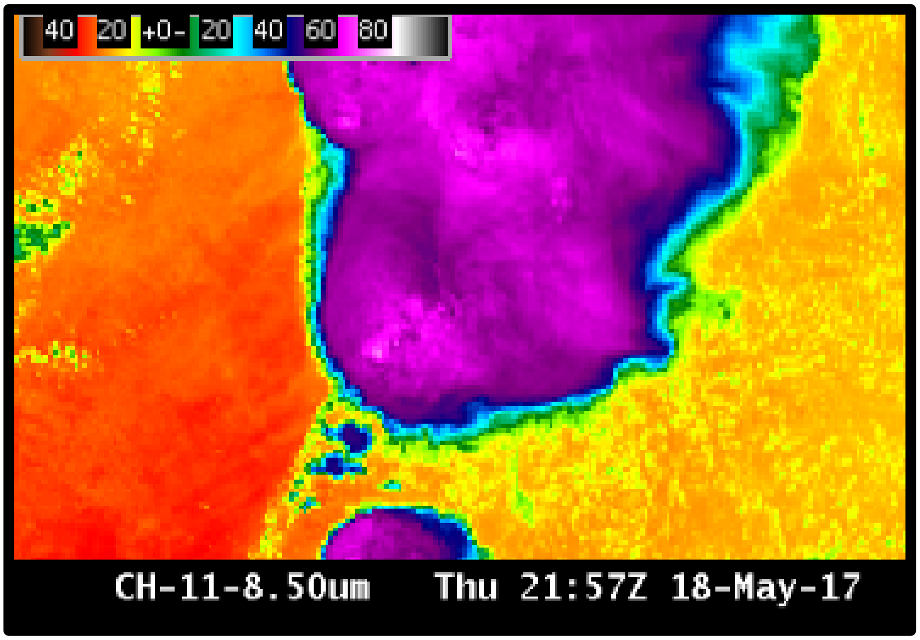
ABI Band 11 (8.5 μm)

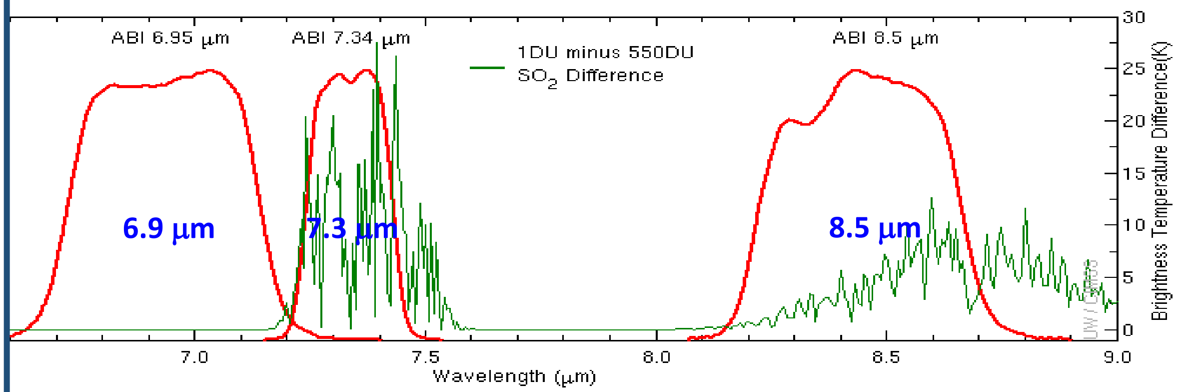
Quick Guide

Why is the Infrared Cloud Phase Band Important?

The infrared 8.5 μm band is a window channel; there is little atmospheric absorption of energy in clear skies at this wavelength (unless SO_2 from a volcanic eruption is present). However, knowledge of emissivity is important in the interpretation of this Band: Differences in surface emissivity at 8.5 μm occur over different soil types, affecting the perceived brightness temperature. Water droplets also have different emissivity properties for 8.5 μm radiation compared to other wavelengths. The 8.5 μm band was not available on either the Legacy GOES Imager or GOES Sounder.



The figure at right shows Spectral Response Functions in red for 3 ABI Channels and the large effect of SO_2 on the detected temperature (green line) at 7.3 μm (where there is also water vapor absorption) and at 8.5 μm. Both channels are thus useful for detecting volcanic ash.



Impact on Operations

Primary Application: This is an important channel to monitor volcanic activity; also cloud Phase can be determined using the brightness temperature difference between the 8.5 μm and 11.2 μm Window Channels that is driven by emissivity differences.

Limitations

This is a "dirty" window: There is more water vapor absorption in this 8.5 μm channel than in the Clean Window Channel at 10.3 μm. Brightness Temperatures will be modulated by water vapor. For most purposes in tracking meteorological features, it makes more sense to use the cleaner 10.3 μm window channel.

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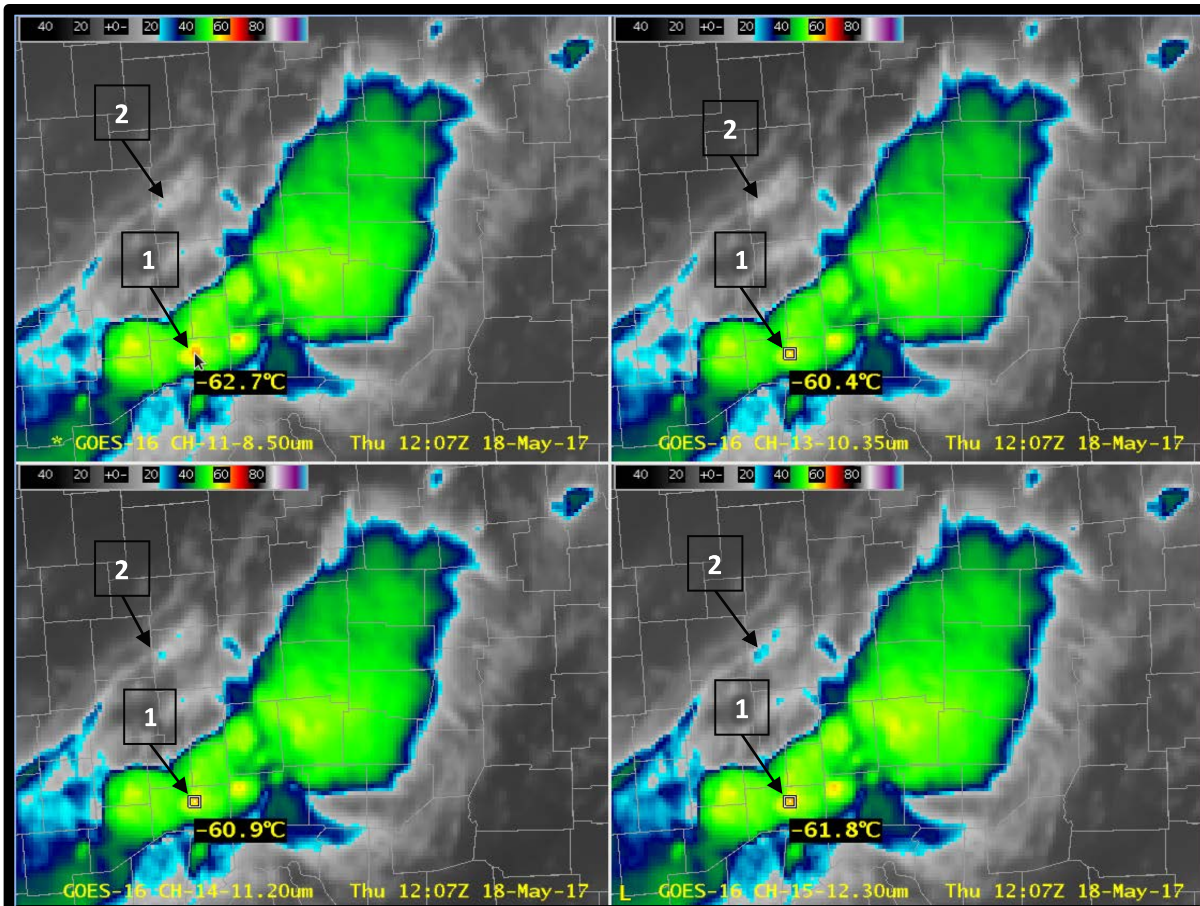
IR Cloud Phase

Satellite Image Interpretation

1 In the 4-panel at right with all four window channels displays, note how the cold overshoot has a different brightness temperature in each band – this is important if you use a threshold temperature for any purpose.

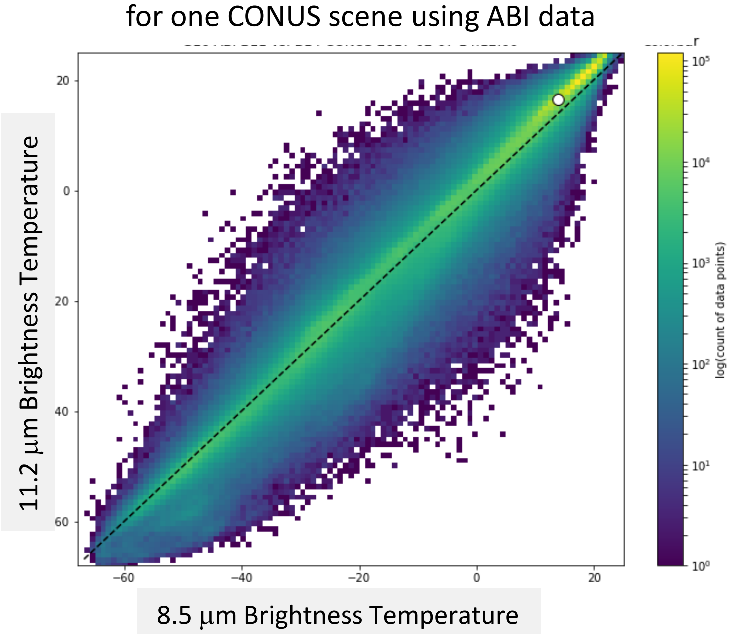
2 Thin Cirrus also shows different brightness temperatures because the cold part of the pixel is better detected by longer wavelengths



GOES-16 Window Channels, 18 May 2017 at 1207 UTC. Upper Left: 8.5 µm ; Upper Right: 10.3 µm ; Lower Left: 11.2 µm ; Lower Right 12.3 µm

There is a wide spread in the scatterplot at right of 8.5 µm (x-axis) vs. 11.2 µm (y-axis) brightness temperatures over the entire CONUS. Brightness temperature difference between these two channels are a function of emissivity differences, absorption of energy by water vapor, and cloud thickness, and it is a useful indicator of cloud top phase. Different regions of the scatterplot are associated with different cloud types.

8.5 µm vs. 11.2 µm Brightness Temperature for one CONUS scene using ABI data



Resources

BAMS Article

Schmit et al. 2017

GOES-R.GOV

Band 11 Fact Sheet

COMET MetEd Training on ABI Band 11

Hyperlinks do not work in AWIPS but they do in VLab