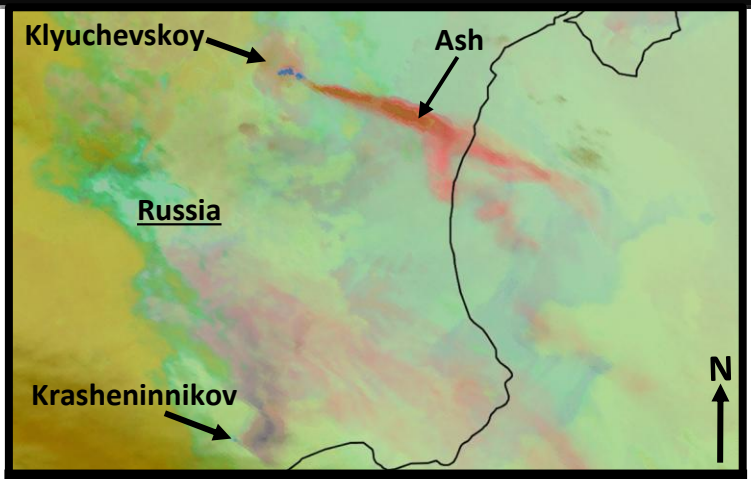
VIIRS Ash RGB

Quick Guide

Why is the VIIRS Ash RGB Important?

The VIIRS Ash RGB utilizes three infrared channels to identify ash plumes and detect sulfur dioxide gas (SO_2) that are produced from volcanic eruptions. Ash and SO_2 emissions are hazardous to public health and aviation operations. Within the red spectra of the RGB, positive 12.0 µm - 10.8 µm brightness temperature difference values indicate ash plumes, which appear in shades of red, magenta and pink colors. The RGB provides 24/7 monitoring and can differentiate ash from ice and water clouds. SO_2 can also be observed in bright green colors due to its strong absorption characteristics within the 8.6 µm band.



VIIRS Ash RGB captures eruptions from the Klyuchevskoy and Krasheninnikov volcanoes along the Kamchatka Peninsula on 5 August 2025 at 1703 UTC.

VIIRS Ash RGB Recipe

Color	Band (µm)	Min – Max Gamma	Physically Relates to…	Small contribution to pixel indicates…	Large Contribution to pixel indicates…
Red	**(M16) 12.0 - (M15) 10.8**	-4 to 2 ˚ C 1	Optical depth, cloud thickness	Thin clouds	**Thick Clouds, ash plume**
Green	**(M15) 10.8 - (M14) 8.6**	-4 to 5 ˚ C 1	Particle phase and size	Large water or ice particles	**Small water or ice particles, sulfur dioxide gas**
Blue	**(M15) 10.8**	-30.2 to 29.9 ˚ C 1	Temperature of Surface	Cold surface	**Warm Surface**

Impact on Operations

Primary Application

Ash Plume Monitoring: Ash plumes are identified in red, magenta, and pink colors at 750-m spatial resolution.

SO_2 Detection: The 8.6 µm channel absorbs SO_2 well, resulting in bright green colors in the imagery and a large positive brightness temperature difference within the green component of the RGB.

Secondary Applications: The Ash and Dust RGBs use the same components, but the Ash RGB is scaled to better highlight volcanic ash rather than dust. Dust and moisture boundaries can also be observed in the imagery. Water vs ice and thick vs thin clouds can be analyzed fairly well, however, other RGBs may be more valuable for cloud analyses.

Limitations

Mixed Scenes: If ice clouds exist in the same region, the RGB will be less effective for ash and SO_2 analysis. Cirrus clouds may be a part of volcanic or non-volcanic cloud systems.

Ash Height/Concentration: The RGB does not provide information on ash height or concentration.

High Viewing Angles: At the satellite limb/edge, SO_2 and low clouds will appear in a similar green color. The Dust RGB is recommended for greater contrast of SO_2 and ash with clouds.

Cool Surfaces: As high terrain or desert ground surfaces experience diurnal cooling, their color becomes less blue and more magenta/pink. Ash plumes will be less apparent over these areas.

Latency: Over CONUS, overpasses are ~3-6 times per day, per satellite. Over Alaska, VIIRS has more frequent coverage. Data latency is ~15 min via Direct Broadcast and ~1-1.5 h via Satellite Broadcast Network (SBN).

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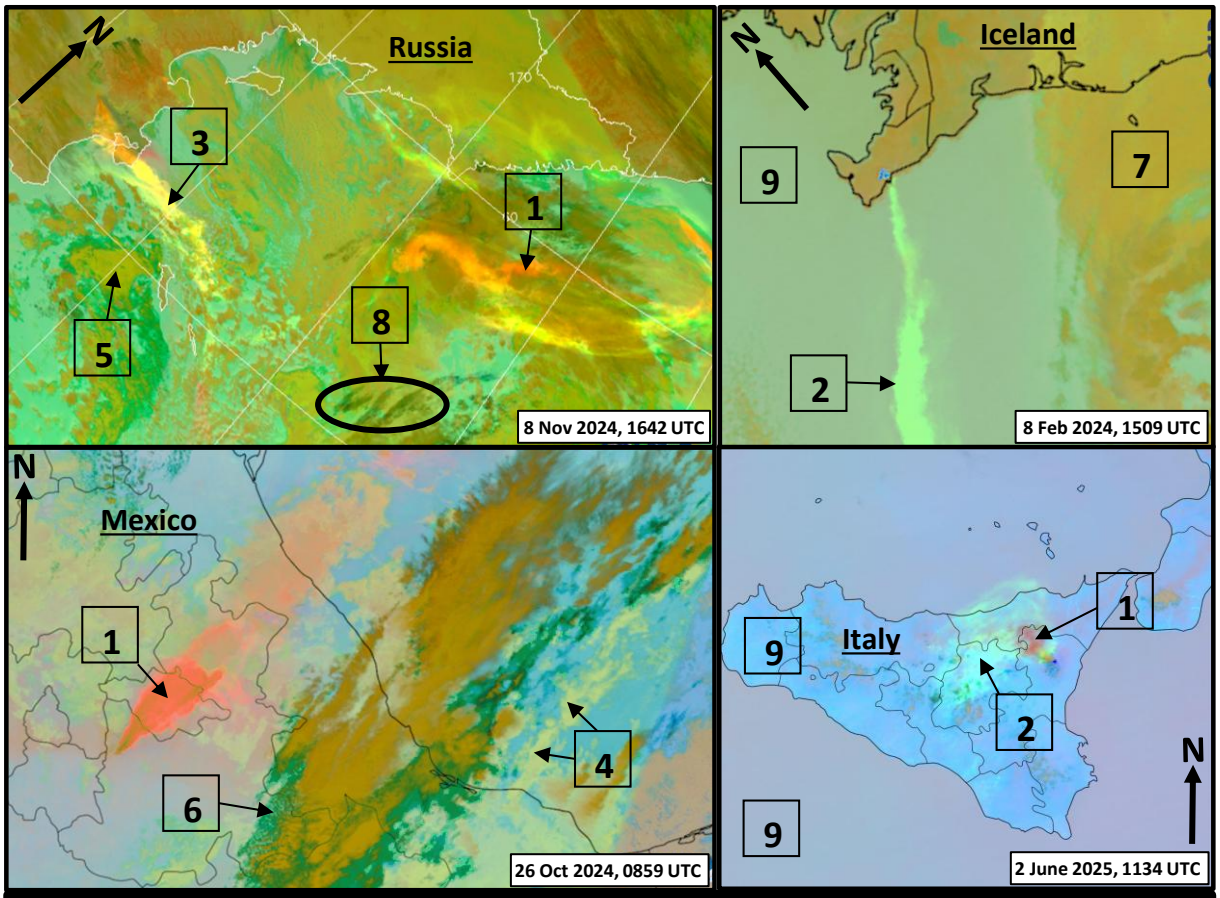
RGB Interpretation

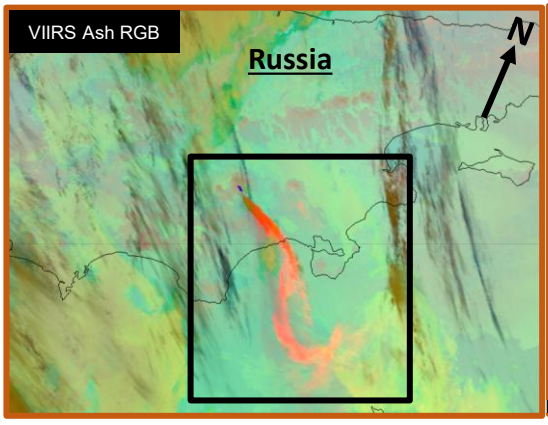
1	**Ash** *(red, magenta, pink)*
2	**Sulfur Dioxide Gas (SO_2)** *(bright green)*
3	**Ash mixed with SO_2** *(yellow)*
4	**Low, thick, water, clouds** *(light green to gray)*
5	**Mid, thick clouds** *(light tan)*
6	**Mid, thin clouds** *(dark green)*
7	**High, thick ice clouds** *(brown)*
8	**High, thin clouds** *(dark blue to black)*
9	**Cloud Free Land/Water** *(shades of blue or pink)*

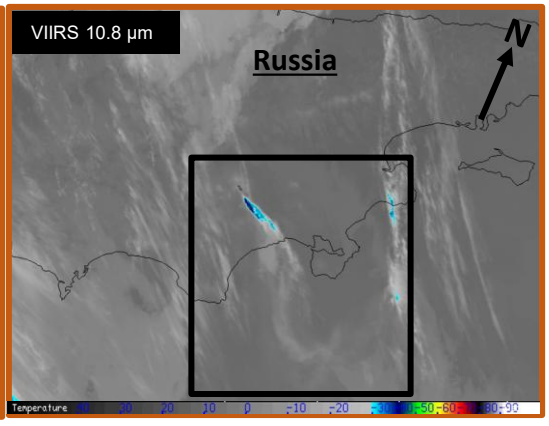
Note, colors may vary diurnally, seasonally, and with latitude.



A VIIRS Ash RGB 4-Panel shows various volcanic eruptions across the world. Top Left: the Klyuchevskoy volcano in Russia erupts producing large swaths of ash and SO_2 over the Bering Sea. Top Right: a long, narrow SO_2 plume produced from Iceland's Fagradalsfjall volcano can be spotted over the North Atlantic Ocean. Bottom Left: Mexico's Popocatepetl volcano erupts spewing ash northeastward towards the Gulf. Bottom Right: In Italy, Mt Etna erupts and produces significant SO_2 and some ash over the island of Sicily.

Ash RGB comparison to 10.8 µm: At 1617 UTC, 7 August 2025, an eruption from the Klyuchevskoy volcano can be seen over Russia. The VIIRS Ash RGB depicts the ash plume distinctly over land and offshore. However, the 10.8 µm channel can see portions of the plume but does not differentiate the ash from the water and ice clouds. Both products have a spatial resolution of 750 meters.





Resources

CIRA SLIDER - JPSS Sectors
Northern Hemisphere, Southern Hemisphere, and CONUS.

Volcanic Cloud Monitoring Data via CIMSS
Sectors: Alaska, Hawaii

Satellite Liaison Blog
Mauna Loa Eruption

COMET Module: Ash & SO_2 RGB Applications for Volcanic Plumes

Ash RGB Quick Guides: SEVIRI, GOES

Ash RGB Quick Brief: GOES

Hyperlinks not available when viewing material in AIR Tool