Very Quick Overview of the 16 Bands on the GOES-16 Advanced Baseline Imager (ABI)

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Where to Go for More Information

• We are just going to scratch the surface today! Please spend some time learning about the ABI’s products:
  – Direct observations from each band
  – Derived products from combinations of bands
• 2-page fact sheets from the GOES-R program and CIRA for each band (extremely useful)
• Links to imagery, band info, calibration (everything you could possibly want) from CIMSS
• BAMS article on ABI (April 2017)
Places to Start Viewing Actual ABI Imagery

- **College of DuPage Experimental GOES-16 Viewer** (CONUS and full disk)
  - Also has product description for each band
  - This is the site I use for GOES imagery! (It’s great!)
- **NOAA’S GOES-East Image Viewer** (CONUS and full disk)
ABI Gives You What You Are Used To – At Higher Resolution!

<table>
<thead>
<tr>
<th>Imager Band Number</th>
<th>Imager Band Name</th>
<th>Wavelength Range (µm)</th>
<th>Spatial Resolution (km)</th>
<th>Corresponding ABI Band(s)</th>
<th>ABI Band Spatial Resolution (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visible</td>
<td>0.55-0.75</td>
<td>1</td>
<td>2 (red)</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>Shortwave IR</td>
<td>3.8-4.0</td>
<td>4</td>
<td>7 (shortwave IR)</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Water Vapor</td>
<td>5.5-7.0</td>
<td>8</td>
<td>8, 9, 10 (upper-, mid-, low- level water vapor)</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Longwave IR 1</td>
<td>10.2-11.2</td>
<td>4</td>
<td>13, 14 (clean longwave IR, longwave IR)</td>
<td>2</td>
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<tr>
<td>5</td>
<td>Longwave IR 2</td>
<td>11.5-12.5</td>
<td>4</td>
<td>15 (dirty longwave IR)</td>
<td>2</td>
</tr>
</tbody>
</table>
ABI Bands (Probably) Most Useful for Everyday Forecasting
ABI Band 2: Visible (Red)

- Highest spatial resolution (0.5 km) of all the ABI bands
- 0.64 µm
- Only available in the daytime!
- Use it in the same way you are used to using the Imager visible channel 1
  - Clouds, fog, snow on ground
  - Convective development
  - Location of storms, fronts
ABI Bands 8, 9, 10: Water Vapor

• Instead of one broad water vapor band, ABI gives you three!
  – 8: Upper-level (6.2 µm)
  – 9: Mid-level (6.9 µm)
  – 10: Low-level (7.3 µm)
• Available during the day and night
• Use the same way you are used to using the Imager water vapor channel 3
  – Location of jet stream
  – Troughs/ridges
ABI Bands 13, 14: Longwave IR

- ABI has two longwave IR bands that correspond to Imager IR channel 4
  - 13: “clean” LWIR (10.3 μm)
  - 14: LWIR (11.2 μm)
- Available during the day and night
- Use these bands the same way you are used to using the Imager IR channel 4
  - Clouds at night
GeoColor (Derived from ABI Band 1 – Blue)

- ABI has two visible bands: red (band 2) and blue (band 1, 0.47 \( \mu \)m)
  - Official use of blue band is for aerosols, but GeoColor is much more user-friendly
  - GeoColor is combination of red, blue, and synthetic green
  - Blue band is black/white, lower spatial resolution (1 km) than red band
    - Difficult for average user to pick out aerosol plumes
    - Much easier to see smoke, dust, haze in GeoColor (since it’s in color not B/W)
- GeoColor is available from NOAA’s GOES-16 image viewer
- COD has a “true color” but it’s NOT the GeoColor product
ABI Bands (Probably) Less Useful for Everyday Forecasting (More for Specialized Applications)
ABI Band 15: Longwave IR

- ABI has a longwave IR band that corresponds to Imager IR channel 5
  - 15: “dirty” LWIR (12.3 μm)
- “Dirty” refers to interference from water vapor absorption
- Available during the day and night
- Not really used on its own, but in conjunction with a “cleaner” IR channel (like band 13) and as part of derived cloud products
ABI Band 7: Shortwave IR

• Similar to Imager shortwave IR channel 2 but with higher resolution
• 3.9 μm
• Available during the day and night
• Same uses as the Imager shortwave IR channel 2:
  – Fog/low clouds at night
  – Fires (hotspots)
  – Volcanic eruptions
  – Snow and ice
ABI Band 3: Veggie (near IR)

- New band (not on Imager)
- 0.86 µm
- Only available in the daytime!
- Main applications:
  - Burn scars
  - Vegetated land
ABI Band 4: Cirrus Clouds (near IR)

• New band (not on Imager)
• 1.37 µm
• Only available in the daytime!
• Main applications:
  – High, thin clouds during the daytime
ABI Band 5: Snow/Ice (near IR)

- New band (not on Imager)
- 1.6 µm
- Main applications:
  - Water clouds (bright) vs. ice clouds (dark) during the day
  - Fire hotspots at night
ABI Band 6: Cloud Particle Size (near IR)

- New band (not on Imager)
- 2.2 μm
- Not really used on its own, but in conjunction with other bands as part of derived cloud products (cloud particle size, cloud mask, AOD)
- Fire hotspots at night
ABI Band 11: Cloud Top Phase (IR)

- New band (not on Imager)
- 8.4 µm
- Not really used on its own, but in conjunction with bands 14 and 15 to derive cloud top phase and type products
- SO₂ plumes from volcanic eruptions
ABI Band 12: Ozone (IR)

• Sort of a new band (not on Imager but on Sounder)
• 9.6 µm
• Primary use is in derived products for dynamics near the Tropopause
• Also component in derived total column ozone product
• Everyone asks me if we can use band 12 for ground-level O$_3$! (We can’t)
  – 90% of O$_3$ is in the Stratosphere, so ABI can’t “see” O$_3$ in Troposphere
  – Also, interference from water vapor absorption at 9.6 µm
  – Not even useful for identifying Stratospheric inversions
    • Use difference b/w ABI bands 8 and 10 (upper- and low-level water vapor) instead
ABI Band 16: CO$_2$ (IR)

• 13.3 µm

• Used in many derived products:
  – Cloud mask
  – Cloud-top height
  – Tropopause delinination