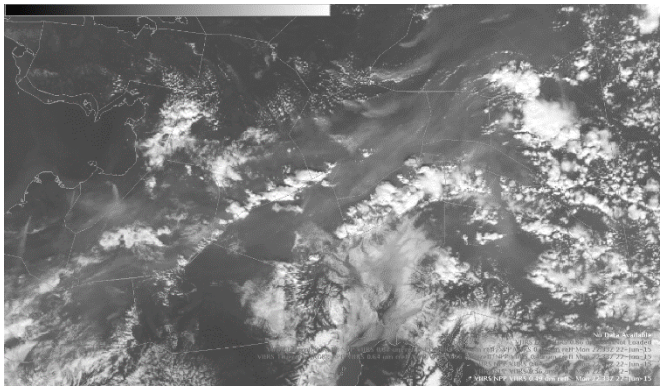
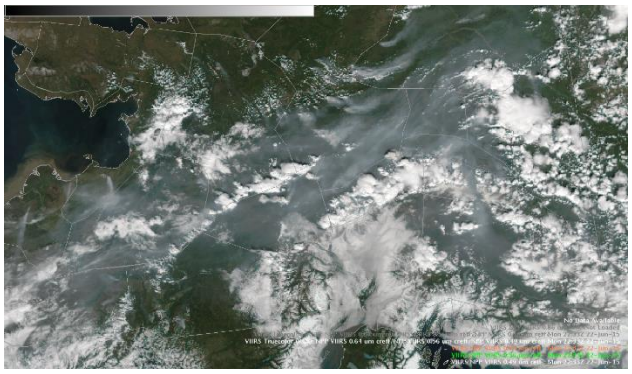
Alaskan Satellite Band Quick Guides

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 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 combined 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. This blue band, combined with "green" (0.55 µm) and "red" (.64 µm) visible bands, can provide "True Color" imagery of the Earth, which is similar to what a human eye would see from space. Measurements in the blue band may be used to provide estimates of visibility and optical depth for air pollution studies and solar insolation estimates.





Playing the Blues in Some Smokey Bar

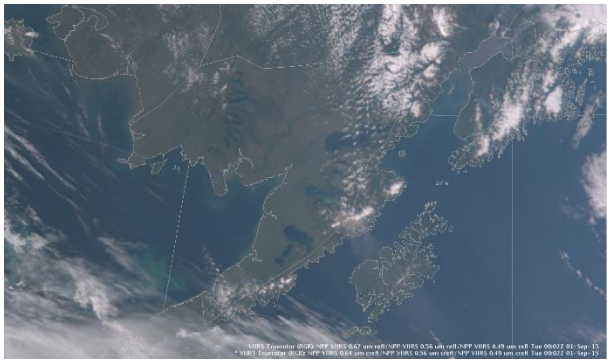
The VIIRS 0.49 µm image (above left) will typically appear slightly hazy compared to other visible wavelengths because it is more prone to atmospheric scattering, however other small aerosols are also effective scatterers. The Truecolor RGB image (above right) shows smoke over interior Alaska during July 2015. The smoke is distinctive from the cloud because it is thin with a bluish tint, caused by the fine particle scattering of the blue wavelength.

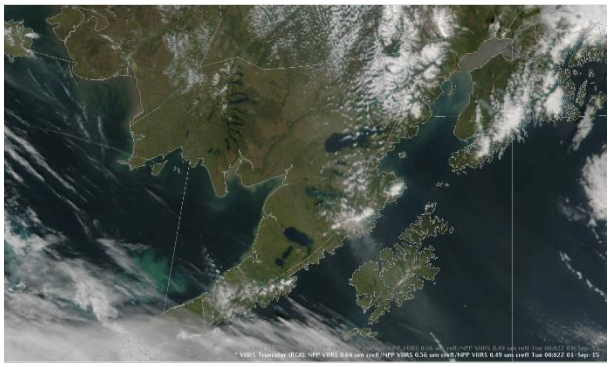
Pollution Intensity

This image (left) shows interior Alaska during a very active fire day. Where the smoke is thin there is a bluish tint, however 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.

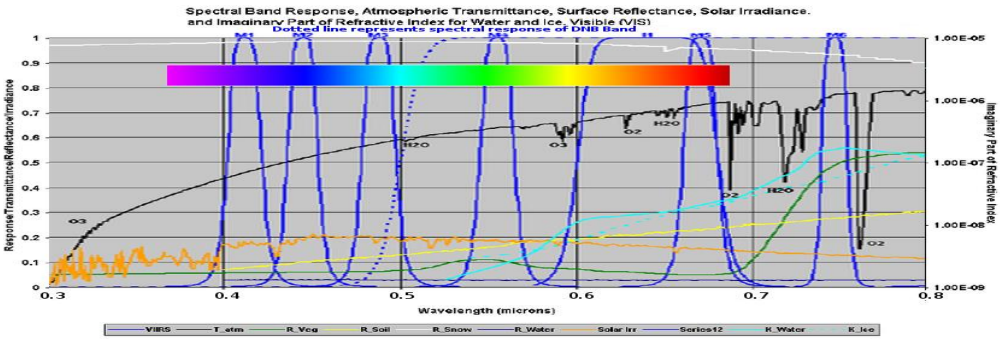
Water and Air are Blue

Atmospheric scattering in the blue visible band causes the hazy blue appearance in a Truecolor RGB (top, right) from 09 Sep 2015, however these effects can be calculated and removed from the imagery. The image below, right shows the same Truecolor RGB with “corrected reflectances”. Surface features are more clear and colors more natural in the corrected image. Smoke will still have stronger reflectances in the corrected blue band despite the removal of the background atmospheric effects.





Liquid water selectively scatters and absorbs certain wavelengths of visible light. The shorter visible wavelengths reflect from greater depths, which is why deep ocean water appears blue most of the time. Shallow coastal areas tends to contain a greater amount of particles that scatter light differently, which is why sea water close to shore may appear more green or brown. In the bottom right image, notice the ocean color variation in Cook Inlet and portions of the Bering Sea.



Satellite(s)	Instrument	Band Name	Wavelength	Resolution at NADIR
Suomi NPP	VIIRS	M3	0.49µm	750m
Terra and Aqua	MODIS	3	0.47µm	500m

This table shows a comparison between VIIRS and MODIS for the “Blue” visible band.

Additional References

- Quick guides to channels on the GOES-R Advanced Baseline Imager (ABI). ABI Band 1 is centered at 0.47 µm 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@alaksa.edu

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