



Part 2 Questions & Answers Session

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Brad Quayle (brad.quayle@usda.gov), Jenny Hewson (jennifer.h.hewson@nasa.gov), Dylan Mendes (dylan.m.mendes@nasa.gov) or Diane Davies (diane.k.davies@nasa.gov).

Question 1: What are the data we rely on for fire detection? Only thermal data or smoke? Or is there any other data that helps how to identify false positives we work on (like wind congestion or any accuracy metrics)?

Answer 1: See [the FIRMS FAQ on how fires are detected by satellite](#): the active fire algorithms use a contextual algorithm that exploits the strong emission of mid-infrared radiation from fires. It does not use smoke data – but the presence of heavy smoke, as well as clouds, may obscure fire detections. To identify potential false positives, we recommend use of the detection confidence associated with each detection. Some detections with very low confidence values may possibly be false positives. This confidence information is viewable by clicking on the fire detection of interest in the map viewer or by displaying the active fire detection data based on their confidence value (See the “Custom” button under the “Fire/Hotspots” layer group and set the dropdown to “Confidence”).

Question 2: How about aerosol layers? Is it possible to estimate spatial distribution? Have you ever used other satellites like TEMPO or PACE to integrate results?

Answer 2: FIRMS currently makes available Aerosol Index layers from OMPS aboard SNPP and NOAA-20 (see Part 1 of this series). The OMPS Aerosol Index (AI) is useful for both detection as well as tracking of aerosols, including those generated by fires (and associated smoke) as well as other sources, such as dust storms. NASA's LANCE ([Land, Atmosphere, NRT Capability for Earth observation](#)), within which FIRMS is situated, continually investigates additional data sources to make available and, in fact, recently made available multiple [NRT products from ESA's TROPOMI sensor](#) (including an AI product), as well as selected [NRT products from PACE](#) (including a regional aerosol optical properties product). Selected TEMPO NRT products will be made available through LANCE in the future (the data will be available from [this site](#)). The FIRMS team will assess whether some of these products may be suitable for FIRMS.

Question 3: What is the definition of data ingestion?



Answer 3: It depends on the context. For the purposes of FIRMS, it means acquiring and integrating data into the FIRMS application. FIRMS is part of NASA's Land, Atmosphere Near real-time Capability for Earth observation (LANCE). LANCE is a virtual system that leverages the existing science and data processing systems within NASA to make available near real-time data readily accessible through one [site](#). Each of the science and data processing systems that provision data through LANCE download (ingest), process, and make the data accessible through LANCE within three hours of satellite overpass.

Question 4: Another question, is it possible that FIRMS captures temperature anomalies caused by other sources rather than fire? I saw areas on the map that I know and suffer from urban heat island by high levels of impermeable surfaces, asphalt, buildings.

Answer 4: The active fire detection algorithms used for the MODIS and VIIRS active fire detection data are designed to detect thermal anomalies that have relatively high temperatures associated with fire/combustion. Consequently, the active fire algorithm approaches are not designed to not detect the sources of heat you mention above. However, these features can be relatively easily interpreted and discerned using land surface temperature products derived from [MODIS](#) and [VIIRS](#). [MODIS](#) and [VIIRS](#) near real-time LST products are available from NASA LANCE, linked respectively.

Question 5: I was wondering if the Static Thermal Anomaly masks we saw on the FIRMS website are made available somewhere as shapefiles. I would be interested to use them to improve the maps I use to distinguish vegetation fires from non-vegetation fires for my own fire detection algorithm.

Answer 5: The STA layer is not considered an official NASA product. Consequently, we do not distribute the STA layer. But the information tab gives you all the info on where we are getting the STA locations from.

Question 6: What sort of time intervals with respect to flyover location are you working with for this data?

Answer 6: There are various temporal frequencies depending on the satellite. In FIRMS Fire Map and NASA Worldview you can overlay the daily orbit tracks for polar-orbiting satellite platforms to see the orbit tracks each satellite will be following on the selected date and their respective overpass times for your area of interest. To access and display these track layers, in the ADVANCED mode of the FIRMS map viewer, see the "Orbit Track and Overpass Times" layer group and toggle on the desired satellite orbit track for the currently selected date. The overpass times are labeled in UTC.



Question 7: What happens with solar farms? Is it possible that they will show on maps like a false positive? What can we do to avoid these kinds of false positives?

Answer 7: Solar farms can be a potential cause of false positives. The fire detection algorithms for MODIS and VIIRS integrate the use of multispectral data (visible and near infrared bands) to aid in detecting fire activity. These additional bands are used to identify glint and reject potential false positives. Consequently, false positives resulting from sun glint are very limited with MODIS and VIIRS active fire detection data. However, active fire detection algorithms and products for geostationary satellite sensors are not as robust. Due to this and other various technical factors, the output active fire detection from these sensors is more affected by sun glint from solar farms, water, and other specular surfaces, etc.

Question 8: Would STA detect peat fire, in the context of below ground peat fire, and will STA be obscured by heavy smoke from vegetation fire?

Answer 8: No. Peat fires typically smolder under the surface and do not broadly exhibit flaming fire activity at the surface. Smoldering, subsurface fires are difficult to detect. Additionally, persistence of fire activity is also a consideration. Wildfires typically occur in a specific location over a relatively short period of time during the year, a couple days or less. Conversely, industrial heat sources are persistent and can likely be detected for longer periods of time, if not the entire year. Consequently, in addition to assessing the number of detections at a given location we also try to consider the persistence of the detected activity in an attempt to exclude wildfires from STA.

Question 9: Thank you for the session. I am from India and we have a yearly problem of farm fires that contribute to pollution. How can we distinguish general fires from stubble burning through VIIRS or other NASA products?

Answer 9: There has been a lot of coverage of the pollution in India in the news that uses FIRMS to help inform. Additional contextual information, such as the spatial extent of farm extents, could be used to further assess stubble burning; active fire detections from both VIIRS (aboard SNPP, NOAA-20, NOAA-21) and MODIS (aboard Aqua and Terra) are being observed in these areas.

Question 10: How does STA filter out thermal anomalies from industrial facilities? Are they using coverage binding through some .tif file, or with a nearest neighbor algorithm? Can you tell me a bit more about the feature it might involve for false positive detection?



Answer 10: Please see [this article for a summary on how STAs are derived](#). For this initial version of the STA layer, cumulative active fire detection data for calendar year 2023 from SNPP VIIRS and Terra and Aqua MODIS were processed, analyzed and summarized on a grid. These gridded results were assessed to identify areas of semi-persistent to persistent thermal activity. The cumulative active fire detection data, considering their respective spatial resolutions, were used to map the general extent of each STA feature. The resulting STA features have not been thoroughly reviewed in the context of high resolution imagery for validation, but the majority of STAs are industrial features, such as power plants, gas flares, etc. In addition to using high-resolution imagery to evaluate STAs, we recommend leveraging the Industrial Plants and Power Plants layers in FIRMS. These are inventories of particular types of industrial facilities not compiled or distributed by NASA.

Question 11: Is there a way to delineate surface versus atmospheric thermal energy? Up here in northern Canada I've seen large smoke columns that carry a lot of heat and appear to artificially inflate the size of the fire but once the smoke subsides these hits are no longer valid. It often appears in a repeating grid pattern of hits along the direction the smoke column is heading.

Answer 11: Part 1 of this series touched on this topic/issue. Super-heated smoke plumes can result in false positives in VIIRS active fire detection data. These particular conditions combined with relatively high view angles and nighttime conditions can result in clusters of false positives in these plume areas. It is a complex situation to overcome in the algorithm but efforts are being conducted to examine this situation further and address it. Please see this FIRMS FAQ [Are there ever false detections or data artifacts?](#) under the section *Caveats to Consider When Using Active Fire Data from FIRMS* for more information. Additionally, [this NASA Land Data Operational Products Evaluation note](#) thoroughly describes the situation as well.


Question 12: Last July, there was an aerosol anomaly in Cape Verde. I wondered if you knew something about what happened then? We saw in the lecture a similar thing happening, what can you tell about these oceanic releases of aerosols?

Answer 12: The Cape Verde Islands are home to the Cape Verde Atmospheric Laboratory (CVAO) used for studying atmospheric aerosols. This location is routinely used by NASA for campaigns to study aerosol characteristics and transport from the US, Europe, and Africa to the tropical Atlantic Ocean and their effects. In the context of your question, there are media reports about a significant aerosol anomaly that was persistent in the Cape Verde region throughout the month of July 2025. It appears the source of the aerosols were pulses of dust from Saharan Africa. Please see [this FIRMS](#)



[link](#) which displays the SNPP OMPS Aerosol Index and iterate through it daily for the month of July to view the presence and migration of the aerosols in this region.

Question 13: I understand that the Static Thermal Anomalies Mask corresponds to persistent thermal sources, such as industrial facilities or volcanic activity, and not necessarily to forest fires. What guarantees exist that this mask does not include actual wildfires, or is it not possible to be completely certain? Additionally, how can this mask be downloaded for independent analysis, considering that my research focuses on forest fires in Andean ecosystems and I need to exclude non-vegetation thermal sources?

Answer 13: The current STA layer is generated through the analysis of cumulative active fire detection data (SNPP VIIRS and Terra/Aqua MODIS) for the calendar year 2023. These data were analyzed to identify persistent sources of thermal activity that may be from industrial or natural sources. These data have not been validated, but we do provide multiple independent sources of industrial or natural heat source locations for reference and use with the STA data. The aim of the STA layer is to enable users to separate active fire detections from wildfires vs active fire detections from industrial or other natural heat sources. While the STA layer (not an official NASA dataset) is not available for download, details about the layer are documented under the information tag  in the FIRMS viewer. Layer and source information for the inventoried industrial and natural heat sources are also provided for each of these data products.

Question 14: What, if any, differences are there between lava flows and pyroclastic flows?

Answer 14: Relating to FIRMS, the thermal anomaly detections do not differentiate between lava and pyroclastic flows. Both of these features could potentially show up as an STA, if visible by the sensors aboard the satellites during satellite overpass. However, pyroclastic flows are typically rapid, short-lived events that cool relatively quickly. Consequently, those features may not be detected in the active fire detection products and/or would not be persistently detected over a longer period of time to be included as a STA feature.

Question 15: What's the temperature thresholds for the STA detection - thermal springs are excluded?

Answer 3: The STA layer is derived from the output data produced by the MODIS and VIIRS active fire detection algorithms. No customized algorithm with particular thresholds or other methods is being applied to identify STAs. The standard active fire



detection data outputs are processed and analyzed to derive the locations of STA features.

Question 16: Would the data we collect from what we learned be applied to how we advance in the future when we look at other planets and their volcanic activity?

Answer 4: Satellite detection of active fire/hot spots, and other relevant fire remote sensing procedures and products, can be applied to various research activities. In short, it is possible.

Question 17: Is it possible to access these contents in Spanish?

Answer 5: The ARSET team plans to make this training available in Spanish in January 2026. You can register at the following link:

<https://www.earthdata.nasa.gov/es/learn/trainings/observaciones-satelitales-y-herramientas-de-la-nasa-para-el-monitoreo-de-incendios>.

Question 18: Also coal seam fires? (In reference to Question 3)

Answer 6: Potentially, coal seam fires may be detected but likely not on a consistent basis. The ability to detect a coal seam fire would depend if the thermal activity is visible by the sensors aboard the satellites during satellite overpass. Many coal seam fires burn deep underground and thermal activity may not be strongly exhibited at the surface. In spot checking a few areas where coal seam fires were documented to be occurring, we did not observe any corresponding STA features.

Question 19: Given that FIRMS provides data on active fires, smoke, burned area, static thermal anomalies, and post-fire assessment tools, what is the recommended approach for integrating these datasets to continuously monitor an area of interest?

Answer 7: There are a range of capabilities available in FIRMS to help users monitor an area. For example:

- Users can monitor an area of interest by setting up an alert to receive an email when active fire detections for an area of interest are observed; an optional image is also available with the alert.
- Using the interactive map, users can assess burned areas using multiple products that were included in webinar one. These include:
 - The MODIS and VIIRS burned area products, these products provide the extent and month that the area burned.



- Several vegetation indices that are available from the harmonized landsat sentinel (HLS) dataset. These indices will provide a range of information including guidance on burn severity, post-fire vegetation recovery, etc.
- False color composite imagery products from MODIS, VIIRS, and HLS are also available to further inform on the extent and characteristics of an area that has burned.
- Historical fire data can also be downloaded from the [Archive Download](#) allowing you to view fire patterns over time.

Question 20: Additionally, are there methodologies or modeling techniques that would allow not only the characterization and visualization of these phenomena but also the prediction of fire occurrence, smoke dispersion, or post-fire vegetation recovery? (Continued from Question 7)

Answer 8: Fire prediction is an ongoing area of research. At FIRMS, we display active fire/hot spot detections from sensors aboard satellites. Additionally, there is a VIIRS modeled fire perimeter product (not global) that is available in the experimental tab. FIRMS does not include any fire prediction layers. However, vegetation indices combined with meteorological and field observations are frequently used by agencies to derive fire risk/danger products. These data products are routinely updated and used by wildfire managers to help assess the risk for potential fire occurrence and growth. In the context of smoke dispersion, active fire detection data are an important component of providing near real-time estimates of smoke emissions from wildfires. Several applications exist that use estimated or measured smoke information in the context of meteorological observation and forecast data to model the dispersion of smoke. For post-fire vegetation recovery, satellite remote sensing products included in FIRMS such as the HLS NDVI and NBR indices are well suited for assessing post-fire vegetation conditions. Additionally, these indices are provided at 30-meter resolution which provides a reasonable spatial resolution for assessment of conditions at a landscape scale and they are provided at a relatively frequent temporal interval.