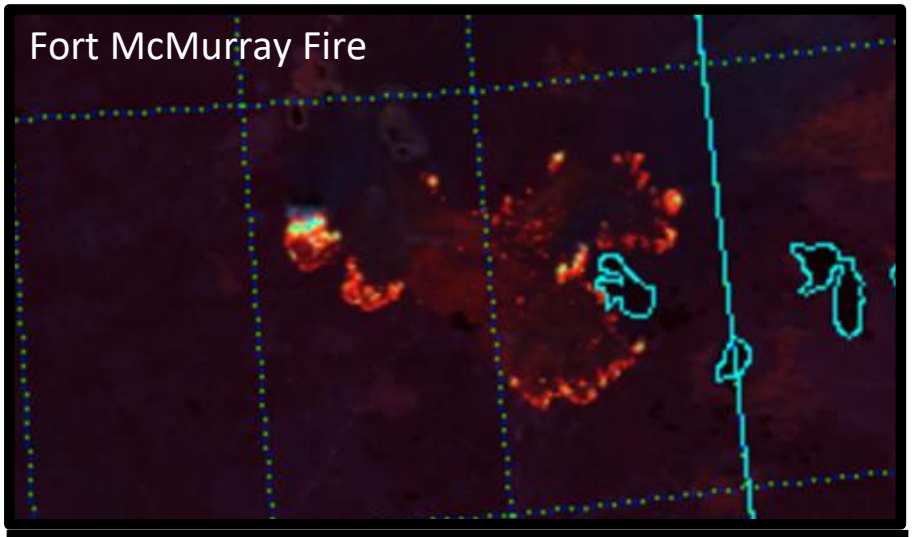
VIIRS Fire Temperature RGB Quick Guide

Why is the Fire Temperature RGB Important?

This RGB is useful for fire detection and provides a qualitative estimate of fire activity and intensity. It takes advantage of the fact that more intense fires emit more radiation at shorter wavelengths in the shortwave IR. Small/"cool" fires will only show up at 3.7 µm and appear red. Moderately intense/large fires will be detected at both 3.7 µm and 2.25 µm and will appear orange to yellow (yellow being more intense). Very intense fires will be detected by all three bands and appear white.



Fire Temperature RGB from S-NPP VIIRS at 1942 UTC, 16 May 2016

Fire Temperature RGB Recipe

Color	Band (µm)	Physically Relates to…	Small contribution to pixel indicates…	Large Contribution to pixel indicates…
Red	3.7	Cloud phase, temperature	Cold clouds, snow/ice, cold land surfaces	Warm land surfaces, hot spots (fires)
Green	2.25	Particle size, vegetation	Large cloud particles, snow/ ice, forests, water	Small cloud particles, dry grass, bare ground (moderate and intense fires)
Blue	1.6	Cloud phase, snow, vegetation	Ice clouds, snow/ice, green vegetation, water	Liquid clouds, dry vegetation, bare ground (intense fires)

Impact on Operations

Primary Application

Detect Fire Hot Spots: The 3.7 µm band is very useful for fire detection. Smaller, cooler fires appear bright red against a purple or maroon background.

Monitor Fire Activity: The 2.25 µm band is capable of detecting fires of moderate size/intensity (appear yellow) and the 1.6 µm band is only capable of detecting very intense fires (appear white). Thus, pixel color is related to fire activity and intensity.

Fires Look Like Fires: The color of fires in this RGB is similar to the behavior of real flames: cooler flames are more red, hotter flames are yellow to white hot.

Limitations

Clouds Inhibit Fire detection: Fires are only visible in clear sky areas

No Smoke, No Fire?
Wrong! The Fire Temperature RGB is highly sensitive to fires, but generally not sensitive to smoke.

Deserts and Warm Backgrounds: Deserts and and hot land surfaces may emit enough radiation at 3.7 µm to appear red, similar to small/cool fires

VIIRS Saturation and Fold-over : The 3.7 µm channel on VIIRS saturates at a relatively low temperature (368 K). Very intense fires (500+ K) can cause "fold-over" which causes very low radiance to be reported. This may cause fires to appear blue.

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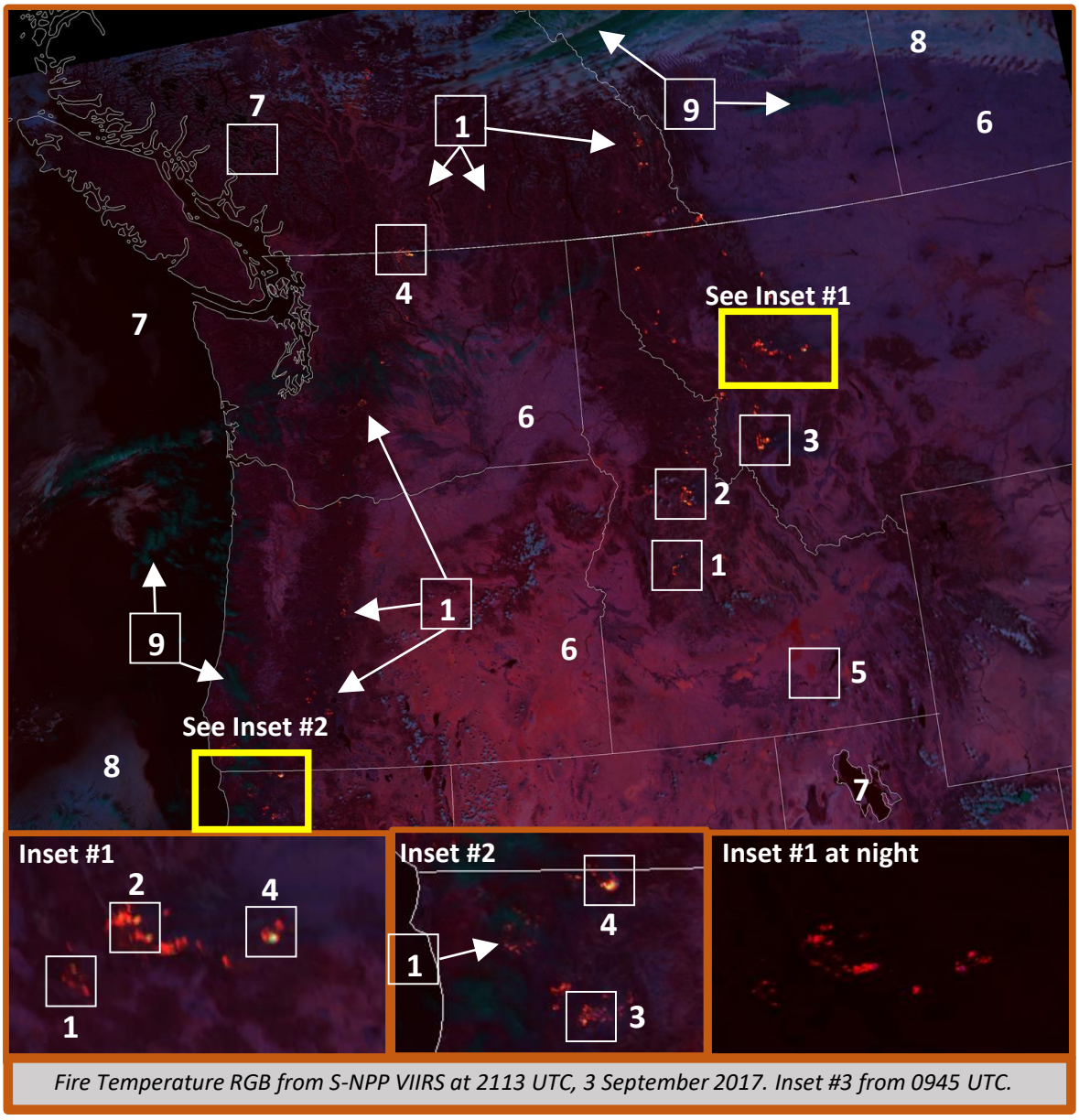
Quick Guide

RGB Interpretation

- **1** “Warm” fire *(red)*
- **2** “Very Warm” fire *(orange)*
- **3** “Hot” fire *(yellow)*
- **4** Very intense fire *(near white)*
- **5** Burn scar (day) *(shades of maroon)*
- **6** Land Surface (day) *(Purples to pinks)*
- **7** Water, snow, ice, nighttime *(nearly black)*
- **8** Water cloud (day) *(shades of blue)*
- **9** Ice cloud (day) *(dark green)*

Note:, colors may vary diurnally, seasonally, and latitudinally

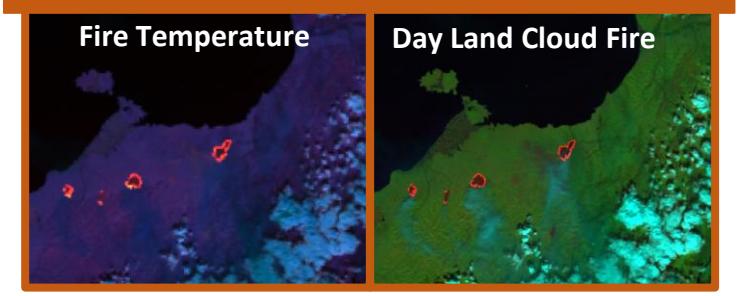


Fire Temperature RGB from S-NPP VIIRS at 2113 UTC, 3 September 2017. Inset #3 from 0945 UTC.

RGB Color Guide

Comparison to Day Land Cloud Fire RGB:

The Fire Temperature RGB provides information on fire intensity and is generally insensitive to smoke. Fire Temperature is produced at 750 m resolution, while Day Land Cloud Fire is at 375 m.



2326 UTC 8 June 2017

Resources

VIIRS Imagery Team Blog
http://rammb.cira.colostate.edu/projects/alaska/blog/index.php/uncategorized/the-land-of-10000-fires/

ACCAP VAWS Presentation
https://accap.uaf.edu/VIIRS

VISIT Satellite Chat
http://rammb.cira.colostate.edu/training/visit/satellite_chat/20160518/

Hyperlinks not available when viewing material in AIR Tool