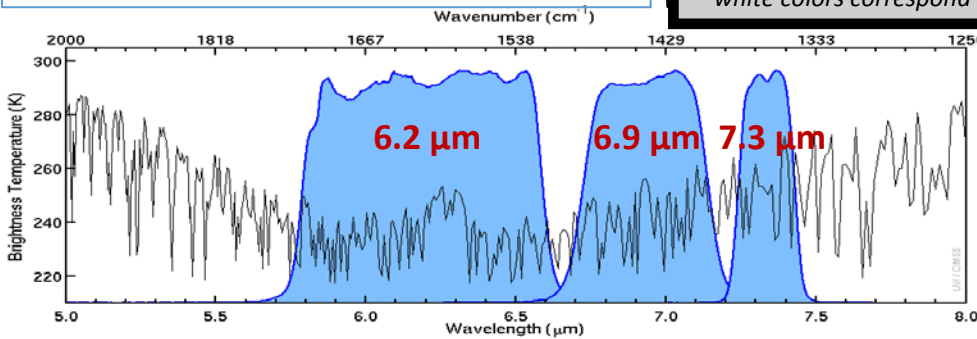
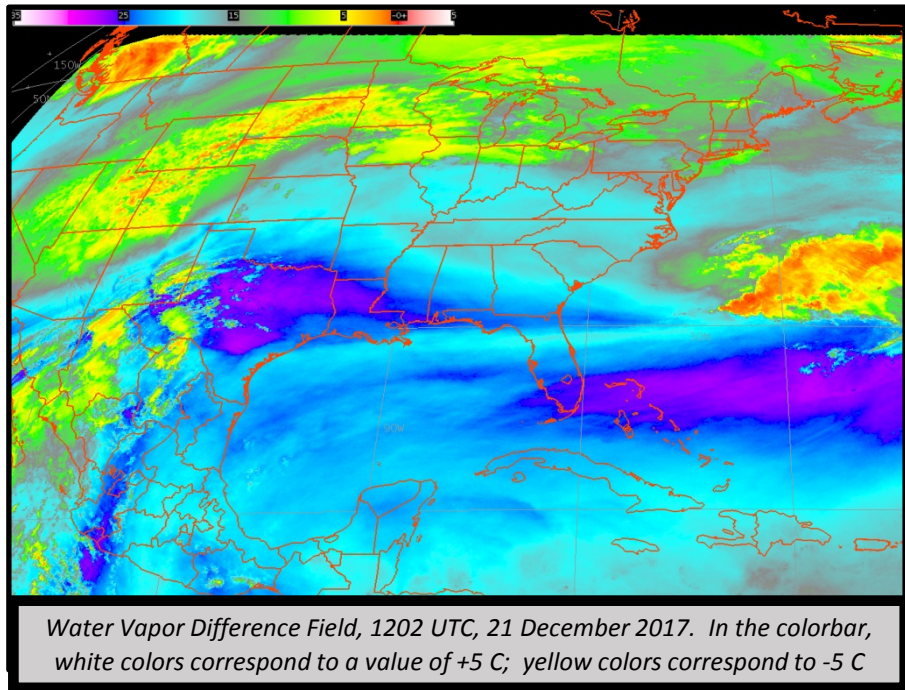


Why is the “Split Water Vapor” Brightness Temperature Difference ($6.2 \mu\text{m} - 7.3 \mu\text{m}$) Important?

Energy at $6.2 \mu\text{m}$ and $7.3 \mu\text{m}$ that moves through the atmosphere is absorbed by water vapor. That absorption occurs more readily at $6.2 \mu\text{m}$ than at $7.3 \mu\text{m}$. The brightness temperature is cooler when more absorption occurs. The difference between the two bands gives an approximation of the concentration and distribution of water vapor. Details about middle and upper-level features in the atmosphere can be readily apparent in the WV difference without a detailed examination of the individual $6.2 \mu\text{m}$ and $7.3 \mu\text{m}$ images.



Spectral response functions for the three ABI Water Vapor Bands, along with clear-sky top-of-atmosphere brightness temperature for a USA Standard Atmosphere. Cooling due to water vapor is strongest in the $6.2 \mu\text{m}$ channel

Impact on Operations

Application: This Brightness Temperature Difference is the ‘Red’ Component of the Airmass Red Green Blue (RGB) Composite. Values between -26.2 K and 0.9 K are used.

Application: This Brightness Temperature Difference is large in regions of thin cirrus – detected in the upper level WV band ($6.2 \mu\text{m}$), but transparent in the low-level WV band ($7.3 \mu\text{m}$). The value is typically large in clear regions where tropopause folds exist.

Application: Information about cloud height can be deduced if one channel sees a cloud but the second does not.

Limitations

Limited information over thick clouds: The BTD is small over thick clouds, especially if the atmosphere above the clouds is dry. In the color enhancement used above, these regions are red.

Limitation: “Water vapor” bands are infrared bands that sense the mean temperature of a layer of moisture — a layer whose altitude and depth can vary, depending on both the temperature/moisture profile of the atmospheric column and the satellite viewing angle. Weighting functions can describe from where in the atmosphere the energy emanates.

Image Interpretation

1

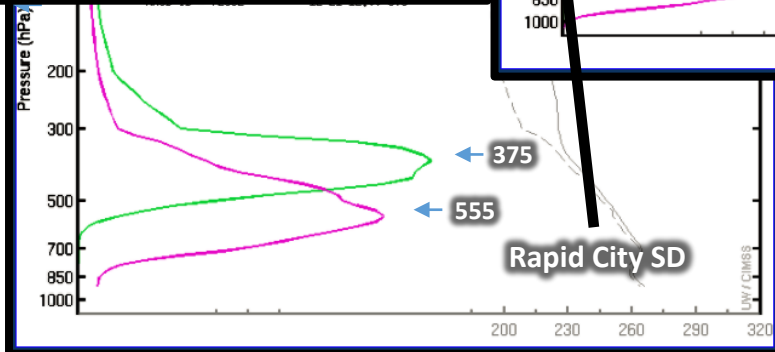
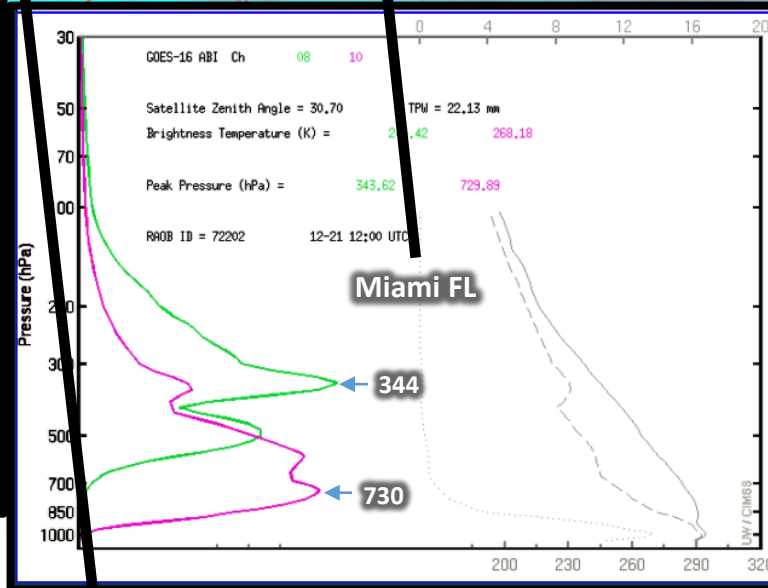
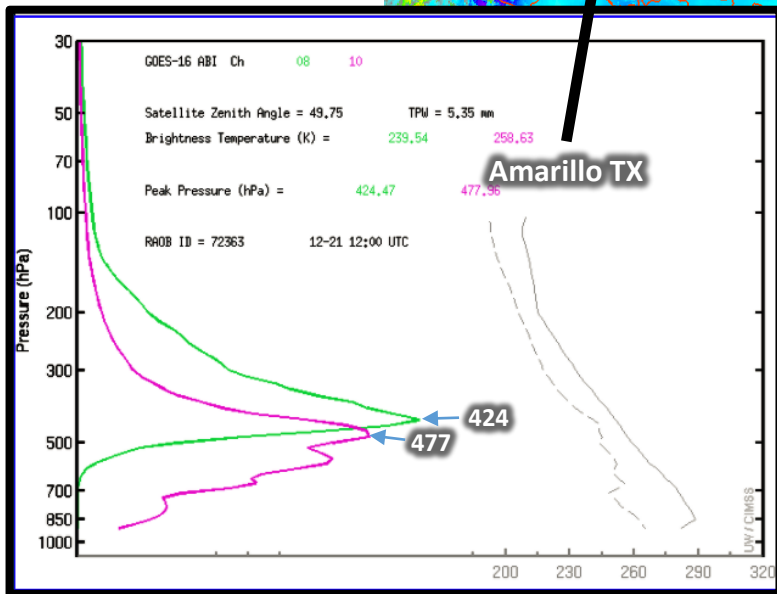
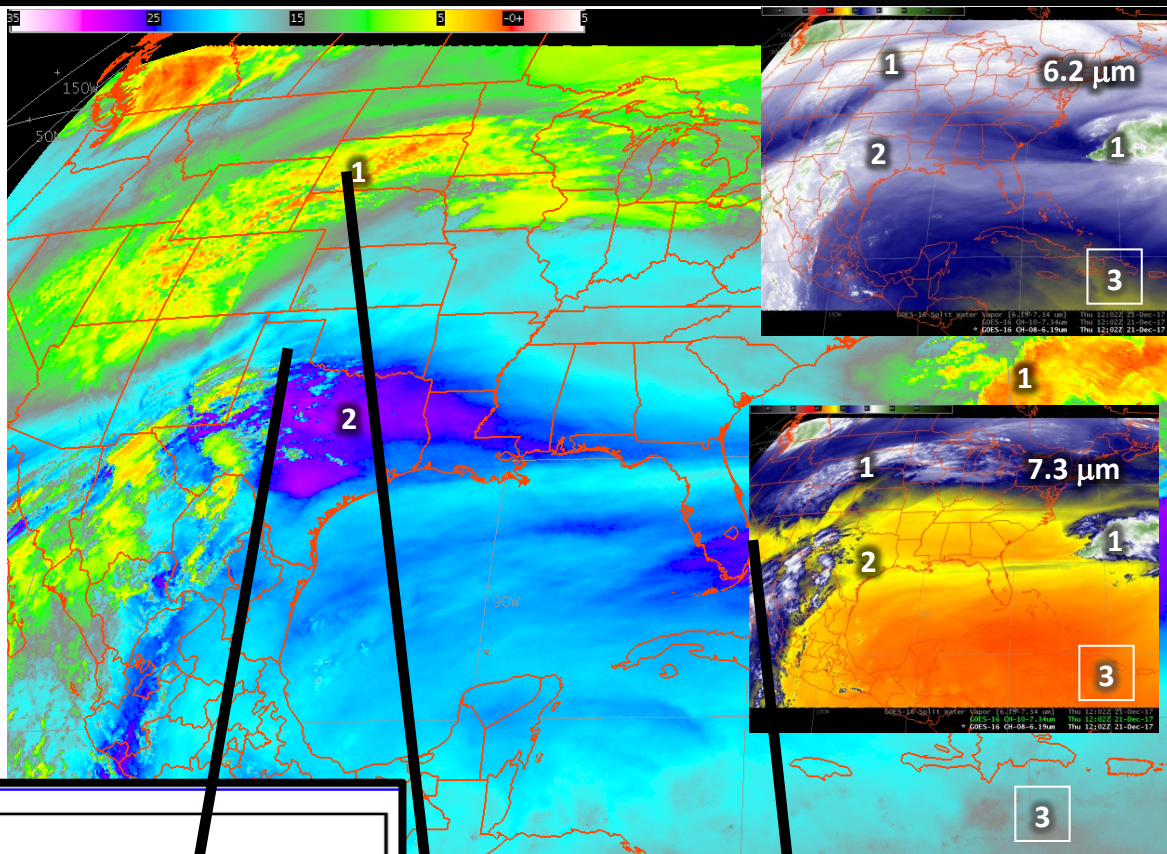
Values are near zero over thick high clouds

2

Values are very large and negative where small amounts of high-level moisture are present

3

Values are negative in a very dry atmosphere



Weighting Functions show from where in the atmosphere the energy detected by the satellite originated. Peak levels are indicated. Green lines: 6.2 μm Purple lines: 7.3 μm

Resources

[Weighting Function Website](#)

Hyperlinks do not work in AWIPS but they do in VLab