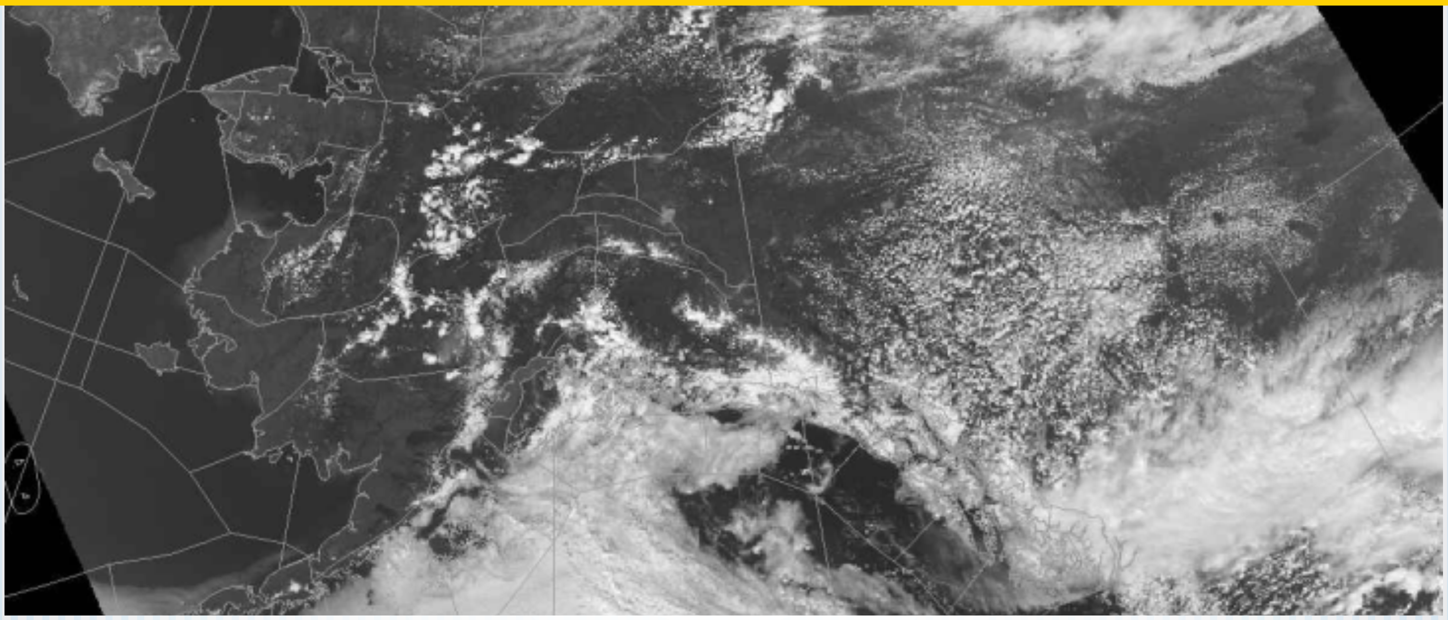
ALASKA DIRECT BROADCAST QUICK GUIDES
The 0.64 µm "Visible" Band

OVERVIEW

The 0.64 µm band is the classic visible wavelength that has been used on several generations of weather satellites dating back to the 1960s. Of all the various spectral bands, the 0.64 µm band offers perhaps the most straightforward interpretation: it represents what our human eyes would see (in black and white) if we were riding along on the weather satellite. The 0.64 µm band can show shadows, especially when the sun angle is low, with the result that convective clouds can take on a particularly well-textured appearance in the 0.64 µm band.

While the great strength of the 0.64 µm imagery is its comparatively intuitive interpretation, its weaknesses also correspond to some of the shortcomings in human vision: 0.64 µm imagery relies on reflected sunlight, so it is not useable during periods of darkness, leaving Alaska with a plethora of visible imagery in the summer and a shortage of such imagery in the winter. Also, distinguishing between two features that both appear bright in the visible spectrum can be difficult in the 0.64 µm band, such as a patch of low clouds overlying snow-covered ground or sea ice. The image below is a VIIRS I1 band from 2151Z June 19, 2015.



FLYING THE RED-EYE

The portion of the electromagnetic spectrum considered visible to the human eye actually ranges from about 0.39 µm to 0.70 µm. The 0.64 µm wavelength is sometimes referred to as the "red visible" band, since it falls within the red portion of the visible spectrum. However, by convention 0.64 µm imagery is displayed in black and white without any attempt to depict the specific magnitude of "redness" in the image.

NIGHT VISION

The shortcoming of 0.64 µm visible imagery not being usable at night has led to satellite instruments being developed with extreme sensitivity to subtle signals at visible wavelengths. These instruments produce visible imagery at night by using reflected moonlight or even reflected starlight. More information about the Day-Night Band on the SNPP satellite and the Operational Line Scanner on DMSP satellites is available in the "Nighttime Visible" Quick Guide.

ADDITIONAL REFERENCES

Quick guides to channels on the GOES-R Advanced Baseline Imager (ABI). ABI Band 2 is centered at 0.64 µm
http://www.goes-r.gov/education/ABI-bands-quick-info.html

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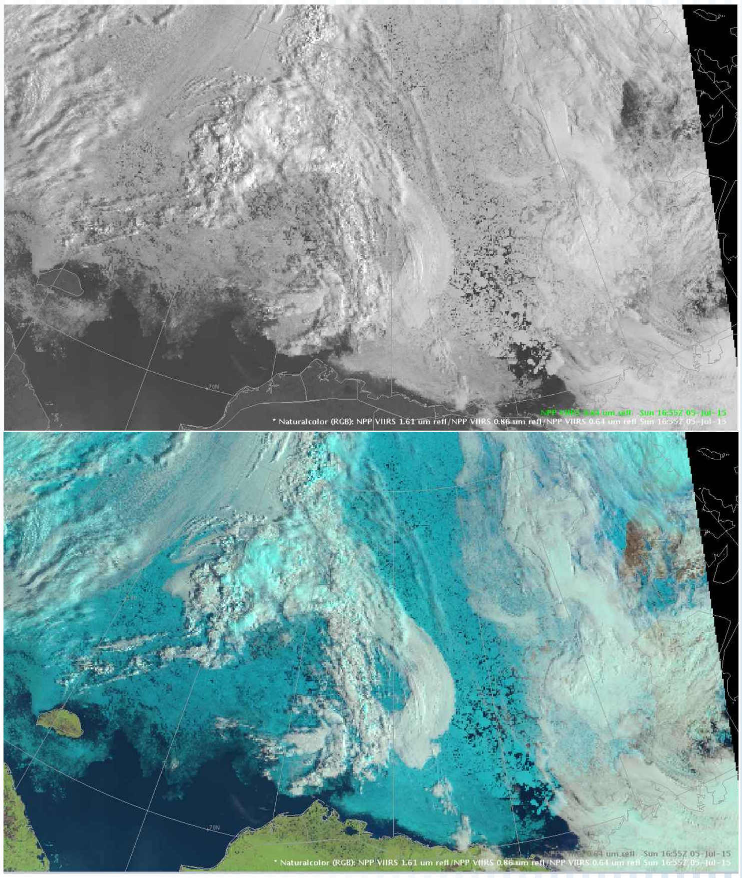
0.64 µm VISIBLE AS A COMPONENT OF RGBS

The 0.64 µm channel is often combined with additional channels of different wavelengths to produce a composite RGB, with the goal that the resulting RGB will outperform its single-channel ancestors in highlighting certain cloud or landscape features. As mentioned earlier in this Quick Guide, a shortcoming of the 0.64 µm wavelength is its comparative lack of utility in discriminating clouds from snow-covered ground or sea ice, as all of these features appear similarly white at 0.64 µm. The images at right are a 0.64 µm visible shot over Alaska's North Slope from the VIIRS instrument at 1655Z June 5, 2015 (top), and a Natural Color RGB from the same time and location that combines the VIIRS I1 0.64 µm visible channel with higher wavelengths at 0.86 µm and 1.61 µm (bottom). Discriminating clouds from sea ice is nearly impossible in the 0.64 µm channel alone, yet this task is easy using the Natural Color RGB. Bear in mind that since the 0.64 µm channel does not work at night, any RGB using 0.64 µm as an ingredient will not appear as designed at night.



*VIIRS imagery from 1655Z June 5, 2015.
0.64 µm visible shot over Alaska's North Slope (top).
Natural Color RGB that combines the VIIRS I1 0.64 µm visible channel with 0.86 µm and 1.61 µm (bottom).*

Satellite(s)	Instrument	Band Name	Wavelength	Resolution at NADIR
Suomi NPP	VIIRS	I1	0.64 µm	375 m
Terra and Aqua	MODIS	1	0.65 µm	250 m
POES and METOP	AVHRR	1	0.6375 µm	1100 m
DMSP	OLS	HRD	0.754 µm	550 m

Table showing the various satellites that carry instruments generating imagery at roughly 0.64 µm. Note that while MODIS offers the finest spatial resolution at nadir, the VIIRS instrument suffers much less degradation out on the limb and actually has better resolution than MODIS at the edge of the swath.

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