

Why is the Day Land Cloud Fire RGB Important?

Also called “Natural Fire Color”, this RGB combines three channels useful for fire monitoring. The 0.64 μm channel provides sensitivity to smoke, the 0.86 μm channel provides sensitivity to vegetation health and burn scars, and the 3.7 μm channel is sensitive to the hot spots from active fires. With VIIRS, we have the advantage that all of these channels are available at 375 m resolution, making it particularly useful for detecting small fires.

Fort McMurray Fire



Day Land Cloud Fire RGB from S-NPP VIIRS at 1942 UTC, 16 May 2016

Day Land Cloud Fire RGB Recipe

| Color | Band (μm) | Min-Max Gamma | Physically Relates to... | <u>Small</u> contribution to pixel indicates... | <u>Large</u> Contribution to pixel indicates... |
|-------|------------------------|------------------|----------------------------|-------------------------------------------------|-------------------------------------------------|
| Red | 3.7 | 0 to 60 C 0.4 | Temperature, clouds | Cold land surfaces, ice/snow, clouds | Warm land surfaces, hot spots (active fires) |
| Green | 0.86 | 0 to 100% 1 | Vegetation, land vs. water | Water, bare or rocky ground, burn scar | Healthy vegetation, snow/ice, clouds |
| Blue | 0.64 | 0 to 100% 1 | Smoke and clouds | Water, dark ground, burn scar | Smoke, snow/ice, clouds |

Impact on Operations

Primary Application

Detect Active Fires: The 375 m-resolution 3.7 μm channel on VIIRS is the best channel for detecting small fires.



Monitor Vegetation: the 0.86 μm channel has high sensitivity to vegetation health. Healthy vegetation will appear vivid green, while dried out grasses will appear more brown. Burn scars will appear reddish brown in an active fire and dark brown in an old fire.

Daytime Smoke: the 0.64 μm channel provides sensitivity to smoke during the day, which will appear blue

Limitations

Clouds Inhibit Fire

detection: Fires are only visible in clear sky areas



Deserts and Warm

Backgrounds: Deserts 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 causes some pixels in active fires to appear blue or cyan instead of red.

RGB Interpretation

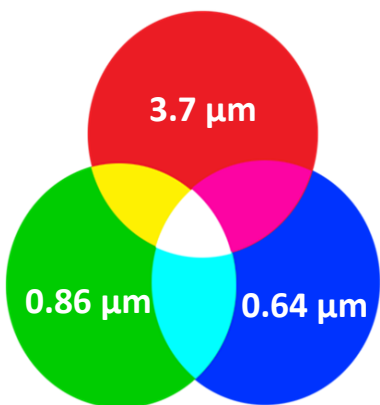
- 1 Active fire/hot spot (red)
- 2 New Burn Scar (reddish brown)
- 3 Smoke (blue)
- 4 Clouds (cyan)
- 5 Healthy Vegetation (shades of green)
- 6 Bare Ground/Old Burn Scar/Urban Area (brown)
- 7 Water/Non-fire Areas at Night (nearly black)

Note: colors may vary diurnally and seasonally



Day Land Cloud Fire RGB from S-NPP VIIRS at 2137 UTC, 09 October 2017.

RGB Color Guide



Comparison to the Day Land Cloud RGB:

Unlike the Day Land Cloud ("Natural Color") RGB, left, the Day Land Cloud Fire ("Natural Fire Color") RGB, right, does not differentiate ice clouds and snow from low clouds. But, it is much more sensitive to hot spots from fires as seen at 2327Z on 6 June 2017.



Resources

SNPP - VIIRS Imagery and Visualization Team Blog

<http://rammb.cira.colostate.edu/projects/npp/blog/index.php/tag/natural-fire-color-rgb/>

RAMMB-Slider

<https://tinyurl.com/VIIRS-Natural-Fire-Color>

Hyperlinks not available when viewing material in AIR Tool