



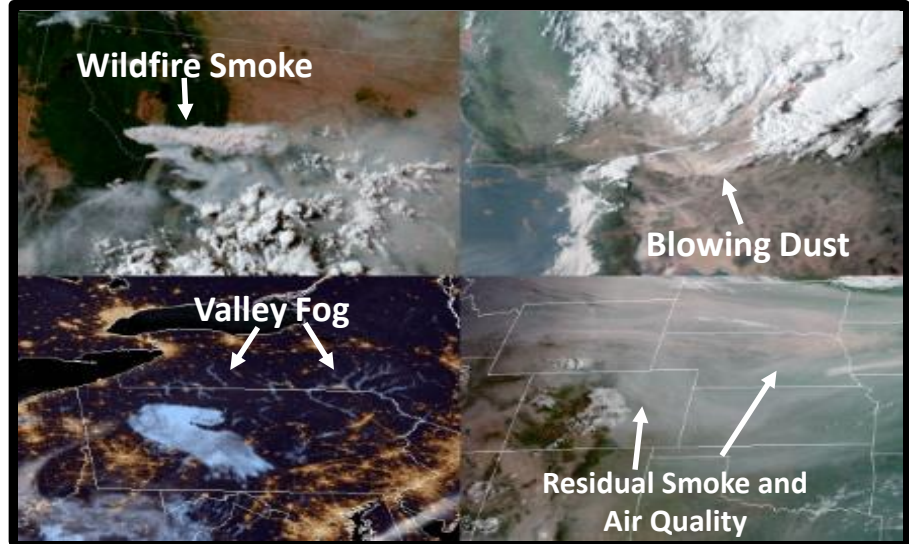
GeoColor Product

Quick Guide



Why is the GeoColor Product Important?

GeoColor imagery provides as close an approximation to daytime True Color imagery as is possible from GOES-16, and thus allows for intuitive interpretation of meteorological and surface-based features. At night, instead of being dark like in other visible bands, an IR-based multispectral product is provided that differentiates between low liquid water clouds and higher ice clouds. A static city lights database derived from the VIIRS Day Night Band is provided as the nighttime background for geo-referencing. The 5-min imagery is mapped into a 1.5 km Mercator grid over the Continental U.S. for AWIPS.



Four examples of operational applications of the GeoColor product. The valley fog example is nighttime, and the other three are daytime.

How is the GeoColor product created?

GeoColor uses a total of five channels from the GOES-R ABI. For the daytime imagery, channels 1, 2, and 3 (0.47 - blue, 0.64 - red, and 0.86 μm - near IR) are first corrected for Rayleigh scattering; this is a key step in order to maximize the contrast between clear sky and clouds, and it results in vibrant colors. Next, the green component is simulated using a lookup table that was built using data from Himawari-8 AH1, which does have a green channel at 0.51 μm . Finally, the red, green, and blue components are combined to create the pseudo-true color RGB. At night, the window IR channel 13 (10.3 μm) and the traditional fog product (10.3-3.9 μm) are used to identify both ice and liquid water clouds, and they are made partially transparent and placed atop a static city lights background. Note that power outages will not be reflected by the city lights since it's a static dataset.

Impact on Operations

Primary Applications

Daytime Aerosol

Detection: Identify smoke, blowing dust, smog, and anything that has a unique color property



Nighttime cloud detection: Differentiate low liquid water clouds from higher ice clouds at night

Nighttime Geo-Location: City lights aid geo-referencing by helping determine whether clouds (such as fog) are affecting populated areas

Intuitive Interpretation: Since the colors of features in the daytime are what we intuitively expect them to be, the product requires little to no training, and has proven to be excellent for social media posts

Limitations

Shallow Water Colors:

Since a lookup table is being used for the green component, sometimes shallow water colors may show up as noisy or incorrect



Thick vs. Thin clouds at night: The nighttime cloud layer is made partially transparent, and the amount of opacity is a function of the cloud top temperature. Sometimes optically thick clouds in the lower atmosphere may show up as being partially transparent (including precipitating convection).

Sunrise/Sunset: Near sunrise and sunset, the daytime and nighttime portions are blended, which may cause certain clouds (e.g., the blue low cloud enhancement) to briefly change colors or disappear.





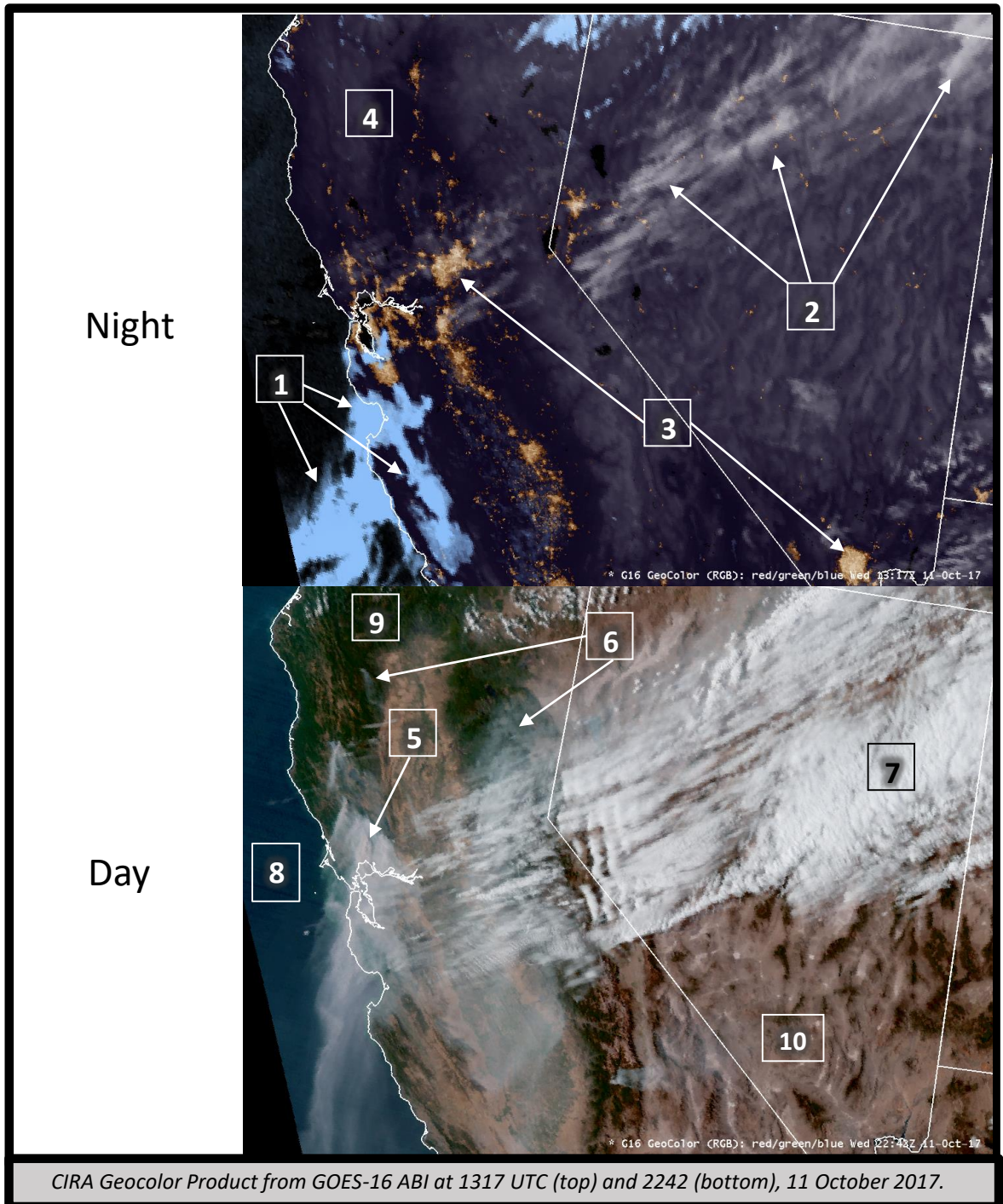
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Interpretation

- 1** Low-Level water clouds (light blue)
- 2** Mid-Level and Cirrus clouds (grayish white)
- 3** City Lights (from Day/Night Band) (gold)
- 4** Clear Sky Land (dark purple)
- 5** Thick smoke (dark gray/tan)
- 6** Thinner smoke (bluish gray)
- 7** High/Thick Clouds (bright white)
- 8** Ocean surface (shades of blue)
- 9** Vegetation/Forest (shades of green)
- 10** Dry/Desert (shades of brown)



Where to find GeoColor in AWIPS

Since GeoColor requires detailed calculations, it must be produced outside of AWIPS and delivered via LDM. Email Dan.Lindsey@noaa.gov for setup instructions. The goal is to make GeoColor operational and sent via SBN

Comparison to Other Products:

Daytime true color imagery provides a convenient 'baseline' for interpreting false-color imagery products. Use it to help differentiate clouds from other features, such as smoke or blowing dust. At night, city lights can help orient weather phenomena to major population centers. If you're interested in zooming in on the details of clouds during the day, use the higher resolution (500-m) "red" band (2) instead of GeoColor.

Resources

GeoColor on the Web
Use RAMMB/SLIDER for Full Disk, Full Resolution imagery:
<http://rammb-slider.cira.colostate.edu>

FDTD Webinar:
http://rammb.cira.colostate.edu/training/visit/satellite_chat/20170712