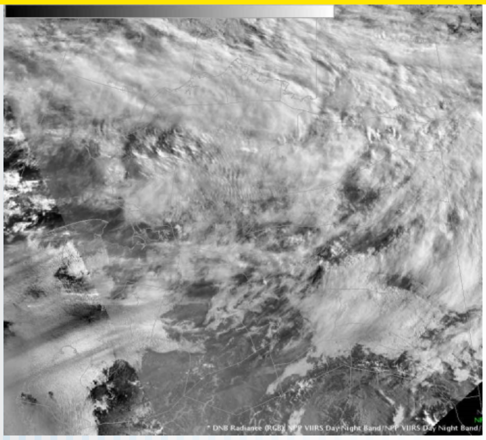
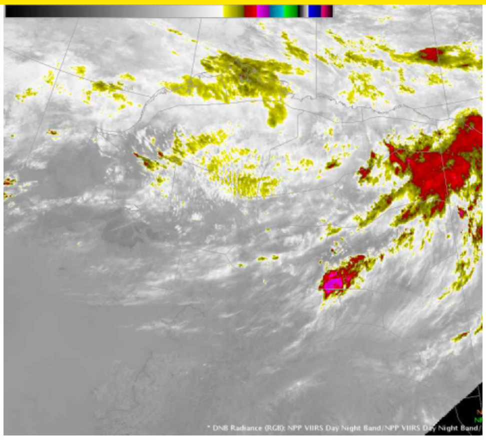
GINA ALASKA DIRECT BROADCAST QUICK GUIDES
Anatomy of an RGB

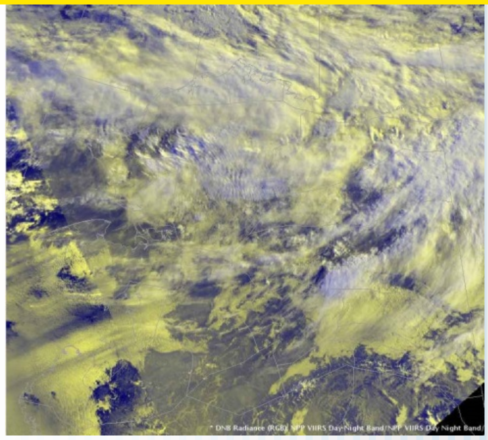
OVERVIEW

Multi-spectral satellite products, also known as RGBs, combine two or more single-channel satellite images into one product. “RGB” stands for Red-Green-Blue, where different single-wavelength images are each assigned to the Red, Green, and Blue portions of the visible spectrum, with the resulting full-color multi-spectral image representing a superposition of its single-wavelength components. RGBs allow forecasters to take in a large amount of satellite information by examining just one product. This efficiency is important as the number of channels on modern satellites continues to expand, and forecasters do not have time to examine every individual wavelength from every satellite pass. Some meteorological features also stand out more clearly in RGBs than in single-wavelength imagery.

The variety of overlapping colors can make new RGBs difficult to interpret at first, and getting the most value out of an RGB means more than learning, for example, that “light green means low stratus.” Understanding how the component channels each contribute to the final appearance of the resulting multi-spectral RGB delivers the most complete meteorological insight.







A SAMPLE TWO-COMPONENT RGB

These three VIIRS images from 1430Z August 3rd, 2015, include the Day-Night Band (DNB) at left, the conventional longwave infrared (IR) at center, and the resulting DNB Reflectance RGB at right. The DNB is used for both the red and green components of the RGB, and the longwave IR is used for the blue component.

This RGB helps forecasters differentiate low clouds from higher clouds, and works at night thanks to the DNB. Clouds in the DNB contribute red and green (which appear yellow when combined) to the resulting RGB. Since colder temperatures in the longwave IR yield a stronger blue signal, the colder cloud tops show a white-blue tint in the RGB. Lower, warmer clouds have minimal representation from the longwave IR and thus have minimal blue color, which leaves them appearing yellow. Cloud-free land and ocean appear dark blue in the RGB because in those clear regions there is no input from the DNB (leaving the red and green components dark), but there is still some (admittedly weak) signal from the longwave IR as the blue channel.

ADDITIONAL REFERENCES

- The COMET module, “Multispectral Satellite Applications: RGB Products Explained” describes RGBs in further detail at https://www.meted.ucar.edu/satmet/multispectral_topics/rgb/
- EUMETSAT’s RGB training is available at http://eumetrain.org/resources/bsc_2014_s7.html

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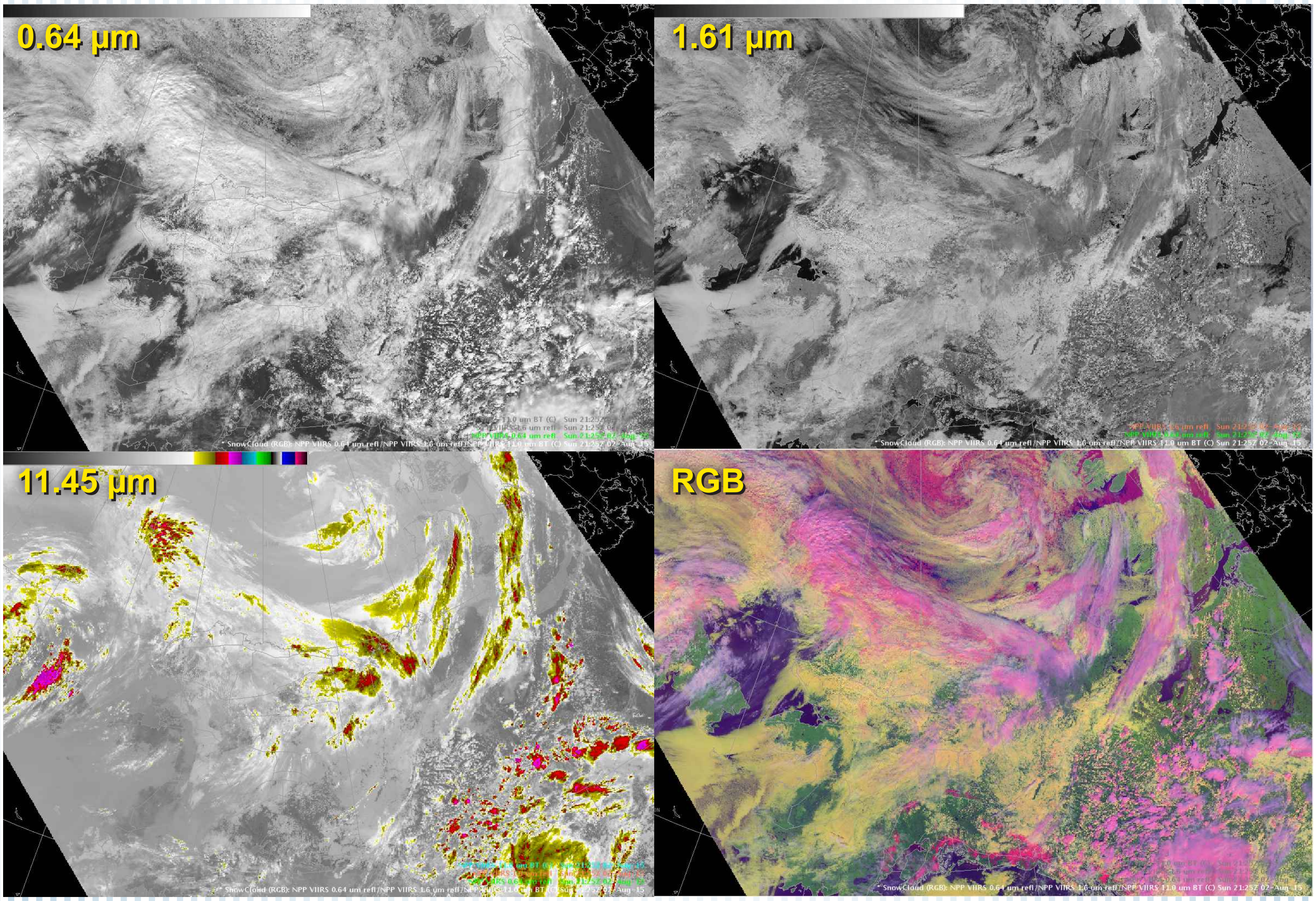
THE THREE-COMPONENT SNOW/CLOUD RGB

The snow/cloud RGB was designed to help differentiate clouds from snow and ice, as shown in the VIIRS images below from 2125Z August 2, 2015. In the 0.64 µm visible channel (red component of the RGB) clouds, snow, and ice all appear white. At the 1.61 µm near IR wavelength (green component) snow and ice absorbs much of the incoming sunlight, so glaciers along the North Gulf Coast and the ice pack over the Arctic Ocean appear dark. In the 11.45 µm longwave IR (blue component), brighter values represent colder temperatures, so high clouds will have a much greater blue contribution than lower, warmer clouds. In the resulting RGB, surface ice and snow have the greatest contribution of red since the channels assigned to green and blue do not contribute much at the surface or lower levels. Cirrus has a pink-violet color because it has some red from the visible and blue from the longwave IR, but a diminished amount of green because of ice crystals in the cirrus. Mid clouds are white as the balance of the three colors is more equal. Low clouds will have a yellowish tint due to higher contributions of red and green and a diminished amount of blue.



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