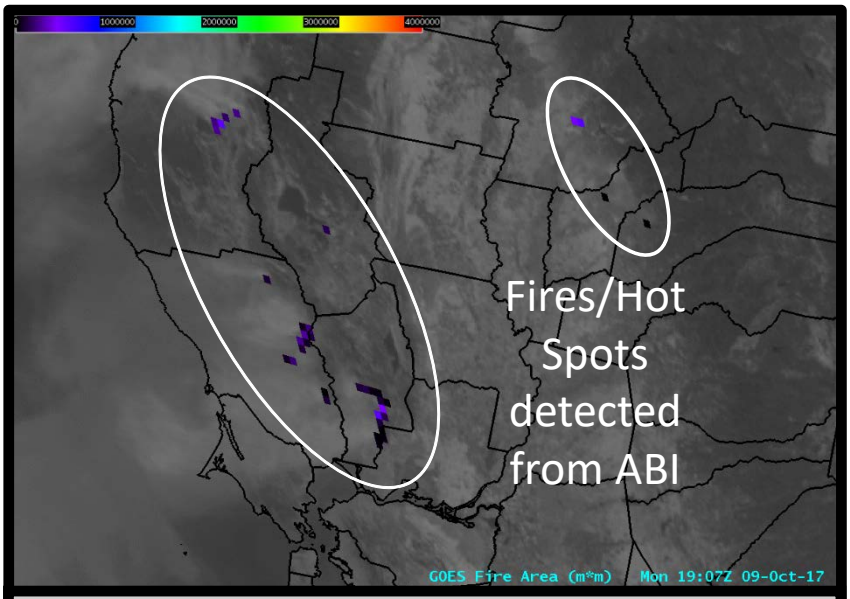
Fire/Hot Spot Characterization

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. These products are used by fire weather forecasters to better monitor wildfires and their rapid changes by leveraging the higher spatial and temporal resolution of the GOES-R ABI. The Fire/Hot Spot Characterization is produced by the CIMSS WFABBA algorithm, which utilizes sensitivities in the Band 7 (3.9 µm) and Band 14 (11.2 µm) channels to high-temperature anomalies allowing the detection of fires and their characteristics such as size, temperature, and intensity.



Fire Area from GOES-16 ABI at 1907 UTC, 09 October 2017

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 the location of fires/hot spots based on comparative differences between the sensitivity to high temperature anomalies of the 3.9 µm ABI channel to that of the 11.2 µm ABI channel. Since this product is based on IR channel information, the product is available day or night, with the nighttime availability enhancing fire intelligence given the lack of smoke plume recognition without visible imagery.

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.

Limitations

Clear vs. Obscured Sky: The surface-based product is of highest performance when created under clear sky conditions. Any unknown cloud or smoke contamination will impact fire detection and characterization estimates.

Satellite Viewing Angle: Fire detection and characterization performance is best at the sub-satellite point and decreases with increasing viewing angle/pixel size. As pixel size increases, the minimum detectable fire increases along with potential error. Fire detection and characterization is limited to satellite viewing angles ≤ 80°.

Fire Detection Pixels: Detection pixels are only shown for a portion of the detected fire. Data range restrictions and saturated fire pixels (hottest fires) prevent the assignment of fire properties to these pixels. Therefore, entire hot spots apparent in Band 7 may not appear in the fire/hot spot characterization. This will be rectified in a future AWIPS II product release.

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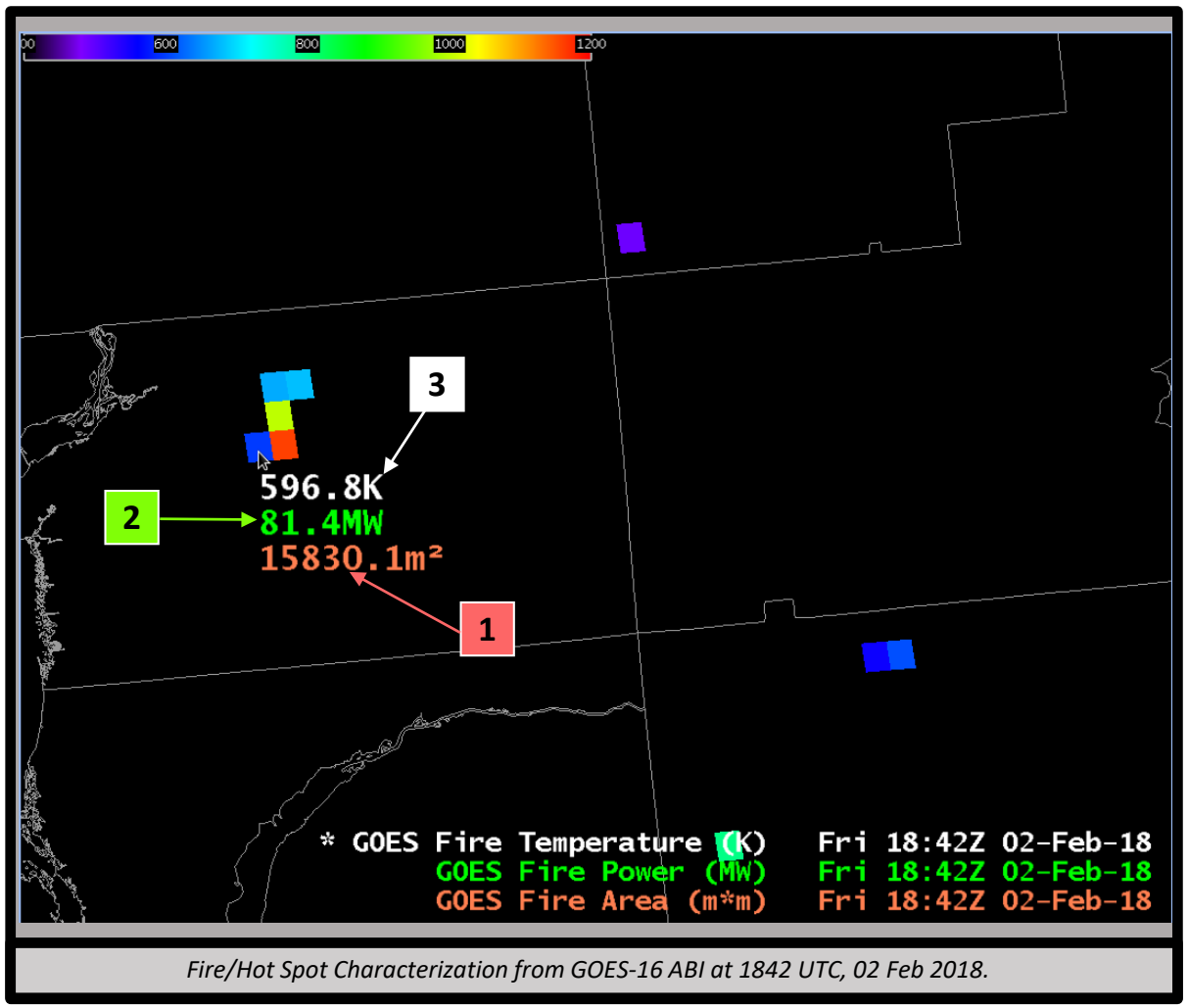
Interpretation

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

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

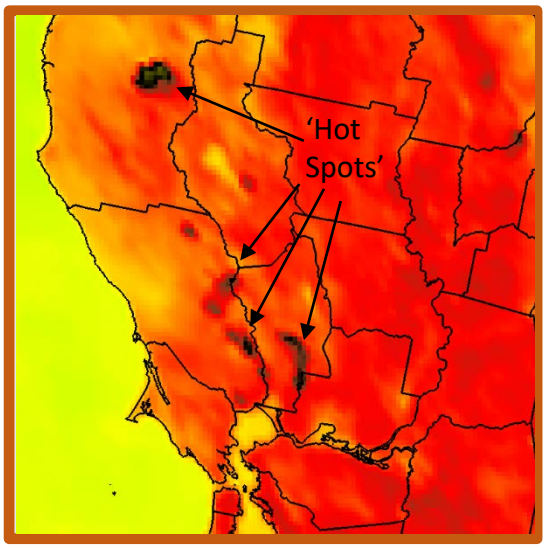
3 **Fire Temperature –** *Indicates the instantaneous maximum temperature per pixel of the fire (expressed in Kelvin)*

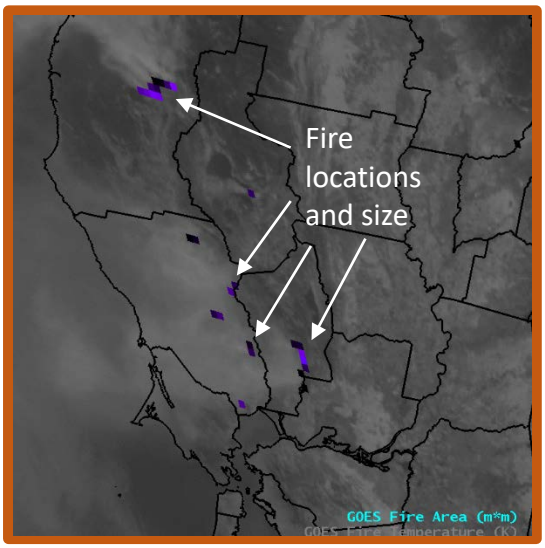
Note: Information for each product is derived from sub-pixel data; therefore each displayed pixel may not be representative of true fire size.



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

Traditionally, the 3.9 µm channel (left panel; below) has been used to locate high brightness temperature anomalies in satellite imagery to determine 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