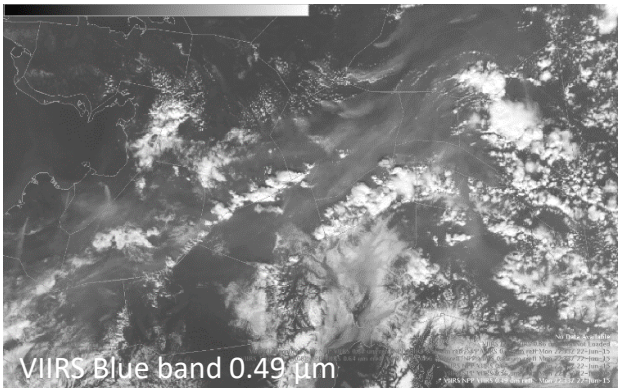
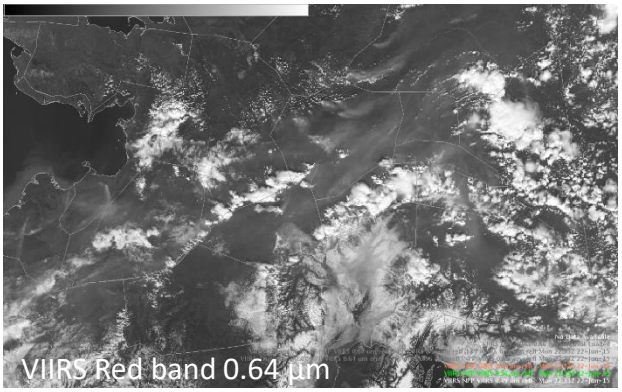
Alaskan Satellite Band Quick Guides

The 0.49 µm "Blue Visible" Band

Overview

The 0.49 µm, or "blue" band, is one of the visible channels on VIIRS. It is useful for daytime monitoring fine aerosols such as haze and smoke, because at this wavelength light is more effectively "scattered" by the air and other small molecules. So when your kids ask you, "Why is the sky blue?" feel free to hand them this Quick Guide. When compared with other visible reflectance bands, the 0.49 µm channel provides a means to discriminate aerosol size, since larger molecules, such as dust and volcanic ash, scatter more effectively at larger wavelengths. As a result, measurements in the blue band may be used for estimating visibility and optical depth in studies of air pollution and solar insolation. Also, the blue band, combined with "green" (0.55 µm) and "red" (0.64 µm) visible bands, can provide "TrueColor" imagery of the Earth, which is similar to what a human eye would see from space.


VIIRS Blue band 0.49 µm


VIIRS Red band 0.64 µm

Playing the Blues in Some Smokey Bar

The VIIRS 0.49 µm image (above left) will typically appear slightly hazy compared to the VIIRS 0.64 µm image (above right) because it is more prone to atmospheric scattering, however other small aerosols are also effective scatterers. Both images above show smoke over interior Alaska (22 Jun 2015), which is distinctive from the clouds because of it's thin, wispy appearance, but there is more smoke visible in the upper left image due to fine particle scattering of the blue wavelength.

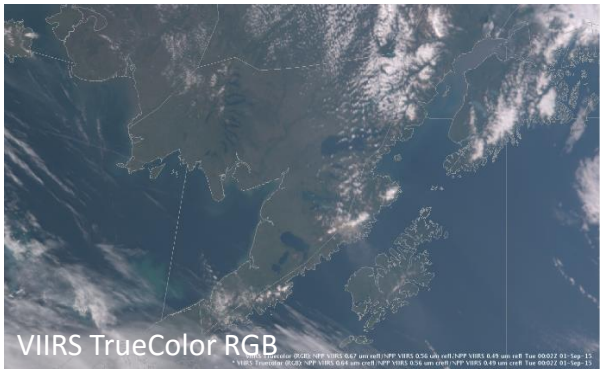

VIIRS TrueColor RGB

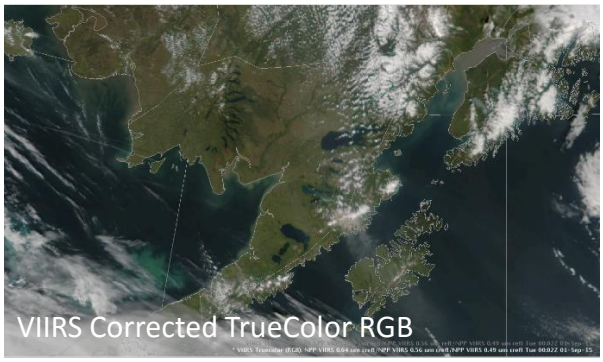
Pollution Intensity

The VIIRS TrueColor image (left) shows interior Alaska during a very active fire day (24 Jun 2015). Where the smoke is thin there is a bluish tint, but the area with thick smoke near the center of the image is brownish white. This is because larger aerosols and greater concentrations scatter energy at higher visible wavelengths, thus including more contributions from the green and red colors.

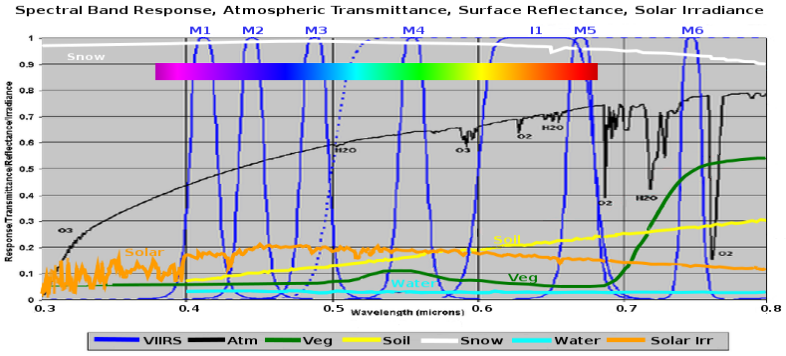
Water and Air are Blue

Atmospheric scattering from the blue visible band causes the hazy bluish appearance of the TrueColor RGB on the right (09 Sep 2015), however this background condition can be calculated and removed. The image below, right shows the same TrueColor RGB with “Rayleigh corrected reflectances”. You can see that surface features are more clear and colors more natural. Smoke and dust will still be evident in corrected imagery since only background atmospheric effects were removed. Notice the air-born dust blowing from the Katmai region of the Alaska Peninsula.





Liquid water selectively scatters and absorbs wavelengths of visible light. Shorter wavelengths reflect from greater depths, which is why deep ocean water appears blue. Shallow coastal areas tend to contain more suspended matter that scatter light differently, which is why sea water near shore may appear more green or brown. Notice the ocean color variation in Cook Inlet and portions of the Bering Sea.



Satellite(s)	Instrument	Band Name	Central Wavelength	Resolution at NADIR
Suomi NPP	VIIRS	M3	0.49µm	750m
Terra and Aqua	MODIS	3	0.47µm	500m
GOES-R Series	ABI	1	0.47µm	1000m

Additional References

- Quick guides to channels on the GOES-R Advanced Baseline Imager (ABI). http://www.goes-r.gov/education/ABI-bands-quick-info.html
- For more information contact Eric Stevens eric@gina.alaska.edu or Carl Dierking cfdierking@alaska.edu

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