

ABI Clouds vs. Snow Spectral Bands Activity

Go to this page <http://cimss.ssec.wisc.edu/education/apps/bandapp/FirstLightABI.html> and click on the “CONUS” activity.

This activity features GOES-16 ABI data from the day when it was first operational – January 15 2017. Load the page into your web browser, then toggle through the 16 bands by simply clicking on the image. (you can also click on the ovals near individual band numbers) Be sure to read the descriptive text associated with each band to get a feel for what details each ABI band helps reveal.

Since the images are from January there is a good chance that there is snow on the ground. In fact, there is a winter storm in the Central Plains. Let’s compare ABI bands to determine snow cover from clouds – which two should we try? Pick two: Band _____ and Band _____.

If you picked Band 2 (0.64 μm) and Band 5 (1.6 μm) you are right! Low and mid-level clouds consist of water droplets and electromagnetic energy at 1.6 micrometers (μm) is reflected by water droplets but absorbed by ice. This is why Band 5 (aka the Snow/Ice band) helps differentiate between clouds made up of water droplets that will appear brighter due to reflected energy and snow cover (and high clouds) which are made up of ice crystals and appear darker due to absorbed energy.

List 2 states covered by snow in this image: _____ and _____.

Now add the ‘Cirrus’ Band 4 (1.37 μm). The Cirrus Band is unique among the reflective bands on the ABI in that it occupies a region of very strong absorption by water vapor in the electromagnetic spectrum yet also detects reflected solar radiation, which is why it can reveal very thin cirrus clouds during the day.

Where are 2 areas of cirrus clouds in this image?

_____ and _____.

Compare all three bands to determine 1) the extent of the low and mid-level clouds, 2) the large area of snow cover in North and South Dakota, and 3) Cirrus clouds over the Gulf of Mexico and above the large winter storm system in the Central Plains.

By comparing Band 2 (Visible ‘Red’ band) with Band 4 (Near Infrared ‘Cirrus’ band) with Band 5 (Near Infrared ‘Snow’ band) we can confidently distinguish between clouds associated with the large winter storm on January 15 and snow cover to the north as well as areas of high cirrus clouds.

Finally, Click on the **Interactive Chart**. Scroll your mouse over these 3 features and watch the graph while toggling between different bands. Reflectance values indicate energy that originated at the Sun and reflected by the Earth or clouds back up to the satellite (Bands 1-6). Temperature values is energy emitted by Earth and/or the atmosphere up to the satellite for detection (Bands 7-16). Compare these values over the main features in this winter scene to confirm what you learned in this activity.

By the way – both Band 1 (Visible ‘Blue Band’) and Band 2 (Visible ‘Red band’) would work in this comparison since they both measure reflected solar energy. The biggest difference between the two bands is resolution – Band 2 provides higher spatial resolution and more detail.

References:

ABI Bands Quick Information Guides: <https://www.goes-r.gov/mission/ABI-bands-quick-info.html>

GOES-R Education Proving Ground: <http://cimss.ssec.wisc.edu/education/goesr/>

