



TECHNICAL SPECIFICATION

Specialized software for wildfire detection and monitoring

This public call aims to acquire software for effective management and monitoring of potential forest fire hot spots for large tracts of land.

The proposed software must have specific features to meet the demands of potential fire risk, detection, instant notification/alerts, current meteorological information as well as history & forecast, monitoring and simulation of fire spread, basic incident management and analysis of burnt areas with a fire scar and severity map, incorporating advanced mapping and data processing technologies from satellites.

The solution must not only receive data from public satellite sources but must also fill in gaps with a proprietary constellation of thermal imaging satellites designed, built and launched specifically for forest fire detection, monitoring, and analysis.

1. Data Source and satellites in different orbits

The software must integrate a mapping system that aggregates multispectral data, hotspots and auxiliary information from various satellites in near real-time. This approach should enable the identification of areas with high levels of infrared radiation, indicative of the location of possible fire outbreaks.

The software must be compatible with satellites in Low Earth Orbit (LEO) and Geostationary Orbit (GEO). For LEO satellites, the minimum processing required must be 18 LEO satellites and 8 GEO satellites.

The software must have access to the following features:

1.1. It must have at least 2 non-public thermal infrared imaging satellites:

- Must have MWIR resolution of at least 200 m
- Must have at least 2 LWIR and RGB support bands to monitor surface temperature for forest fire fuels, identification and intensity of smoke plumes.
- Must have a swath width of at least 400 km
- It must be able to detect fire sizes of at least 4m x 4m.
- It must allow images to be viewed on demand as an option.











1.2. Must have at least 20 public satellites available that provide data on forest fire outbreaks:

- From at least 8 geostationary satellites, with accurate fire detection should start from at least 30x30m, with 24/7 monitoring and average spatial resolution of at least 2 km/px.
- From at least 18 low earth orbit satellites, with accurate fire detection from at least 10x10m, with average data processing in a maximum of 1.5 hours.

2. Essential software features

2.1. Active fire (hotspot and cluster)

The software must monitor current fire events, presenting an overview and grouping of the detected hotspots (cluster), their characteristics and relevant information, within this monitoring, the software must have the following characteristics: time and place of first and last detection, geographical coordinates of the occurrence, confidence level, current weather information with history and forecast, radioactive power of the fire and classification of affected area.

It must process hotspot data, provide weather details, satellite images and personalized incident management.

The software must have highly effective technological resources, such as machine learning (ML) and artificial intelligence (AI) algorithms. With these resources, the software must estimate the probability of a group of hotspots (clusters) being a forest fire incident.

Hotspots must be able to be extracted continuously from multispectral satellite images. Hotspot data providing information on active and historical fires should be automatically correlated in spatio-temporal terms, including fire progression (intensity, rate of spread), burned area and origin analysis.

All hotspot-related data should also be retrievable programmatically via an application programming interface (API), so that it can be integrated into individual customer systems or manually analyzed in a GIS-type system.

2.2. Monitoring capabilities

The service can persistently monitor a large geographical area, such as an entire state, every day, with at least 18 satellite passes per 24-hour period. Users must be able to define the











areas they wish to monitor (area of interest, "AOI") via the interface. The area must be specified as a polygon that can be drawn on the main map, inserted as a Well-Known Text ("WKT"), or be self-imported and updated by users within the platform. Users belonging to the same organization must be able to share and use the same monitoring areas.

The software must allow at least 5 customizable automatic fire detection notification delivery methods: Push (browser), Email, SMS, WhatsApp, Webhook.

It must include an Activity Feed automatically updated with recent detections.

2.3. Layers

The software must offer at least 4 types of base maps, including topographical layers and details of vegetation, terrain, administrative and political divisions.

It should distinguish hotspots based on burnt area, future burning potential and active fire time.

It should be updated with sediment climate layers every at least 3 hours.

It should allow visualization of power infrastructure and the movement of fire department fleets and aerial vehicles in real-time.

It must offer filtering options to customize the view according to the user's needs.

2.4. Filters

The software must allow for the possibility of different types of filters, including timeline, to analyze historical data, event types and causes, as well as satellite sources for better classification.

2.5. Burned area and severity map

The automatic detection and mapping of burnt areas must delineate and estimate the total burnt areas and their severity with very high accuracy of between 20 and 30 m/px.

The following information must be provided for each burned area:

- Severity
- Location
- Estimated total burned area
- Satellite images from before and after the fire











• Direct link to the associated cluster

2.6. Analytical dashboard

The software must contain a dashboard to provide valuable information on the events that occur in one or several monitored areas.

The dashboard should include interactive graphs that can show a total estimate of the areas affected, the number of events in each period, the peak of the season, the most common type of incident, the event duration and size distribution, the events per month and the events per area.

2.7. Fire spread simulation

The fire spread simulation model must take advantage of near real-time fire data, together with essential fire factors, to predict the spread of an active fire for up to 12 hours. To predict fire spread, variables such as wind, terrain slopes, land classes and initial fire fronts must be considered.

There should be a colored scale to help visualize the progression of the fire at least every hour. By moving the scale slide left and right, the user should be able to choose how many hours of forecast should be displayed on the map.

3. Additional functionalities:

- Must have the ability to export data to reports.
- It must have a split screen to monitor two hotspot activities simultaneously.
- Must allow visualization in 3D mode for regions with irregular topography.
- Must have measurement tools to determine area size and distances.
- Feature extensions should include the integration of existing cameras, aircraft, fire brigade tracking and customized information.
- In addition to viewing data via the software interface, there must be programmatic access via two application program interfaces ("API"): a push and a pull mechanism.

4. Service and support package:

The manufacturing company must offer customer support via a portal for feedback and questions. Updates and announcements of improvements should be communicated via the portal and electronic messages.











The manufacturing company should offer various workshops to introduce the platform to its users, as well as priority support and a dedicated customer success manager to ensure the best implementation.

The manufacturer should offer support to help with system integration (API developer on staff).

The manufacturer must have training available at the customer's site (at least once a year). The manufacturing company must have ongoing support for customer success, including a response time of no more than 1 working day for any problem during the fire season defined by the customer.

The manufacturer must have a workshop/question and answer session before the start, during and after the forest fire season to answer questions.

The manufacturing company must have system configuration and support in place before delivery to ensure that the solution is ready for operation on the first day of service.

The delivery of the solution must allow for the physical or online presence of a team. No additional infrastructure should be required to use the software, just a device to connect to the Internet, including a computer, tablet or cell phone.

Note: The bidder must submit a letter of solidarity from the software manufacturer guaranteeing the supply, technical assistance and warranty of the service offered.





