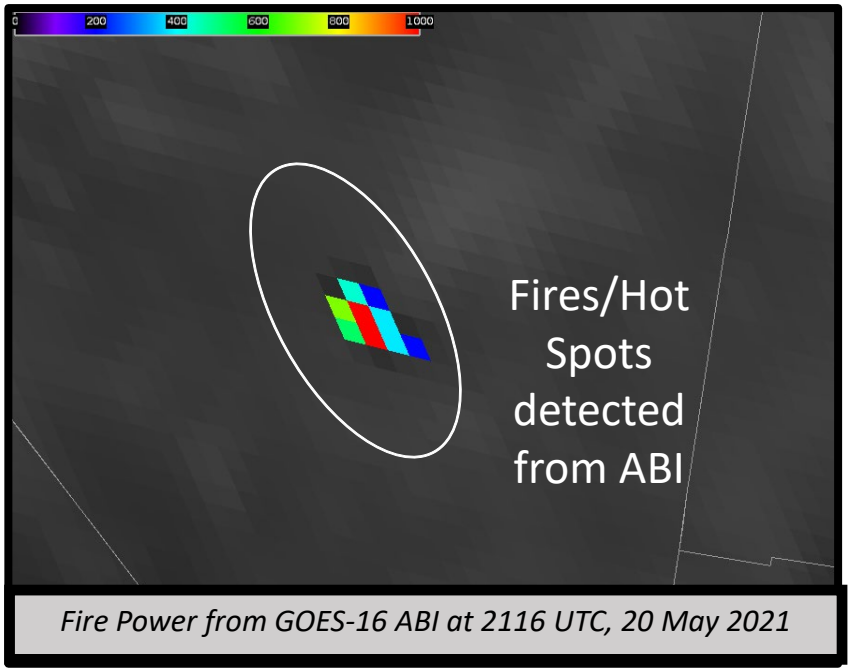
Fire/Hot Spot Characterization

Quick Guide

Why is the Fire/Hot Spot Characterization important?

The GOES-R Fire/Hot Spot Characterization consists of Fire Area, Fire Power and Fire Temperature products, along with Product Flags. Use these products that exploit the excellent spatial and temporal resolution of ABI to monitor wildfires and how they change. The Fire/Hot Spot Characterization relies on different sensitivities in Band 7 (3.9 µm) and Band 14 (11.2 µm) to high-temperature anomalies from fires allowing the detection of fires and their characteristics such as size, temperature, and intensity. Product flags ('Fire Mask') from the algorithm are included to help forecasters interpret the output.



Fire Power from GOES-16 ABI at 2116 UTC, 20 May 2021

How is the Fire/Hot Spot Characterization created?

ABI Band	Wavelength (µm)	Band Usage
2	0.64	Cloud identification and solar contamination reduction (when available)
7	3.9	Brightness temperature anomaly and cloud detection (required)
14	11.2	Brightness temperature anomaly and cloud detection (required)
15	12.3	Opaque cloud identification (when available)

Impact on Operations

Primary Application

Fire Detection: Provides information on fires/hot spots based on comparative differences between high temperature anomalies between the 3.9 µm ABI channel and 11.2 µm ABI channels. This product is based on IR channel information, and therefore available day or night.

Fire Characteristics: In addition to location, fire characteristics are provided such as fire size (based on detected fire pixels), fire temperature, and the radiative power (intensity) of the fire. These properties coupled with the high temporal refresh of GOES-R also aid in the tracking of fires in real time.

Mask Flags: The algorithm outputs fire detection characteristics as described on the next page. This gives a measure of detection confidence.

Limitations

Clear vs. Obscured Sky: Performs best under clear-sky conditions. Undetected cloud or smoke contamination affects fire detection and characterization.

Satellite Viewing Angle: Fire detection performance decreases with increasing viewing angle/pixel size. Fire detection and characterization is limited to satellite viewing angles ≤ 80°.

Very Small Fires may be missed: A smoke plume may be visible before the fire grows hot enough to be detected.

Fire Detection Pixels: Detection pixels are only shown for a portion of the detected fire. Data range restrictions and saturated fire pixels (hottest fires) preclude the assignment of fire properties to these pixels: entire hot spots apparent in Band 7 may not appear in the fire/hot spot product.

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The mask value controls pixel color if Fire Mask is displayed on top!

Processed

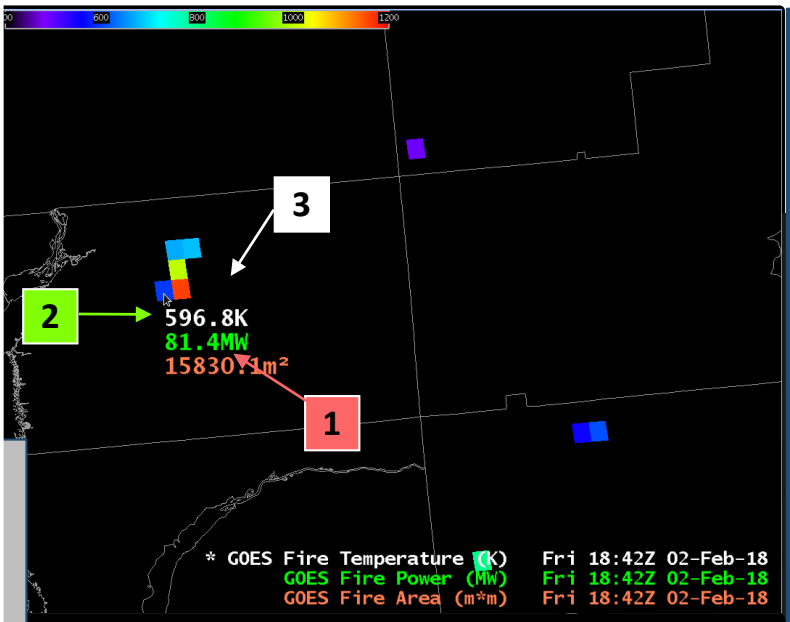
Saturated

Cloudy

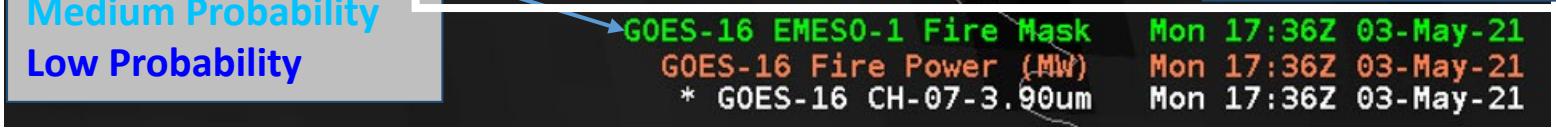
High Probability

Medium Probability

Low Probability



Fire/Hot Spot Characterization from GOES-16 ABI at 1842 UTC, 02 Feb 2018.



Definitions

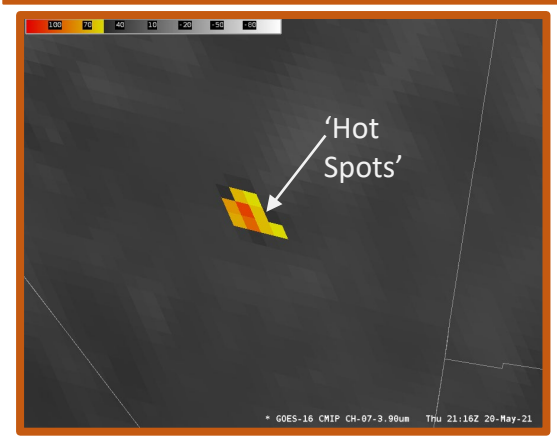
1 **Fire Area –** *the instantaneous areal extent per pixel of the fire (expressed in square meters)*

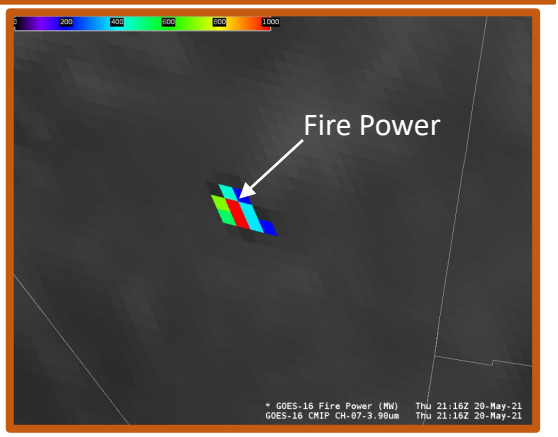
2 **Fire Power –** *the instantaneous maximum intensity per pixel of the fire (expressed in megawatts)*

3 **Fire Temperature –** *the instantaneous maximum temperature per pixel of the fire (expressed in Kelvin)*

Note: Information for each product is derived from sub-pixel data; therefore each displayed pixel may not be representative of true fire size/temperature/power, but trends will yield information.

Traditionally, the 3.9 µm channel (left panel; below) locates hot brightness temperature anomalies in satellite imagery, determining fire location. The Fire/Hot Spot Characterization product (right panel) builds on this information and supplements vital data regarding fire size, temperature and intensity per pixel.





Resources

ATBD Documentation

Fire/Hot Spot Characterization

Algorithm Information

CIMSS WFABBA

Hyperlinks will not work in AWIPS, but they will work in VLab