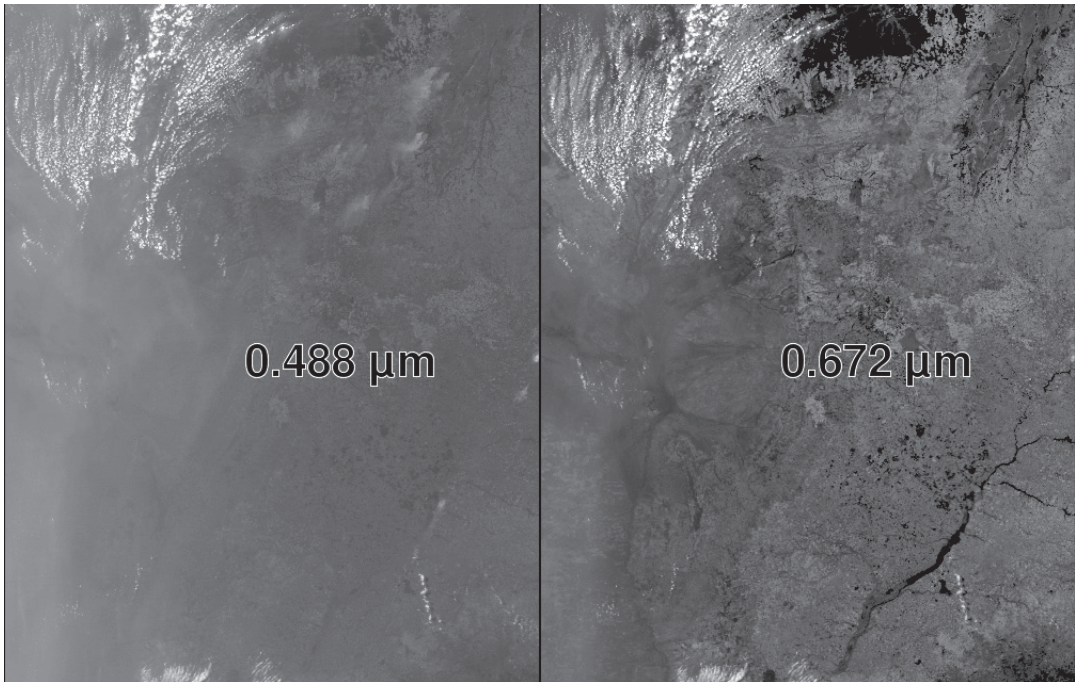
Nickname:
"Blue" visible band

Availability:
Daytime only

Primary purpose:
Aerosols

Uses similar to:
GOES-R ABI Band 2

The 0.47 µm, or "blue" band, one of the two visible bands on the ABI, will provide data for monitoring aerosols. Included on NASA's MODIS and Suomi NPP VIIRS instruments, there are a number of well-established benefits with this band. The geostationary 0.47 µm band will provide nearly continuous daytime observations of dust, haze, smoke and clouds. Measurements of aerosol optical depths (AOD) will help air quality monitoring and tracking. This blue band, combined with a "green" band (which will be simulated from other bands and/or sensors) and a "red" band (0.64 µm), can provide "simulated natural color" imagery of the Earth. Measurements in the blue band may provide estimates of visibility. The 0.47 µm band will also be useful for air pollution studies and improve numerous products that rely on clear-sky radiances (such as land and sea surface products). Other potential uses are related to solar insolation estimates. This band is essential for a natural "true color" RGB. *Source: Schmit et al., 2005 in BAMS and the ABI Weather Event Simulator (WES) Guide by CIMSS.*



Suomi NPP images of similar blue (left-hand side) and red (right-hand side) visible bands. Note how the smoke is more apparent in the 0.488 µm band. The image is over part of South America (August 23, 2014). Image from SSEC.

Did You Know?

There are two baseline scan modes from the ABI. The first is the "flex" mode that consists of a full disk scan every 15 minutes, a continental U.S. (CONUS) image every 5 minutes, and two mesoscale (nominally 1,000 km by 1,000 km) images every minute. The second mode, continuous full disk, consists of only a sequential full disk scan every 5 minutes.

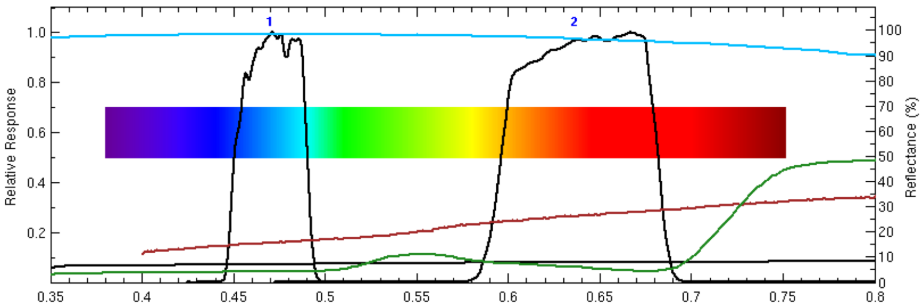
Baseline Products by Band

Wavelength Micrometers	0.47
Band number	1
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	√

Carven's Corner

Visible imagery has long been a staple for the operational forecaster. GOES-R has two visible bands. Forecasters will find that the 0.47 µm blue band is better for identifying aerosols, such as smoke and dust, giving us unprecedented ability to characterize these particulates spatially and temporally that can significantly reduce visibility and be a hazard to aviation. Fortunately we don't need to wait until the launch of the ABI to gain experience with a 0.47 µm in geostationary orbit as the AHI (Advanced Himawari Imager) has a very similar band. The AHI was built by the same company (Exelis) as the ABI.

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



ABI visible spectral bands (black solid lines) and spectral plots for a number of surfaces (snow—light blue; grass—green; dirt—brown; asphalt—black). Higher reflectance is generally "whiter" when enhanced. (Credit: CIMSS and ASTER spectral library)

Tim's Topics

The blue band on the ABI was first proposed by Fred Mosher, then head of the AWC (Aviation Weather Center) for use in estimating slant-wise visibility. This was at a GOES Users' Conference in 2001. One of the heritage instruments for this band is NASA's MODIS, although it was also on the geostationary ATS (Applications Technology Satellite), that was launched in 1967! Today, you can find this band on Suomi NPP's VIIRS. In the late 1990s, the ABI was first envisioned to be only 8 spectral bands, but based on the long list of stated requirements, it was suggested that the ABI should offer 18 spectral bands, of which 16 were approved for implementation.

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ATS-III (1967) was the first geostationary satellite to provide true natural color imagery. (Credit: NASA and SSEC)

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

Imagery fact sheet: http://www.goes-r.gov/education/docs/fs_imagery.pdf
Aerosols fact sheet: http://www.goes-r.gov/education/docs/fs_aerosols.pdf
Visibility product description: http://www.goes-r.gov/products/visibility_pd.html
CIMSS Satellite Blog: http://cimss.ssec.wisc.edu/goes/blog/archives/category/air-quality
ABI BAMS article: http://dx.doi.org/10.1175/BAMS-86-8-1079
GOES-R acronyms: http://www.goes-r.gov/resources/acronyms.html