FIRMS FAQ | NASA Earthdata

Part 3 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), or Diane Davies (diane.k.davies@nasa.gov).

Question 1: How do you obtain and how often do you update protected areas from Brazil and other countries?
Answer 1: FIRMS uses the World Database on Protected Areas (WDPA) curated by the UN Environment World Conservation Monitoring Centre (UNEP-WCMC – link). We aim to update the layer in FIRMS approximately once a year depending on requests from users letting us know that the layer on FIRMS is out of date. If the protected areas for Brazil are not up to date – we encourage you to contact the WCMC with required updates, and when the updates are made in the WDPA, let us know and we will update the layer in FIRMS.

Question 2: What is the difference between NRT and standard data? And How long before the NRT data changes to standard?
Answer 2: Please see the FAQ on the differences between NRT and standard quality data:
https://www.earthdata.nasa.gov/data/tools/firms/faq#heading-accordion-124369-3.

In brief the fire products are generated more rapidly than standard processing allows to meet the needs of the applications community. To facilitate this, a number of changes have been made to the standard processing approach – for active fire detection the same algorithm is used for both NRT and Standard data but there potentially could be a difference in the geolocation – this varies by sensor. For example a key difference between the MODIS/Aqua NRT and MODIS/Aqua Standard (science quality) Fire Products is the accuracy of the fire locations (positions or geolocation). Unlike MODIS/Terra, VIIRS/Suomi NPP, VIIRS/NOAA-20 and VIIRS/NOAA-21, the position of the Aqua satellite is not as well known when the NRT Fire Product is produced. Most of the time, the additional error introduced in the reported fire location of the MODIS and VIIRS NRT products is small (< 100 m), but in some situations this position error may be large (several kilometers). In particular, the larger errors may occur after spacecraft

maneuvers and during space weather events. The NRT Fire location accuracy is also degraded for MODIS/Terra, VIIRS/Suomi NPP, VIIRS/NOAA-20 and VIIRS/NOAA-21 after spacecraft maneuvers, but the time period is typically shorter than for MODIS/Aqua (< 2 hours for MODIS/Terra, VIIRS/Suomi NPP, and VIIRS/NOAA-20/21 vs. up to 12 hours for MODIS/Aqua).
When the Standard Fire products are later processed, the best available satellite position data is used and the quality assurance team removes data degraded by spacecraft maneuvers.

Question 3: How can we determine, with the greatest possible degree of certainty, the range of dates (earliest start date and latest end date) during which a fire was active, based on the temporal sequence of hot spot detections within a specific geographic area?
Answer 3: This can be done using the timeline/calendar or the “time since detection” option which can be found under the “advanced” tab. This was covered in part 2 of the training – in case you missed it. Please also see the blog that explains how to track daily fire progression using geostationary active fire data: https://wiki.earthdata.nasa.gov/pages/viewpage.action?pageId=391318378.

Question 4: Given that each hot spot detection represents a pixel with a specific spatial resolution, how can we interpret the potentially burned area associated with each of these pixels reported by MODIS and VIIRS?
Answer 4: It is not recommended to use active fire detection location data to estimate burned area as determining burned area to an acceptable degree of accuracy is not possible due to non trivial spatial and temporal sampling issues. For some applications, however, acceptable accuracy can be achieved, although the effective area burned per fire pixel is not simply a constant, but rather varies with respect to several different vegetation and fire-related variables. In the list of FIRMS publications, see Giglio et al. (2006) for more information. See our FAQ on this topic: https://www.earthdata.nasa.gov/data/tools/firms/faq#heading-accordion-124439-7

Most recently, Harmonized Landsat Sentinel (HLS) false color composite imagery was included in FIRMS and these data can be helpful in estimating burned area (see our FIRMS Blog post on adding HLS).

Question 5: Will there be a confidence matrix for all the hotspots that have been generated through the detection?

Answer 5: You can see the information on the fire confidence from our FAQ here: https://www.earthdata.nasa.gov/data/tools/firms/faq#heading-accordion-124369-15. When clicking on an active fire point, a table will pop up with metadata about the fire hotspot. Confidence is given in that table.

Question 6: Sir, my question is, how much data can a person get using the API and the timing of getting that data.

Answer 6: Due to heavy server resource demand when generating data, a MAP_KEY is needed in order to process your request. The MAP_KEY limit is 5,000 transactions per 10-minute interval. Larger transactions may count as multiple requests (ex. requesting 7 days). Contact us if you need a limit increase. We address this on a case by case basis.

Question 7: Another thing I want to add is that is there any way to access data mountain cover which is the snow cover.

Answer 7: The extent of detected snow cover for a selected date can be added in advanced mode – see: https://firms.modaps.eosdis.nasa.gov/map/#t:tsd;m:advanced;d:24hrs,24hrs;l:fires_landsat_landsat,fires_modis_aqua,fires_modis_terra,fires_viirs_noaa20,fires_viirs_noaa21,fires_viirs_snpp,country-outline,noaa20_snow,earth;@0.0,0.0,3.0z. Please note the completeness of these data can be affected by cloud cover on a given day. In the context of fire management, this dataset is added to FIRMS for use by fire managers to monitor annual recession of the snow line to inform when/where to start monitoring for the potential risk of wildland fire activity. Earthdata has this data available for download and use. Earthdata Forum is a good resource to see how other users are accessing that data.

Question 8: Will the Area API support JSON/paginated responses in the future?

Answer 8: We only provide CSV responses to our API at the moment. I have noted the request as something we will work on in the future. In the meantime, I suggest using a free online CSV to JSON conversion tool to get the information in JSON.

Question 9: I was wondering if it is possible to use the API for the archived data? I would, for example, like to pull all the fire data from the SNPP satellite from 2018 until 2025 for a given country. Can I do this with the API?

Answer 9: Yes, you can but I would recommend using the Archived Data approach and submitting a Download Request for the example you include above. This will be much faster, then using the API. The API is more suitable for programming and ongoing use of the data.

Question 10: Is the map key for active information time bound?
Answer 10: I am unsure what time bound means in this context, but this information hopefully is sufficient.
Due to heavy server resource demand when generating data, a MAP_KEY is needed in order to process your request. The MAP_KEY limit is 5,000 transactions/10-minute interval. Larger transactions may count as multiple requests (ex. requesting 7 days). Contact us if you need a limit increase; we address this on a case by case basis. Active fire download can be used without a map key.

Question 11: Is there a way to extract near real-time fire occurrences or filter imagery to build a near real-time fire alerting system using this product for active fire monitoring in Africa?
Answer 11: This can be done. As an easy lift, you could subscribe to the FIRMS fire alerts to be notified of fires detected in your area of interest (FIRMS Fire Alerts). You could also set up a window to view imagery using Worldview Snapshots: https://firms.modaps.eosdis.nasa.gov/satellite-imagery/.

Question 12: If for example, I wanted to intersect the FIRMS data with a settlement layer like the Global Human Settlement Layer, to get fires near buildings, would it be correct to use a 375m radius around each fire point, as a sort of uncertainty measure?
Answer 12: For VIIRS potentially a 375m radius would give an approximation of the area that contains one or more active fire/thermal anomaly. If a fire is detected within that radius, that pixel will appear red. For MODIS, you would want to use 1km. However, the actual pixel size varies with the scan and track (see: What does scan and track mean?).

If you prefer to try to account for additional potential uncertainty, you could apply a radius representing the radius based on the diagonal distance to the corner of an active fire detection pixel or cell. For example, that radius for a VIIRS 375m pixel would be determined by multiplying that spatial resolution by 1.414 to calculate total length of the diagonal distance of that cell, then multiply that output by 0.5 to get the radius,

which equals 265m (375 * 1.414 * 0.5 = 265.125). If you wanted to consider the geolocational accuracy for VIIRS in this uncertainty measure, it is within 75 meters. This number could be added to 265m for a radius of 340m. For MODIS, the approach would be the same except it would be for its spatial resolution of 1,000m and its positional accuracy of 50 meters at nadir (1,000 * 1.414 * 0.5 + 50 = 757m).

Question 13: What factors is the choice between WFS and WMS based on?
Answer 13: WMS puts an image of the active fire detections overlaid on a map of the area of interest. WFS has more information on the exact spatial features that can be queried, and then overlays this information on a map for the area of interest. See more information here: FIRMS WMS/WFS Informational Page.

Question 14: What's the starting temperature in Kelvin of a flame? Is there a threshold of Kelvin (or a range of it) that can help define if it is an active flame, a thermal anomaly or a hot area (for example just burned)?
Answer 14: The fire detection is performed using a contextual algorithm that exploits the strong emission of mid-infrared radiation from fires. The NASA MODIS and VIIRS algorithm examines each pixel of the swath, and ultimately assigns to each pixel one of the following classes: missing data, cloud, water, non-fire, fire, or unknown. As outlined in the first training, specific reflective and emissive bands located on the satellite sensor are used to detect fires. They leverage response from fires in Mid-Wave InfraRed (MWIR) and Long-Wave InfraRed (LWIR) bands with other bands used for masking, rejection of false positives, etc. It is important to remember that satellites detect fires only at the time of overpass. With regards to temperatures, typical temperatures are:
– Earth's Surface: ~300K (80 degrees fahrenheit is the average temperature on the surface of the Earth for reference)
– Smoldering Fires: 600K to 800K
– Flaming Fires: ~1000K and Higher
Just based on the satellite derived detection alone, it is not possible to distinguish between types of fires. For more information on satellite measured brightness temperatures, please see the FIRMS FAQ *What is the brightness temperature*

Question 15: As a matter of interest, how does the FIRMS historical BA data compare to that available from Copernicus CDS "Fire burned area from 2001 to present derived from satellite observations"?

Answer 15: The NASA burned area product (MCD64) is a 500m product that uses bands sensitive to detecting areas affected by burning. It is a consistent product using combined surface reflectance observations and active fire detections from both Terra and Aqua MODIS. See the MCD64 users guide for more information (https://lpdaac.usgs.gov/documents/875/MCD64_User_Guide_V6.pdf).

The CDS products are made from more than one sensor at different times throughout its data record (e.g. from MODIS up to 2019 and then OLCI from that point), and there are different versions available for different time periods. Many of the CDS evaluations show their product to be more accurate than the NASA MCD64 500m product, however there are other papers that show the CDS product does not perform as well as the NASA MCD64 500m product.

The NASA product is a continual product and therefore consistent over time.

Question 16: Is there an animation (movie-like) tool in FIRMS? For example, to "play" an animation of the detection over a day in a subdaily view?
Answer 16: This is in development… Watch this space! It could be rolled out by June 2025.

Question 17: (In reference to question #10) Just wondered if the key timed out after or the same key can be used for multiple days. Or just a one time request scenario.
Answer 17: The key is good indefinitely. Save your key. You can also contact us if you lose it and we can give it to you again.

Question 18: Will there ever be a current year archive (i.e., active fire/hotspot information of each satellite since Jan 1, not only the last 7 days) download option for SHP, KML, CSV without having to do the email submission?
Answer 18: We like to keep track of who is accessing our historical data which is why we do the email submission. Also this helps us not to serve too many unuseful files to the public as not to confuse anyone.
We currently provide yearly data after the year is complete +/- three months. There can be a 3 month delay in the standard data for quality control. However this data is only available in CSV format at the moment.

Question 19: How does NASA show pm data on air quality?

Answer 19: While FIRMS does not include a specific PM 2.5 layer, a SMOKE and AEROSOLS mode is included in FIRMS. This mode includes an Aerosol Index (AI) layer generated from the OMPS sensor onboard SNPP. Aerosol Index (AI) layers from NOAA-20 and -21 will soon be included.
If interested in historical satellite-based PM2.5, you can find information and data here: https://sites.wustl.edu/acag/datasets/surface-pm2-5/

Question 20: Regarding the use of FIRMS data in GIS platforms.
When accessing FIRMS data in QGIS or ArcGIS, which is more efficient in terms of data freshness and bandwidth—WMS or WFS—and how does this affect practical analysis?
Answer 20: Since it is simply a georeferenced image representing the data, you can't do any analysis with WMS. So it would be the most lightweight option to use for visualization of the data. WFS has more data included, such as the geometry and attributes of the vector data and, consequently, supports interaction with and analysis of the data features. More information on WMS and WFS is available here: https://firms.modaps.eosdis.nasa.gov/tutorials/wms-wfs-info/.

Question 21: What are the new features that you are working on?
Answer 21: We recently included a layer to help users separate different types of fires (wildfire, industrial sources, etc.).
An animation feature will be included in the future to visualize fire detection progression and changes in imagery and other data over time.
Aerosol Indices (AI) layers from the OMPS sensor aboard NOAA 20 and 21 will be added to FIRMS. These products have a higher spatial resolution than the AI layer from the OMPS sensor aboard SNPP.
Active fire data outside of MODIS could include Sentinel-3. There is a FIRMS blog where we highlight new capabilities. Blog URL: https://wiki.earthdata.nasa.gov/pages/viewrecentblogposts.action?key=FIRMS.

Question 22: What software improvements could be crafted to help crews on the ground coordinate better?
Answer 22: Collaboration is possible and we are open to discussing new features. We would like to hear from the community on what would be most useful in your workflows on the ground would be valuable. The best way to get in touch with the FIRMS team would be to contact us via the feedback module on the FIRMS website. Please note

that given the spatial resolution of satellite active fire data, factors that can affect its positional accuracy and other considerations, these data are not recommended for use at a tactical level.

Question 23: Is the aerosol feature available globally or USA/Canada, please?
Answer 23: The OMPS aerosol index layer from SNPP is global and available in the advanced tab and the smoke & aerosol tabs. The OMPS aerosol index layers from NOAA 20 and 21 will shortly be available in these tabs too. The spatial resolution of the OMPS aerosol index layers from NOAA-20 and 21 have a higher spatial resolution.

Question 24: How about the homework? Could you explain, please?
Answer 24: It is a Google Form found in Part 3 on the training webpage. It will be due by May 14.