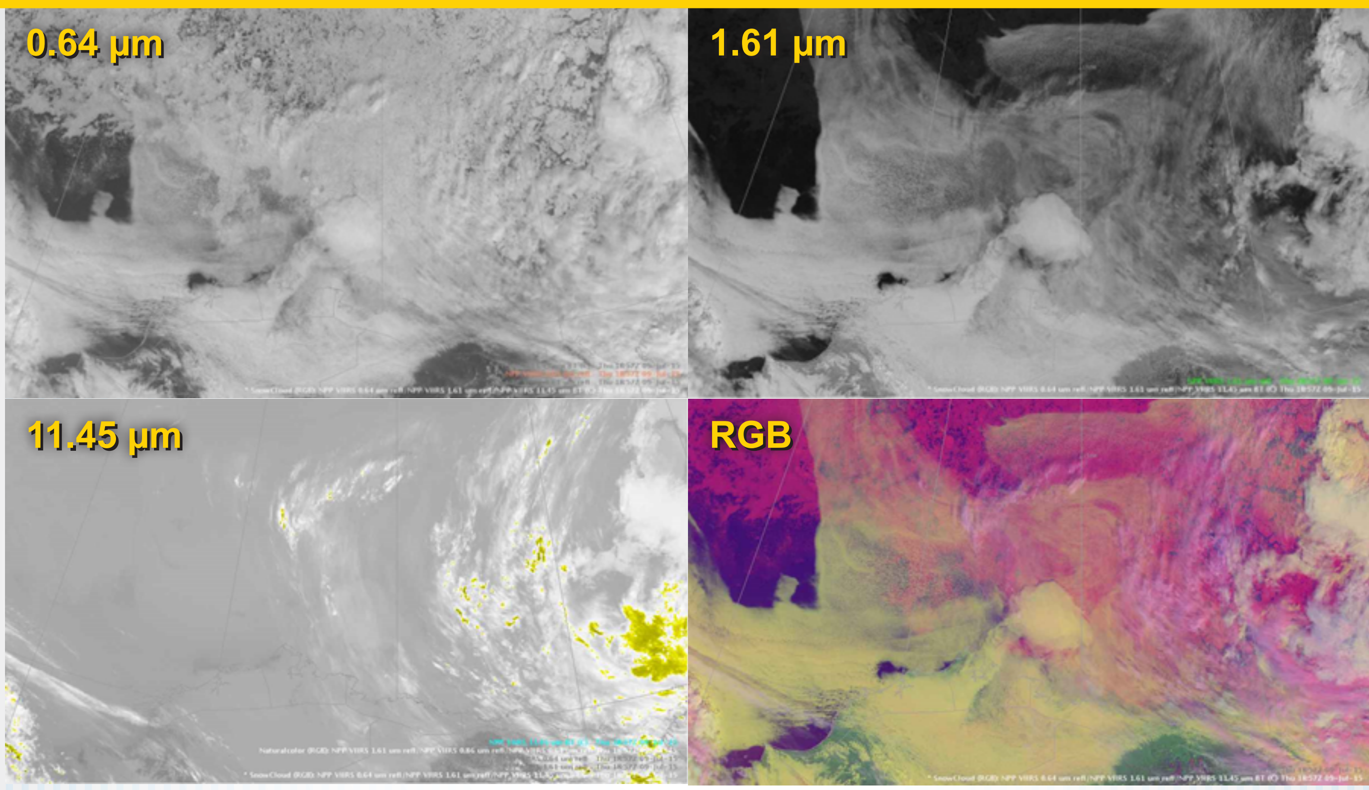
GINA

ALASKA DIRECT BROADCAST QUICK GUIDES

The 1.61 µm Near-IR "Snow/Ice" Band

OVERVIEW

1.61 µm channel earned the nickname "snow/ice band" because surfaces covered by snow and ice strongly absorb the 1.61 µm wavelength of incoming sunshine, while non-glaciated clouds strongly reflect the 1.61 µm wavelength. These properties of the 1.61 µm band make it a useful component of RGB images in Alaska, as the following examples demonstrate.



1.61 µm BAND AS COMPONENT OF RGBS

The four images above are from the Suomi NPP pass over the North Slope and Arctic Ocean at 1857Z July 9, 2015, with the Snow/Cloud RGB in the lower right being a combination of the other three single-channel images. The upper left image is the VIIRS 0.64 µm visible band (red component of the RGB), the upper right is the 1.61 µm snow/ice band (green in the RGB), and the lower left is the VIIRS 11.45 µm longwave infrared (IR) band (blue in the RGB).

In each image, the upper left corner of the swath is free of clouds, so a mix of sea and open water may be observed. The sea ice appears reddish magenta in the RGB because the 1.61 µm channel is well absorbed by sea ice, meaning there is no green signal over sea ice. As shown in the 11.45 µm image, the sea ice and open water have similar longwave brightness temperatures, but since sea ice is much more reflective in the visible than open ocean, the sea ice appears reddish magenta, while the open ocean appears as a darker purple.

ADDITIONAL REFERENCES

Quick guides to channels on the GOES-R Advanced Baseline Imager (ABI). ABI Band 5 is centered at 1.61 µm
http://www.goes-r.gov/education/ABI-bands-quick-info.html

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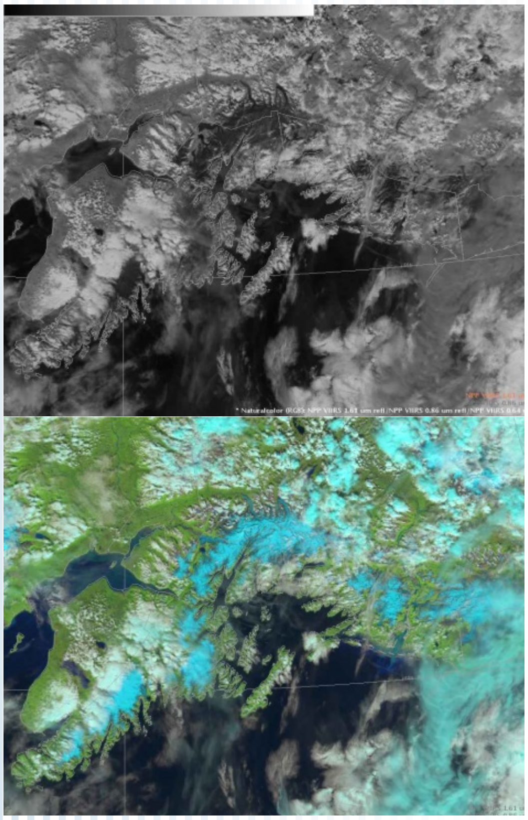


SURE, GLACIERS LOOK BLUE, BUT REALLY...

The imagery at left centered over Prince William Sound is from the Suomi NPP VIIRS instrument at 2156Z on July 10, 2015. The top image is the 1.61 µm snow/ice channel alone. The bottom image is the Natural Color RGB which assigns the 1.61 µm snow/ice channel to the red component, the 0.84 µm channel to the green component, and the 0.64 µm channel to the blue component.

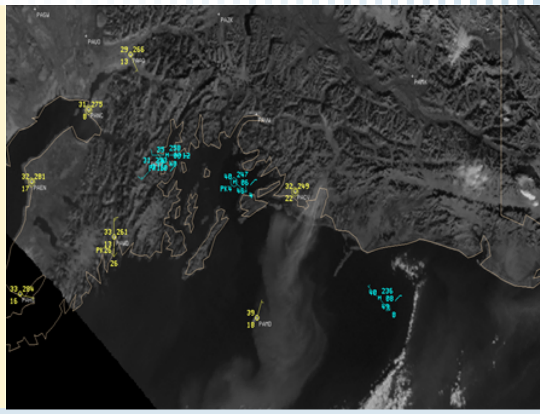
The glaciers and snow in the mountains surrounding Prince William Sound appears dark in the 1.61 µm image, due to this wavelength's strong absorption over snow and ice. Snow and ice are also not very reflective at 0.86 µm (the "veggie band"), so this RGB gets most of its signal over snow and ice from the 0.64 µm visible channel in the blue component, and hence the glaciers and snow appear blue. Liquid phase clouds are highly reflective at all three wavelengths used in this RGB, so they appear white. Glaciated cirrus clouds (in the lower right) are bluish-green because they don't reflect at 1.61 µm but do reflect at 0.64 µm and 0.86 µm.

Suomi NPP VIIRS image from 2156Z July 12, 2015.

HERE'S SILT IN YOUR EYE

1.61 µm imagery can also highlight areas of blowing glacial dust. At right, dust is blowing southward out of the Copper River Delta and over the Gulf of Alaska during an outbreak of strong northerly winds. Thus the VIIRS 1.61 µm channel can, thanks to the absence of obscuring clouds and the presence of daylight, allow forecasters to qualitatively "see the wind." This information can be useful in identifying stronger wind gusts out of bays and passes for marine forecasts.

Image courtesy Jim Nelson, WFO Anchorage



Satellite(s)	Instrument	Band Name	Wavelength	Resolution at NADIR
Suomi NPP	VIIRS	I3	1.61 µm	375 m
Terra and Aqua	MODIS	6	1.64 µm	500 m
POES and METOP	AVHRR	3a (available only during daytime)	1.61 µm	1100 m

The various satellites that carry instruments generating imagery at roughly 1.61 µm.

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