



# Earth Fire Alliance

WSTC Webinar

June 2025



# Agenda

## **Who We Are**

Defining Earth Fire Alliance, our Purpose, Vision, Mission and our approach.

## **What is FireSat – Our Flagship Program**

Fire-focused and user-driven technology to deliver on our mission

## **Where We've Been & Where We're Going**

From concept to execution, we are moving fast and with purpose.

## **How Radical Collaboration Will Get Us There**

Earth Fire Alliance is a collaborative vehicle purpose built to bring FireSat data to a global fire community as fast as possible.



# Agenda

## Who We Are

Defining Earth Fire Alliance, our Purpose, Vision, Mission and our approach.

## What is FireSat – Our Flagship Program

Fire-focused and user-driven technology to deliver on our mission

## Where We've Been & Where We're Going

From concept to execution, we are moving fast and with purpose.

## How Radical Collaboration Will Get Us There

Earth Fire Alliance is a collaborative vehicle purpose built to bring FireSat data to a global fire community as fast as possible.



# Earth Fire Alliance

## PURPOSE

*Earth Fire Alliance is founded on the belief that high-fidelity data, equitably accessible on a global scale, will transform humanity's collective approach and relationship to fire.*



## MISSION

**Observe** all of our planet's wildfires comprehensively.

**Serve** communities world-wide with timely and trustworthy information.

**Conserve** Earth's ecosystems and biodiversity by informing resilience strategies.



## VISION

*Earth Fire Alliance believes a united global response to the wildfire crisis is possible, and that a data-driven response will expand our focus and funding from reactive suppression to proactive stewardship that includes adaptation and beneficial fire practices.*





# Earth Fire Alliance : Operating Principles



## Fast Action

The mandate for speed is clear—this means not only that data is fresh when the tap turns on—but that we act to turn on that tap as quickly as possible.



## Transformative Fire Data

Fire characterization data from every stage of a fire lifecycle, reducing disaster fires by informing decisions in real time and enabling beneficial fire management models.



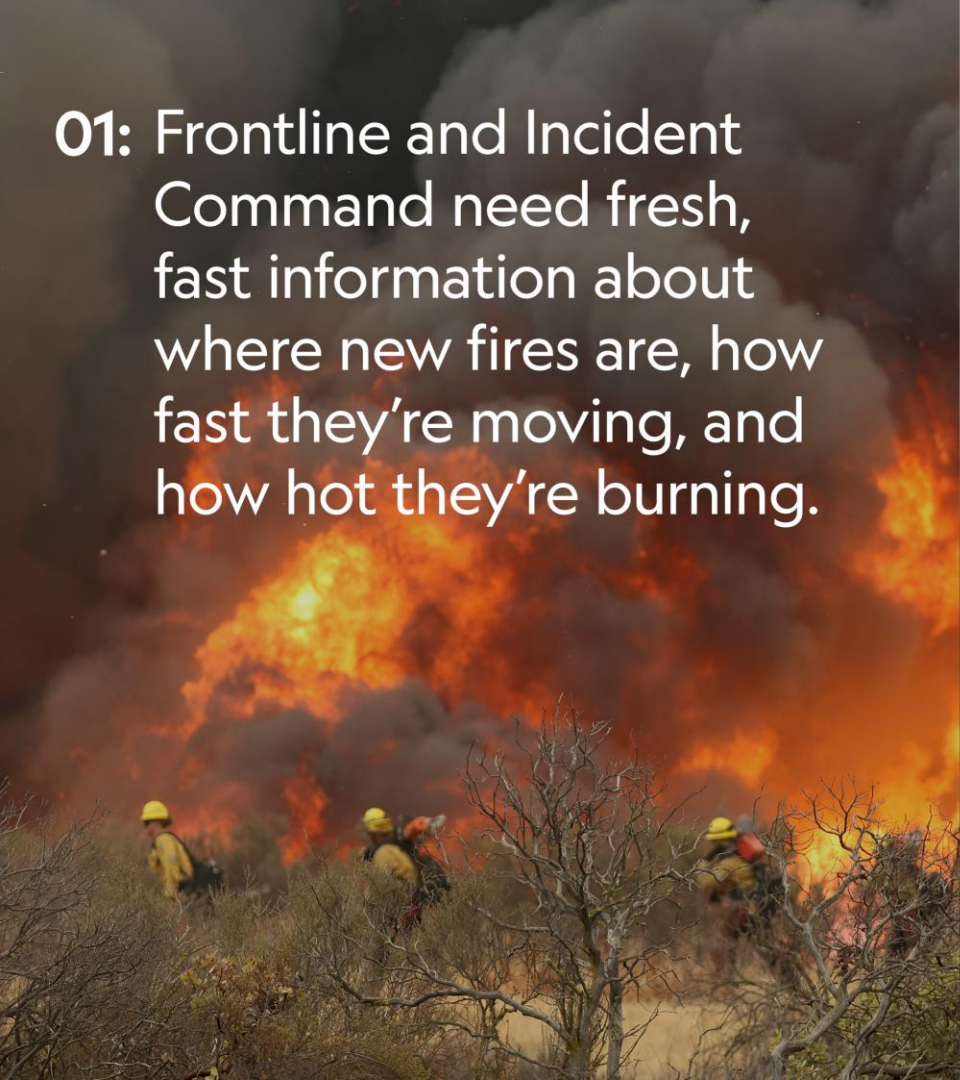
## User-Driven Technology

Designed to collect the data that is being asked for, delivered seamlessly into existing tools & systems.

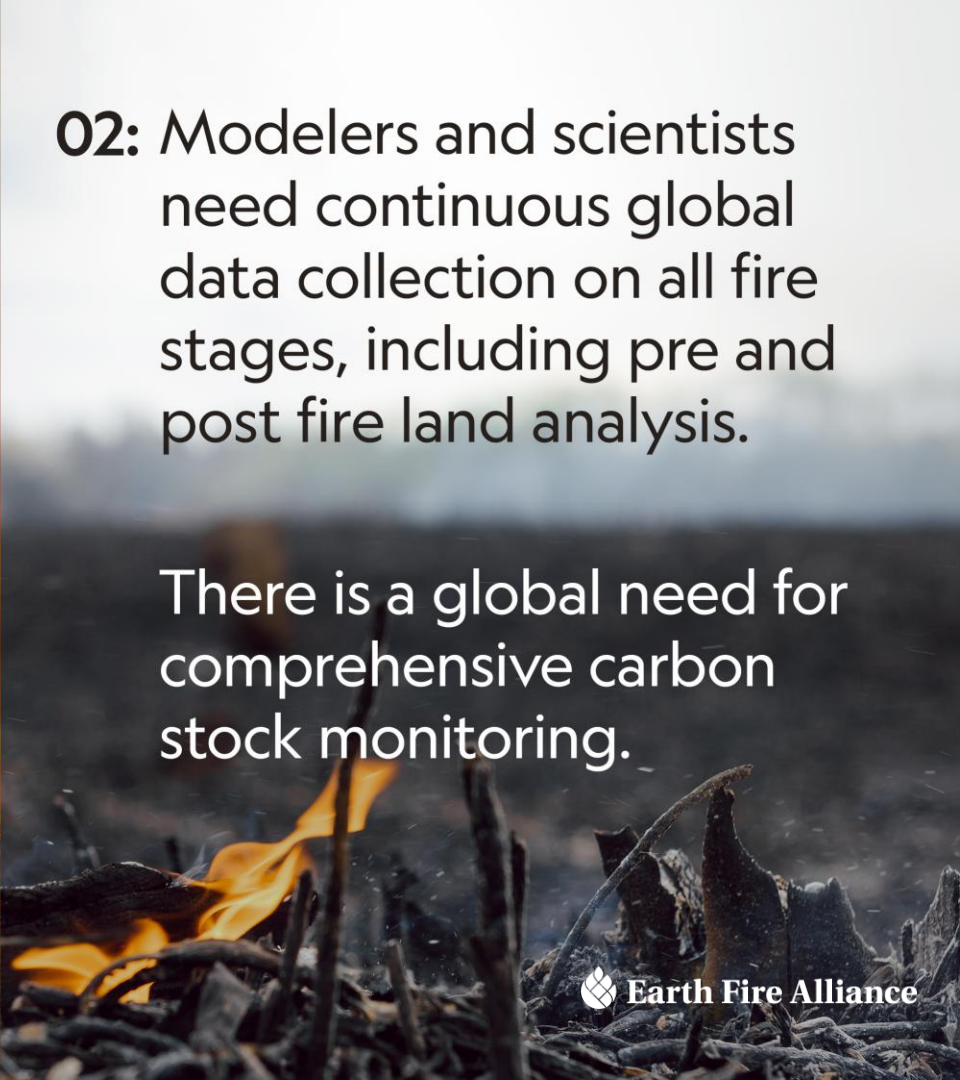


## Radical Collaboration

We believe in aligning collective efforts, technology, and resources—within and across sectors—for a common global good.

A large wildfire with thick black smoke and bright orange flames. In the foreground, several firefighters in yellow gear and helmets are visible, working to contain the fire. The background is filled with dense smoke and fire.

**01:** Frontline and Incident Command need fresh, fast information about where new fires are, how fast they're moving, and how hot they're burning.

A close-up shot of a fire burning on a pile of charred wood and debris. The flames are bright orange and yellow, and the background is dark and smoky.

**02:** Modelers and scientists need continuous global data collection on all fire stages, including pre and post fire land analysis.

There is a global need for comprehensive carbon stock monitoring.



# Equity is Transformative

Earth Fire Alliance, from its inception, is dedicated to *giving* the fire response community what they're asking for.

We remain committed to making our fire data products *equitably accessible and free of cost* to the agencies around the world that protect their communities.



# The Power of Timely & Consistent Wildfire Data

Data from before, during, and after wildfires can reduce destruction, track and record their path, and understand the near- and long-term impact on communities and ecosystems.



## Protect Communities

Provide early warning to protect communities and property.



## Protect Ecosystems

Monitor wildfire progression to protect at-risk ecosystems.



## Measure Climate Impact

Quantify the impact of wildfires on carbon emissions, globally.



## Understand Mitigation Impacts

Measure the impacts of land management and resilience practices.



# Agenda

## Who We Are

Defining Earth Fire Alliance, our Purpose, Vision, Mission and our approach.

## What is FireSat – Our Flagship Program

Fire-focused and user-driven technology to deliver on our mission

## Where We've Been & Where We're Going

From concept to execution, we are moving fast and with purpose.

## How Radical Collaboration Will Get Us There

Earth Fire Alliance is a collaborative vehicle purpose built to bring FireSat data to a global fire community as fast as possible.



## Earth Fire Alliance

### **A Global Community-Led Nonprofit**

Committed to delivering transformative real-time data from all wildfires on Earth, changing our collective approach and relationship to fire.



## FireSat

### **The Alliance's Flagship Program**

A space-based fire detection and characterization system designed specifically for wildfires, providing timely and trustworthy wildfire activity data directly to agencies around the world who protect their communities.



# What is FireSat?

- FireSat is a satellite constellation focused specifically on wildfire, wildfire conditions, and wildfire's ecological effects.
- The FireSat system is designed to provide a consistent, accurate, and comprehensive view of fire activity globally.
- The FireSat program is deploying a constellation spacecraft in low-Earth Orbit (LEO), each with our wildfire-first multispectral imager, to provide unprecedented spatial and temporal coverage, providing unmatched data with unmatched quality, revisit, and latency.



**Earth Fire Alliance**



**MuonSpace**



# FireSat System Overview

## 80 Meter Average Resolution

More pixels means more data and clearer images.

## 5 Meter Hotspot Detection

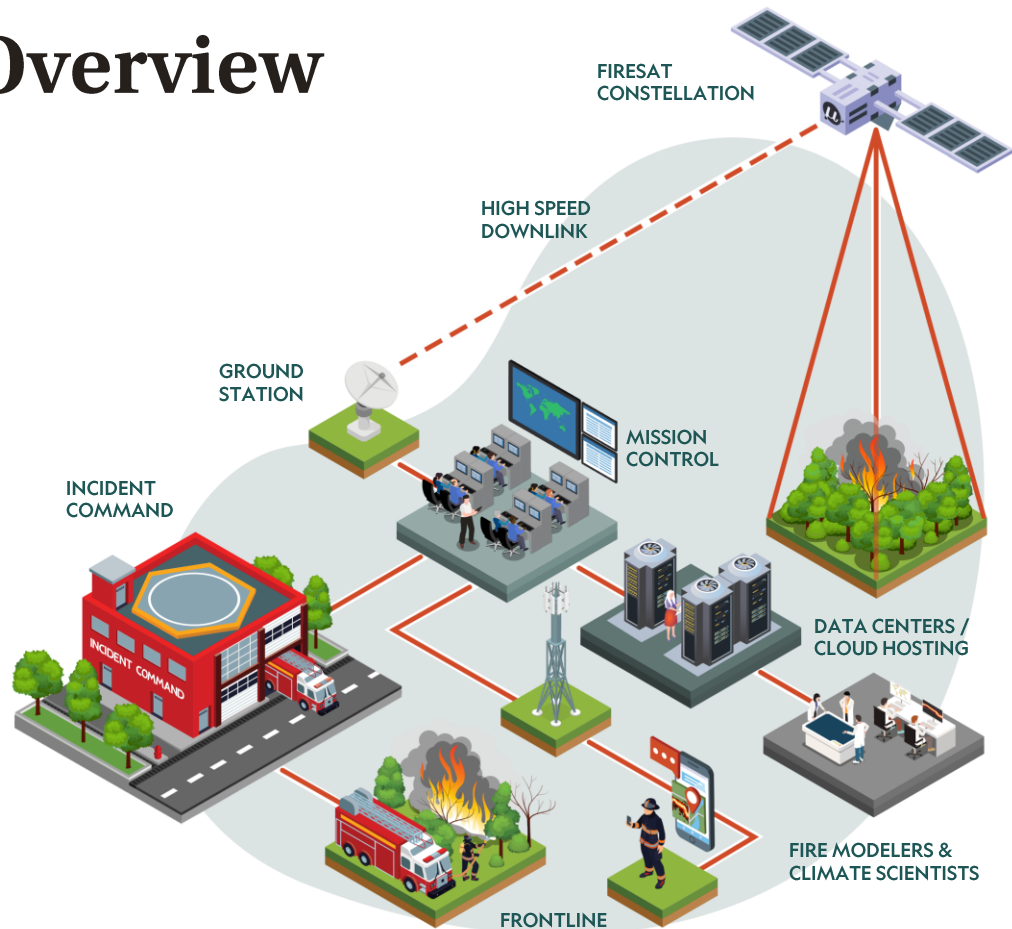
Subpixel detection helps identify new fire starts sooner.

## <5% False Positives

Measuring in six wavelengths to observe fire in all conditions.

## Rapid Refresh

12-hour revisit in 2026 with 3 satellites scales to 20-minute global revisit with 50+ satellites in full constellation.



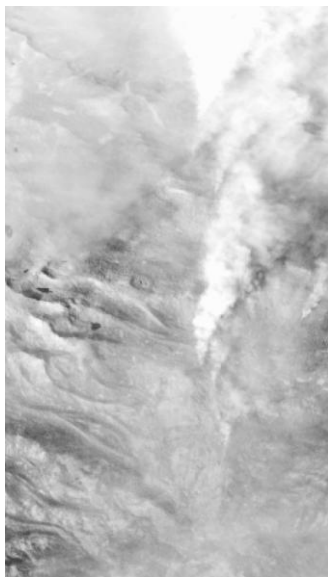


# Simultaneous Insights from Multiple Views

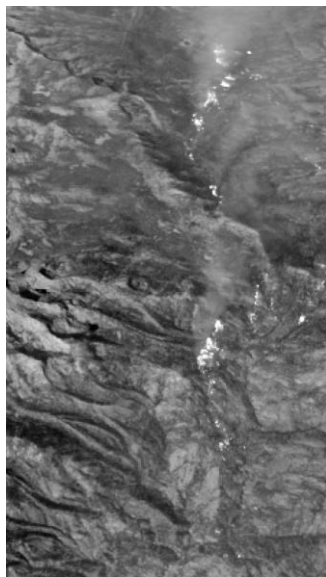
Multispectral imaging across 5 bands optimized to monitor fire intensity and early detection.



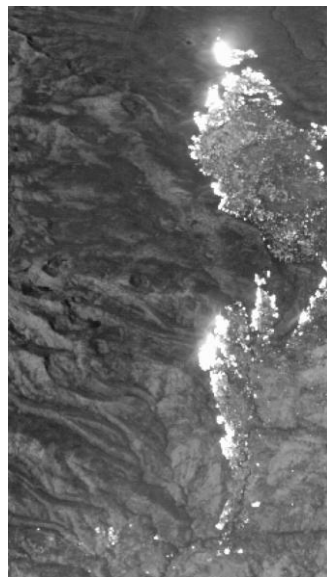
Visible



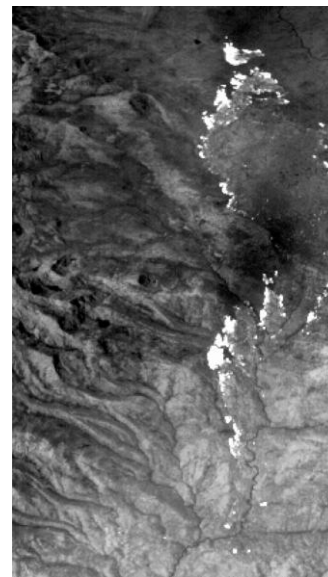
Near Infrared  
(NIR)



Shortwave Infrared  
(SWIR)



Midwave Infrared  
(MWIR)

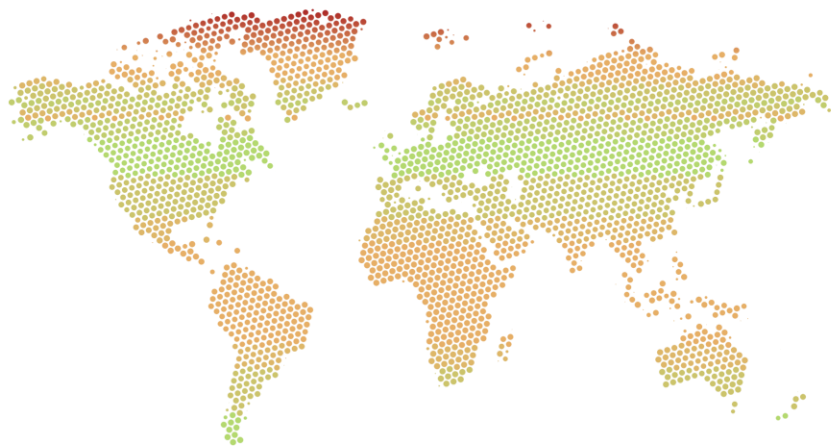


Longwave Infrared  
(LWIR)



## Rapid Revisit

Full constellation achieves mean global revisit rate of 20 minutes, visiting key geographies as often as 9-12 minutes.



0 10 20 30

Global revisit rate (average time between FireSat observations) in minutes

## Low Latency

Near real-time data downlink almost everywhere on Earth using existing ground stations around the globe.

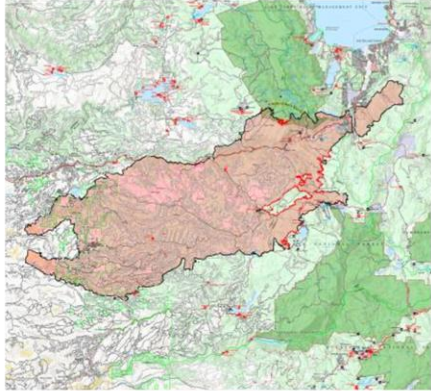


0 10 20 30 40 50 60

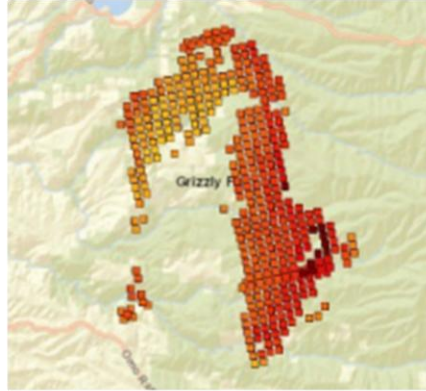
Latency (time from observation to downlink) in minutes



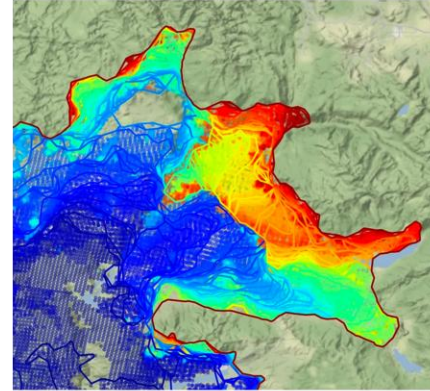
# FireSat data products are designed for interoperability empowering effective decisions in existing support systems.



Fire Perimeter



Fire Radiative Power



Fire Progression



Hotspots

Efficient resource allocation from a real time updating common operating picture

New measures of climate and ecosystem impacts from fire radiative power (heat intensity)

Improved safety for the frontline and public with persistent situational awareness of wildfire

Early detection and assessment of new or growing wildfires during initial attack



# Space Based Fire Data Landscape

## Space Based Fire Monitoring Capabilities

 **FireSat**



GOES-16



MODIS  
Terra/Aqua

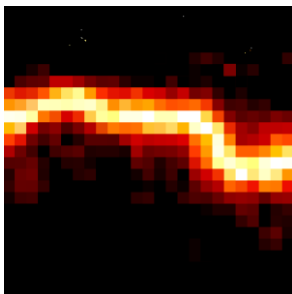


VIIRS  
Suomi NPP

## Spatial Resolution

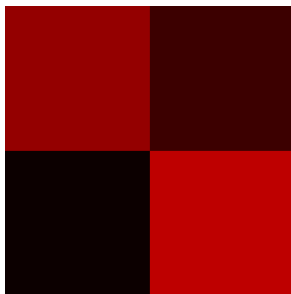
Simulated data product images for an area of 4 square kilometers

*Spatial Resolution is the pixel size of images captured from space.*



**80 Meter**

5 Meter Hotspot Detection



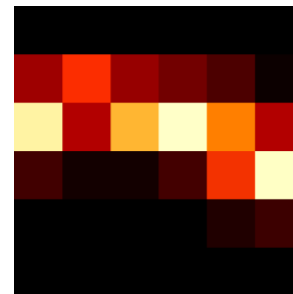
**1000 Meter**

No Subpixel Hotspot Detection



**500 Meter**

No Subpixel Hotspot Detection



**375 Meter**

No Subpixel Hotspot Detection

## Global Revisit

Time between images

2026 - IOC

**12 Hr**

2029 - FOC

**20 min**

\*North America Only

**5 min**

Sunsetting 2025

**24-48 Hour**

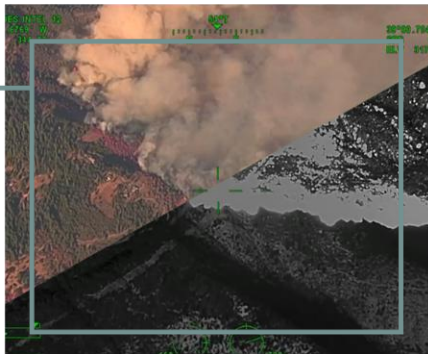
**12 Hour**



# Part of the Remote Sensing Ecosystem

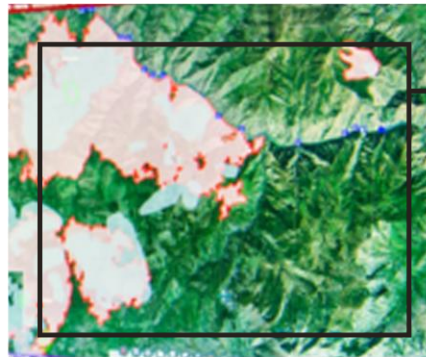
## Aircraft Observations

Rapid intelligence and surveillance in visible and infrared during initial attack of major fire activity. Modeling of fire spread.



## FireGuard

Detection and monitoring of wildfire activity from national assets. Heat mapping, persistent data products of fire location, shape, and directionality.



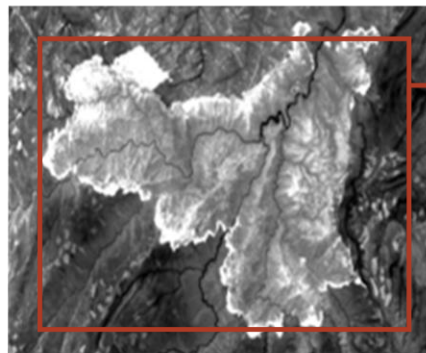
## Ground Cameras

Live camera footage monitoring landscape for early detection of wildfire activity and situational awareness in remote areas.



## FireSat

Satellites provide low-latency global coverage of fire detections and intensity maps across multiple spectral wavelengths.



*Image Courtesy of AlertWildfire*



# Agenda

## Who We Are

Defining Earth Fire Alliance, our Purpose, Vision, Mission and our approach.

## What is FireSat – Our Flagship Program

Fire-focused and user-driven technology to deliver on our mission

## Where We've Been & Where We're Going

From concept to execution, we are moving fast and with purpose.

## How Radical Collaboration Will Get Us There

Earth Fire Alliance is a collaborative vehicle purpose built to bring FireSat data to a global fire community as fast as possible.

## Pre-2025: Laying the Foundation for Success

**Feasibility & Formulation:** Multiple organizations conducting independent efforts convene under a philanthropically funded effort to develop initial requirements for FireSat informed by end user needs

**Design & Validation:** Initial technical design for the FireSat instrument and mission concept completed by Muon Space and a third-party Independent Technical Assessment validates the technical design

**Establish Earth Fire Alliance:** The Alliance is founded to provide high-fidelity accessible data from all wildfires on Earth, with FireSat as its flagship program.



2025



2026



2028



2030

## 2025: First FireSat Test Data Available

**FireSat0 Launch:** Launch of on March 14, 2025 from Vandenberg Space Force Base. First FireSat representative data expected this summer.

**Establish Early Adopter Program:** Global program working with fire agencies and scientists around the globe to accelerate adoption and use of the FireSat data in key wildfire geographies. Leverage test data from FireSat0 to ensure system readiness.

**Representative Packet Data Products:** Expecting to use FireSat0 data packets, not real time, for use with Early Adopters to test and collect feedback to ready operational systems for 2026.



2025



2026



2028



2030

## 2026: Daily FireSat Data Available for Select Regions

**FireSat Initial Operational Capability (IOC) Launch:** First 3 operational satellites launch in mid-2026 with near-real-time data distribution in select geographies.

**Twice Daily Data in Select Regions:** Full resolution monitoring, hotspots, and multi-spectral observation capabilities of FireSat available 2x daily in select regions.

**3 Rapid Collections:** The satellites will offer an unprecedented view of fire progression by observing key geographies 3 times in rapid succession, spaced 20-30 minutes apart. Data updates will be processed and transmitted in specific areas at low-latency, providing up-to-the minute updates on fire activity when the satellites pass overhead.



2025

First FireSat Test  
Data Available



2026



2028



2030

## 2028: Hourly Revisit and Global Data Access

**FireSat Constellation Development:** Incremental launches of 8-10 satellites build up the constellation capability systematically over the next few years.

**Hourly Updates in Key Fire Geographies in Mid-High Latitudes:** The additional satellites in the constellation will increase capability to deliver hourly updates, globally, in near-real-time.

**Early Adopter Program Transition:** Representative use cases and data integration mechanisms are used to roll-out FireSat capability to agencies around the world. Providing global access to near-real-time data updates on fire activity, hotspots, and monitoring.



2025

First FireSat Test  
Data Available



2026

Daily FireSat Data  
Available for  
Select Regions



2028



2030

## 2030: 20-Minute Global Revisit

**Full Operational Capability:** Full capacity of FireSat constellation achieved with global 20-minute average revisit and low-latency downlink of operational data and data products.

**Global Coverage and Data Distribution:** Transformative global fire data delivered in near-real time.

**Long Term System Sustainability:** With the support of end users, technical, funding, and policy partners, the FireSat mission is setup for long-term sustainability and delivery of consistent, timely, and reliable data on fire globally to those around the world protecting their communities.



2025

First FireSat Test  
Data Available



2026

Daily FireSat Data  
Available for  
Select Regions



2028

Hourly Revisit  
and Global Data  
Access



2030



# Agenda

## Who We Are

Defining Earth Fire Alliance, our Purpose, Vision, Mission and our approach.

## What is FireSat – Our Flagship Program

Fire-focused and user-driven technology to deliver on our mission

## Where We've Been & Where We're Going

From concept to execution, we are moving fast and with purpose.

## How Radical Collaboration Will Get Us There

Earth Fire Alliance is a collaborative vehicle purpose built to bring FireSat data to a global fire community as fast as possible.



# The Alliance

Earth Fire Alliance leverages a collaborative, global, community-led approach to deliver transformative real-time data from all wildfires on Earth. While the FireSat constellation serves as the core capability to provide transformative worldwide data, the Alliance allows us to deliver on our Mission – providing value to the global fire community as quickly, seamlessly, and efficiently as possible.

**The Alliance is a broad network of interconnected stakeholders who are purpose-driven and mission-aligned:**

## End Users

Individuals and organizations who use Earth Fire Alliance's real-time data and data products

Early Adopter

Fire Agency

Climate & Fire Science

Fire Modeler

## Technical Partners

Data, contractor, and engineering partners who build, operate, process, distribute, and integrate transformative fire data

Data Integration

Technical Development

Constellation Contributor

Data Distribution

## Funders & Policy Partners

Agencies and organizations who support long term sustainment

Philanthropy

IGO  
(Intergovernmental)

State Government

Federal Government





# The Alliance

Earth Fire Alliance leverages a collaborative, global, community-led approach to deliver transformative real-time data from all wildfires on Earth. While the FireSat constellation serves as the core capability to provide transformative worldwide data, the Alliance allows us to deliver on our Mission – providing value to the global fire community as quickly, seamlessly, and efficiently as possible.

**The Alliance is a broad network of interconnected stakeholders who are purpose-driven and mission-aligned:**

## End Users

Individuals and organizations who use Earth Fire Alliance's real-time data and data products

Early Adopter

Fire Agency

Climate & Fire Science

Fire Modeler

## Technical Partners

Data, contractor, and engineering partners who build, operate, process, distribute, and integrate transformative fire data

Data Integration

Technical Development

Constellation Contributor

Data Distribution

## Funders & Policy Partners

Agencies and organizations who support long term sustainment

Philanthropy

IGO  
(Intergovernmental)

State Government

Federal Government





# FireSat Early Adopter Program Goals

*Earth Fire Alliance's Early Adopter Program aims to work with agencies, fire modelers, and scientists in key geographies around the world to ready systems and understand impacts of a new era of wildfire monitoring.*

## Expedite Use

Reduce adoption timeline by working directly with end-users to understand integration into processes and systems and to make FireSat data operationally useful as quickly as possible.

## Informed Iterations

Continuous improvement of program through feedback cycles with users that will inform improvements of the data distribution mechanisms, data products, and system designs.

## Understand Impact

Report tangible and metric-driven outcomes building the case for support, capturing early program wins, and understanding the measurable difference from FireSat.



# Early Adopter Network: Accelerating Action

**Operational** use of FireSat data and integration into fire management



## Outcome

Identify strategies, decisions, and management practices enhanced or enabled by FireSat data

**Modeling** FireSat data for impacts on ecosystems and climate



## Outcome

Advance analytic use of FireSat data for more comprehensive models of behavior and impacts

**Pathways** for technologies and tools to integrate with FireSat



## Outcome

Streamline data distribution, access, and interoperability; explore constellation build out



# Early Adopter Regions

## Low Latency Data Regions



**WESTERN  
CONTINENTAL US**



**EASTERN AUSTRALIA**



**SOUTHERN EUROPE**

## Daily Analysis and Impact Collects



**AMAZON BASIN**



**BOREAL**



**INDONESIA**

# Earth Fire Alliance Supporters

Earth Fire Alliance is a community-driven effort and works across and with our philanthropic, private industry, government, and agency collaborators.



## Early Adopter Agencies from three continents



AGÊNCIA PARA A  
GESTÃO INTEGRADA  
DE FOGOS RURAIS



# Earth Fire Alliance

Observe. Serve. Conserve.

---

[ann@earthfirealliance.org](mailto:ann@earthfirealliance.org)