Why is the Plume RGB Important?
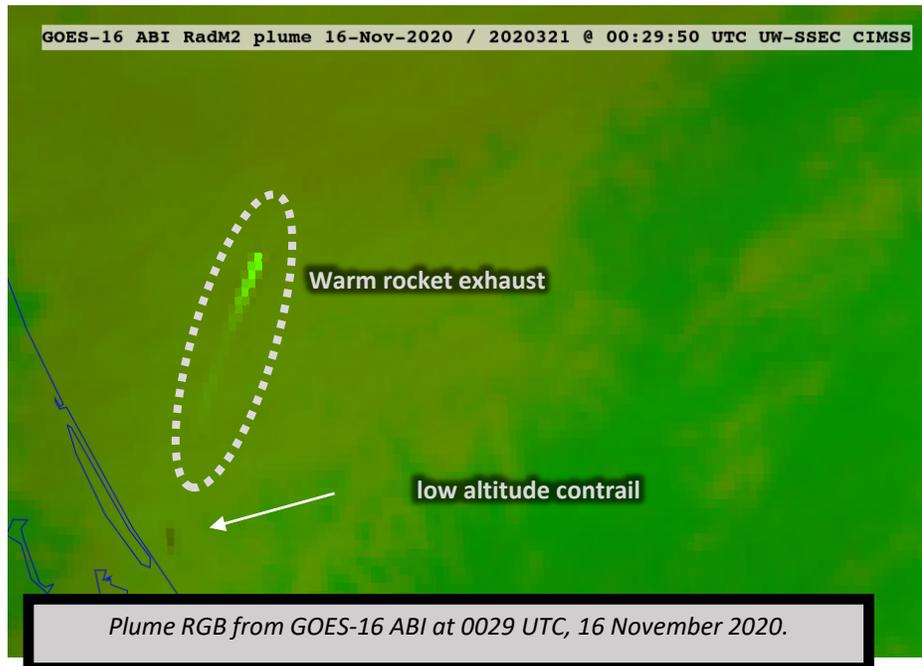
The improved spatial, temporal and spectral attributes of the ABI allow for monitoring plumes associated with rockets and hotspots.

Instead of needing to show 3 or 4-panels with separate spectral bands, this RGB combines information from several key spectral bands: 3.9 micrometer band 7 (the "shortwave infrared band"), the 6.2 micrometer band 8 (the "upper-level water vapor band"), and either a visible or "near-visible" band: ABI band 2 (0.64 micrometer "red" visible" band) is used during the day, ABI band 5 (1.6 micrometer "snow/ice" band) is used at night.

GOES-16 ABI RadM2 plume 16-Nov-2020 / 2020321 @ 00:29:50 UTC UW-SSEC CIMSS

Warm rocket exhaust

low altitude contrail

Plume RGB from GOES-16 ABI at 0029 UTC, 16 November 2020.

How is the Plume RGB Created?

Color	Band (μm)	Range (Min –> Max)	Physically Relates to…	Gamma	Large Contribution to pixel indicates…
Red	**3.9**	273 to 338 K	Plume/contrail temperature	1.0	**Warm plume**
Green	**6.2**	233 to 253 K	Exhaust warming	1.0	**Plume cloud**
Blue (day)	**0.62**	0 to 80 %	Reflective clouds	1.0	**Plume location**
Blue (night)	**1.6**	0 to 80 %	Plume temperature	1.0	**Warm plume**

Impact on Operations

Primary Application

Application: Viewing the spectral signatures associated with rocket launches.

Application: By using both the 3.9 and the 6.2 micrometer bands, this RGB can allow for a quick-look signal associated with rocket plumes or other hot spots. The solar illumination determines if one wants to use the day (ABI band 2) or night (ABI band 5) version of this plume RGB.

Limitations

Thick clouds: Thick clouds or low-level moisture may hinder viewing the plume hotspot when it is lower in the atmosphere.

Limitation: Care should be taken as the region of interest approaches the edge of the full disk.
Limitation: The water vapor plume may be harder to detect, depending on the background.
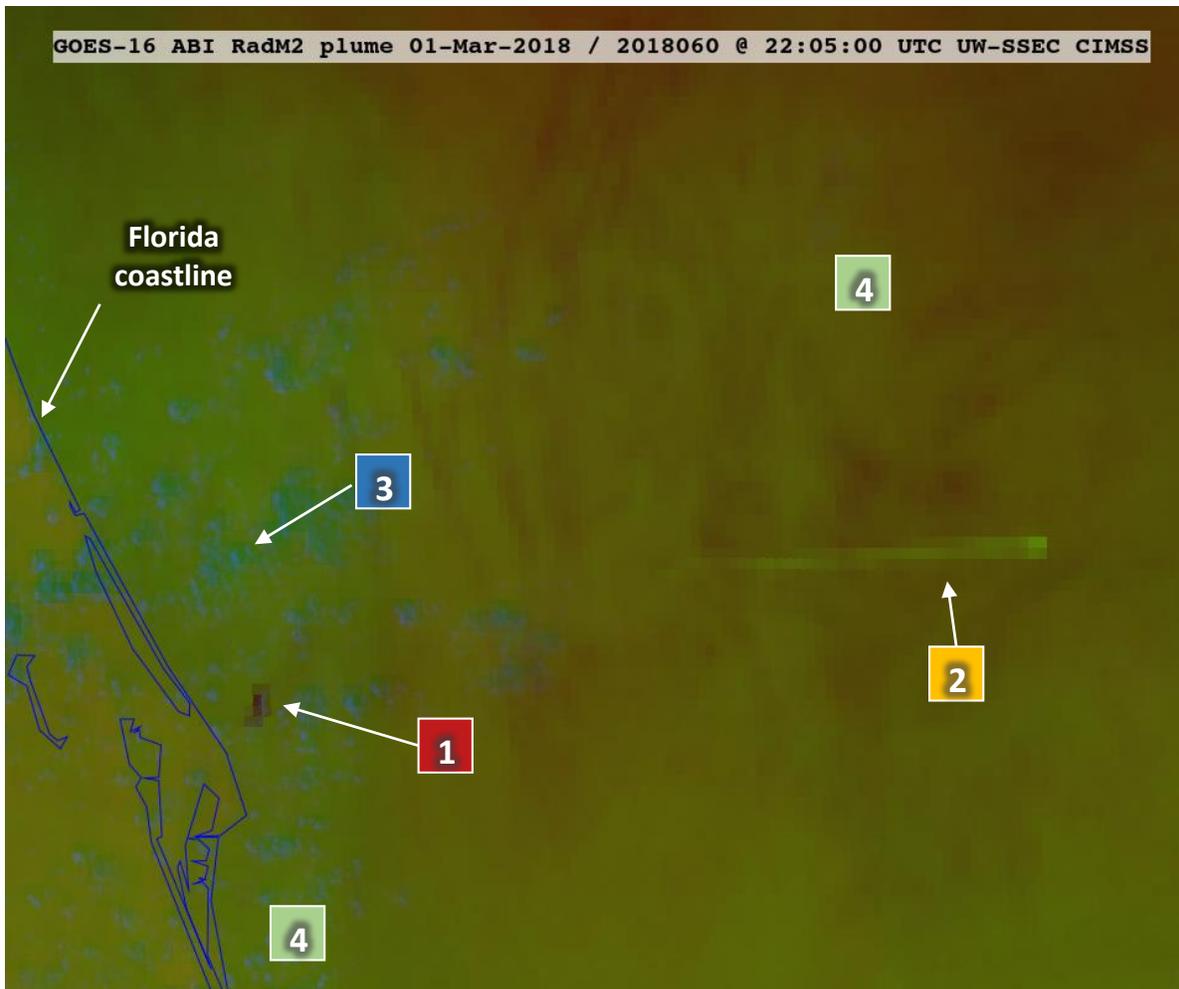**Limitation:** The "blue" component can be overwhelmed by the 3.9 micrometer band.
Hint: May want to also view the Level 2 hot spot characterization product.

Contributor: Tim Schmit   NOAA NESDIS STAR CORP ASPB   http://cimss.ssec.wisc.edu/aspb/

(Rocket) Plume RGB

Quick Guide

RGB Interpretation

1 low altitude contrail *(red to reddish)*

2 Rocket warming trail *(yellow-green)*

3 *Clouds (blueish to blue)*

4 *Clear sky (green to reddish)*

Note:, colors may vary diurnally, seasonally, and latitudinally; plus with hotspots, plumes, moisture amount, etc.

photo credit: United Launch Alliance

RGB Color Guide

Green

Red

Blue

GOES-16 ABI RadM2 plume 01-Mar-2018 / 2018060 @ 22:05:00 UTC UW-SSEC CIMSS

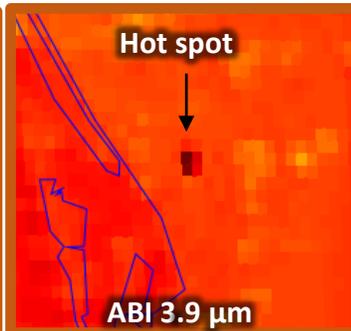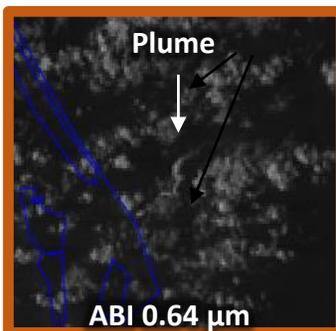Florida coastline

3

1

4

4

2

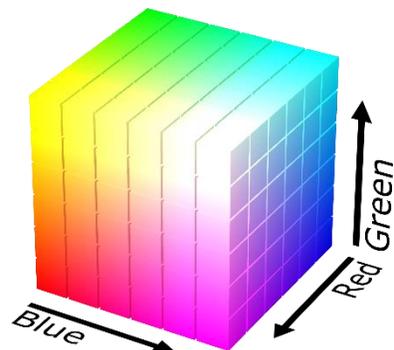*Plume from GOES-16 ABI at 2205 UTC, 01 March 2018.*

Comparison to other products:

Similar to the Fire RGB with hotspots appearing red, similar to the airmass RGB, in that it leverages a mid-level water vapor band. The images shown on this page are of the GOES-S rocket launch from Cape Canaveral, Florida.

Plume

ABI 0.64 µm

Hot spot

ABI 3.9 µm

Resources

CIMSS Satellite Blog

RGB Introduction

Hot Spot Quick Guide
Hot Spot

ABI Band Fact Sheets
(English) (Spanish) (French)

Quick Guides
Quick Guides

Link of Links
GOES-R series resources

Hyperlinks not available when viewing material in AIR Tool