National Environmental Satellite, Data, and Information Service

February 13, 2024

New NOAA/NESDIS Satellite Products for Wildland Fire Applications

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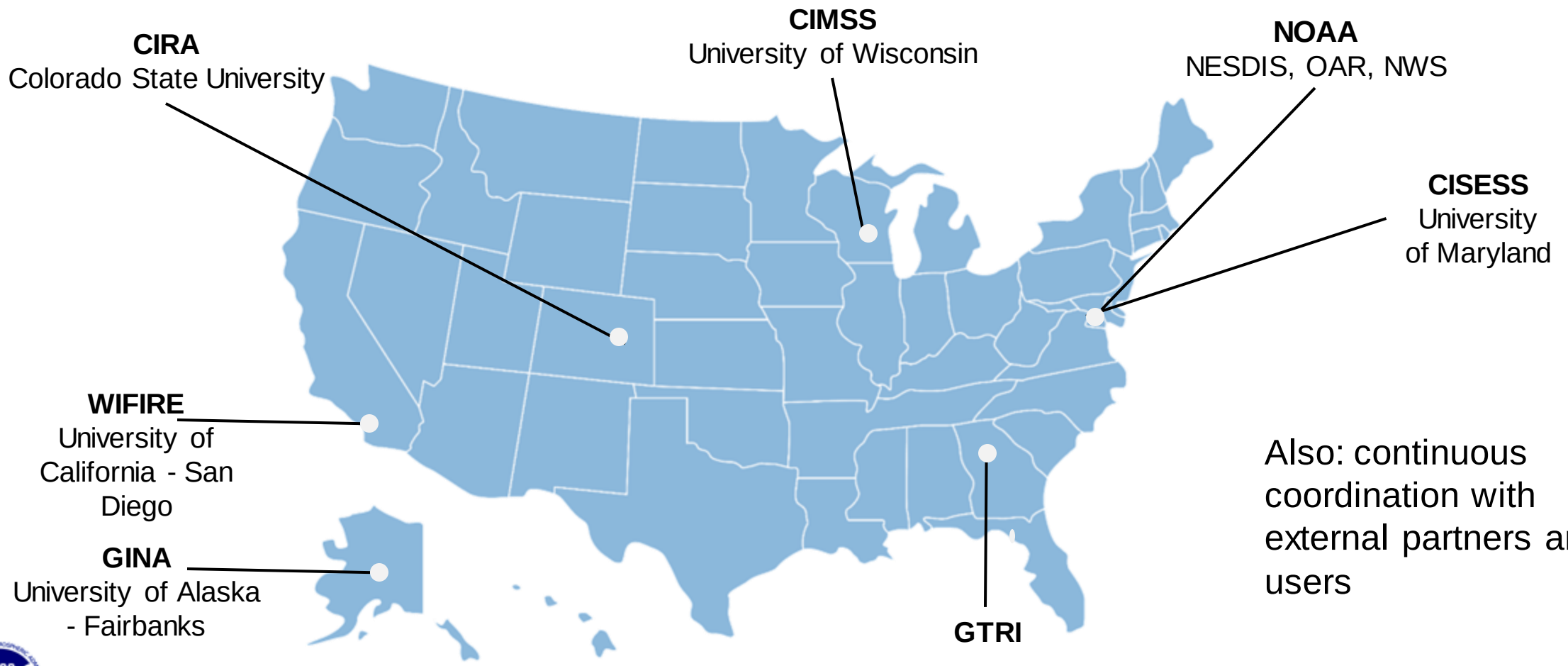
Wildland Fire Products and Services Team



Also: continuous coordination with external partners and users

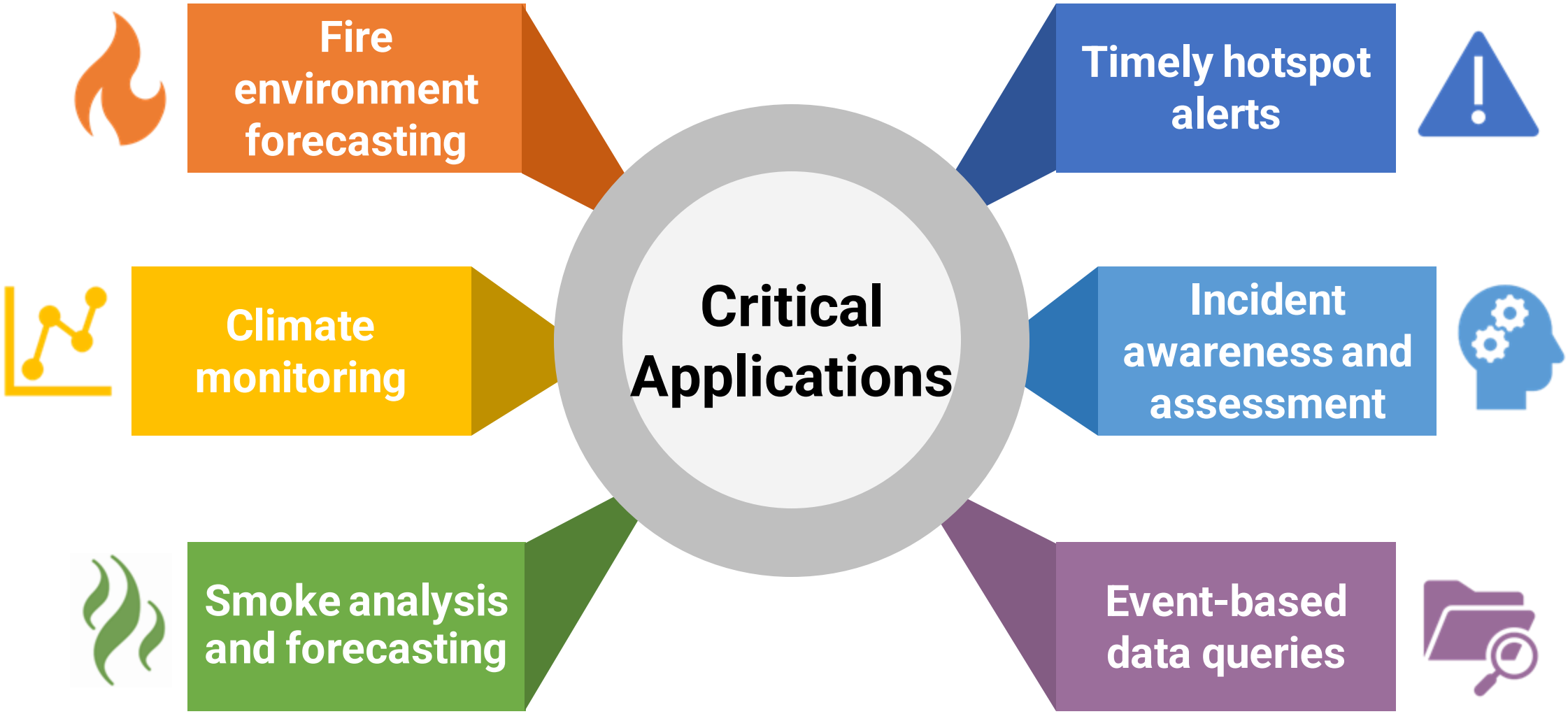
NESDIS Next Generation Fire System (NGFS) (Supported by the DRSA and BIL)

Single or multi-source GEO or LEO satellite data + supplemental data

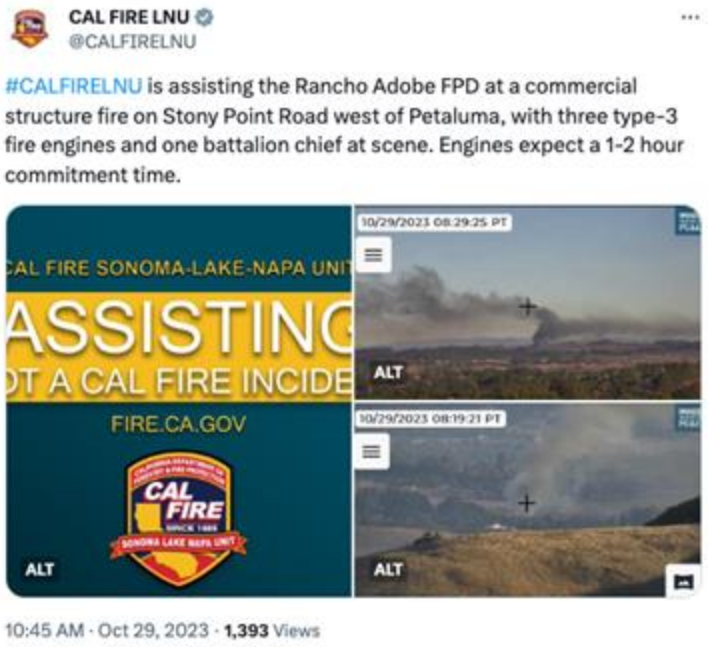
NESDIS Fire Information System

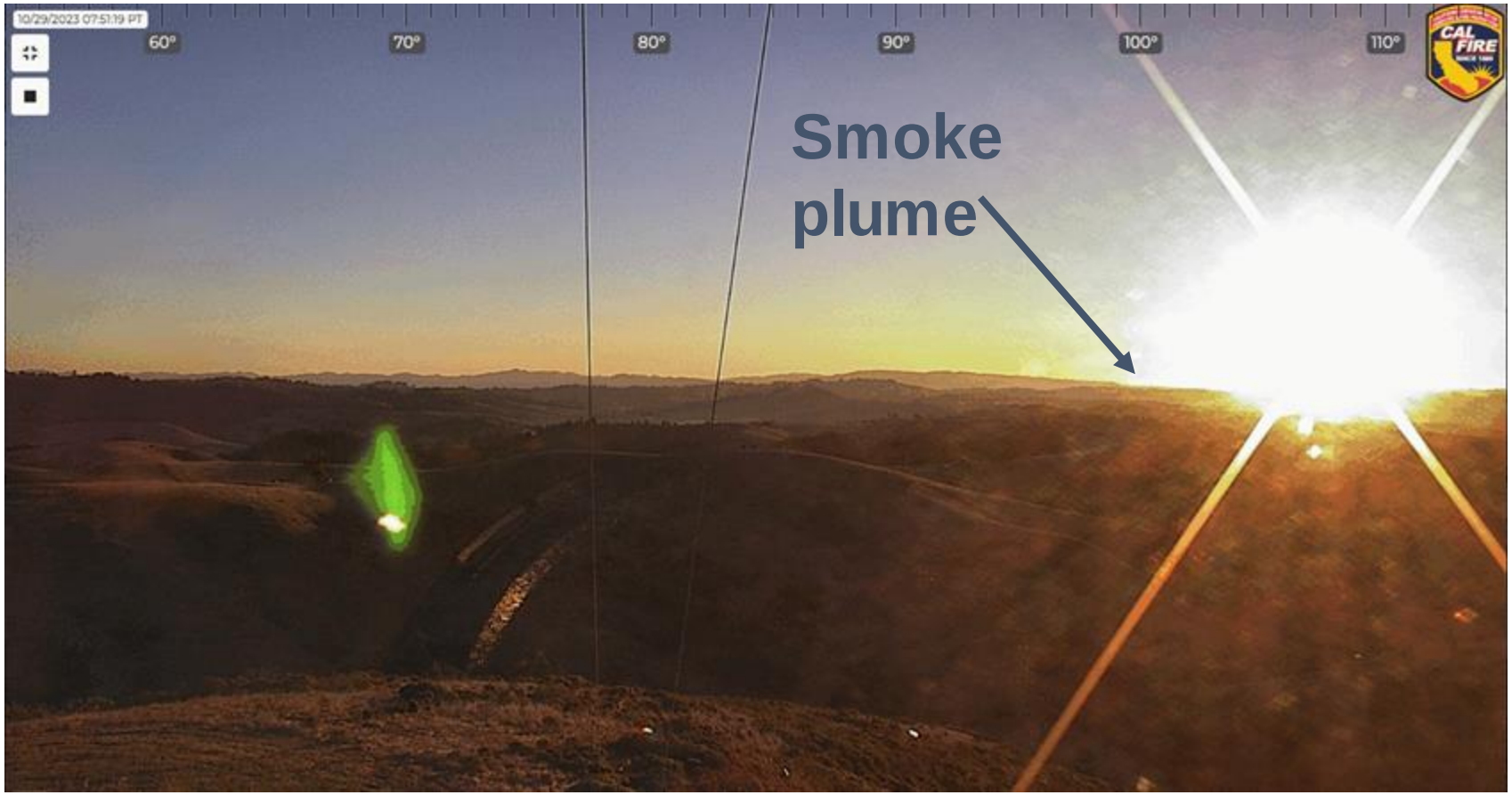
NESDIS Fire Data and Information Portal

Fire Software Repository


Fire environment forecasting
Timely hotspot alerts
Climate monitoring
Critical Applications
Incident awareness and assessment
Smoke analysis and forecasting
Event-based data queries

NOAA GOES-R Satellite Fire Detection Capability





Commercial structure fire - Sonoma Co. (Oct 29, 2023)

Wildfire Alert Report

Date:	2023-10-29
Time:	14:54:25
Production Date and Time:	2023-10-29 14:55:03 UTC
Primary Instrument:	GOES-18 ABI

More details ▼

NGFS alert report

Possible Wildfire

False Color Image (12-11, 11-8.5, 11) [zoomed-in]

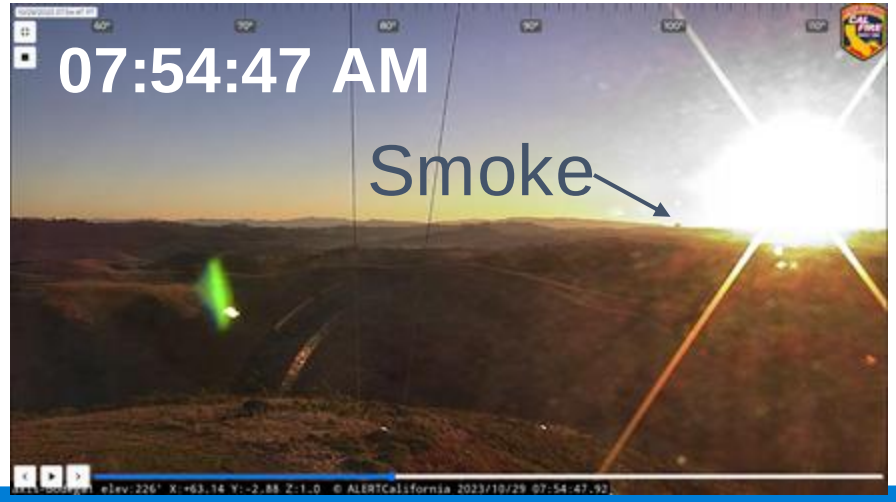
False Color Image (12-11, 11-3.9, 11) [zoomed-in]

Basic Information	
State/Province(s)	CA
Country/Countries	USA
County/Locality(s)	Sonoma County, CA
NWS WFO	San Francisco CA
Identification Method	Enhanced Contextual (Clear)
Mean Object Date/Time	2023-10-29 14:54:29UTC
Radiative Center (Lat, Lon):	38.290°, -122.720°
Nearby Counties (meeting alert criteria):	Sonoma County (0.00 km)
Total Radiative Power Anomaly	n/a
Total Radiative Power	18.50 MW
Map:	

Show More ▲ View all event imagery »

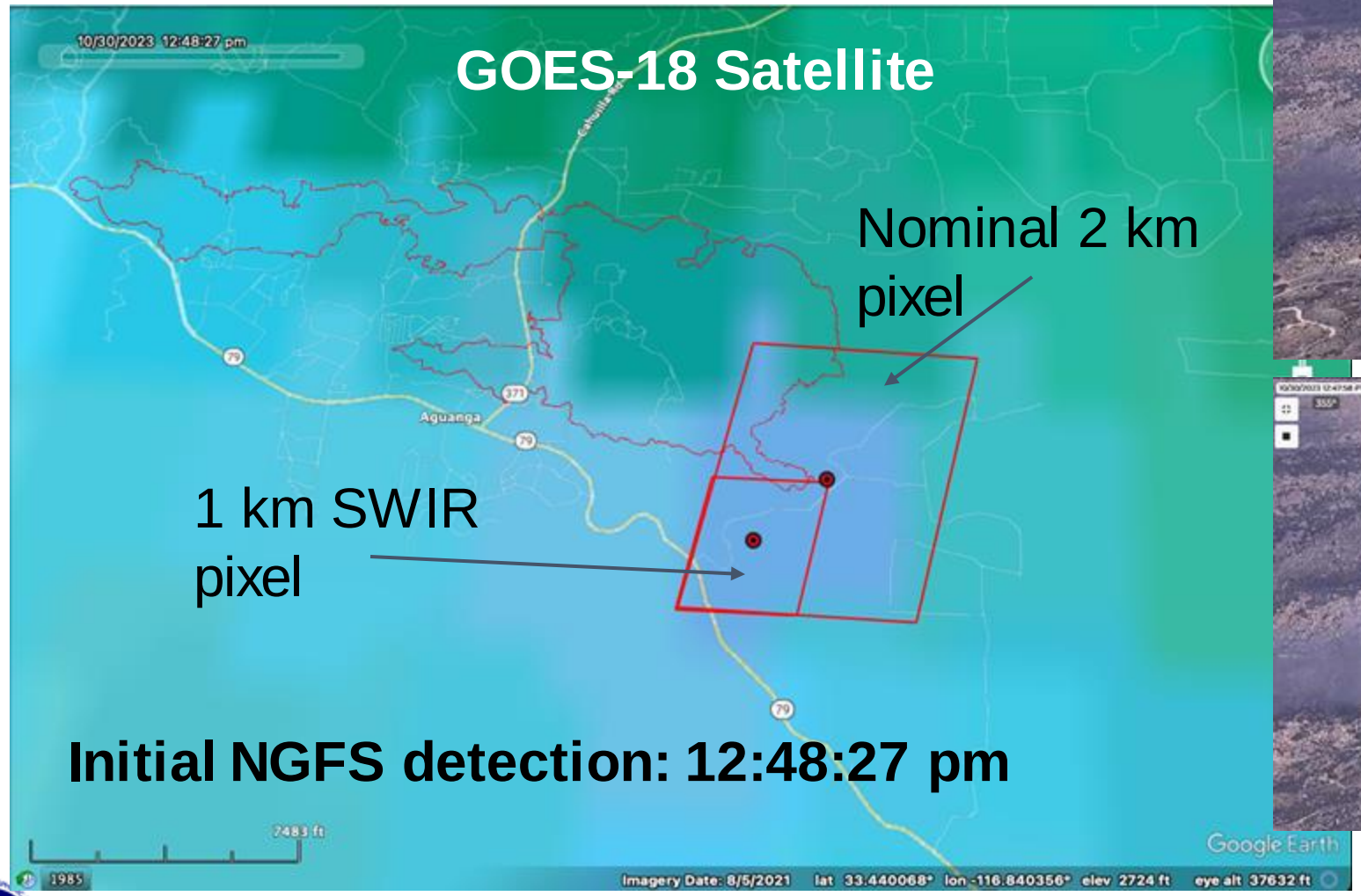
The NOAA NGFS detected the heat from the fire at 7:54:29 AM PDT.

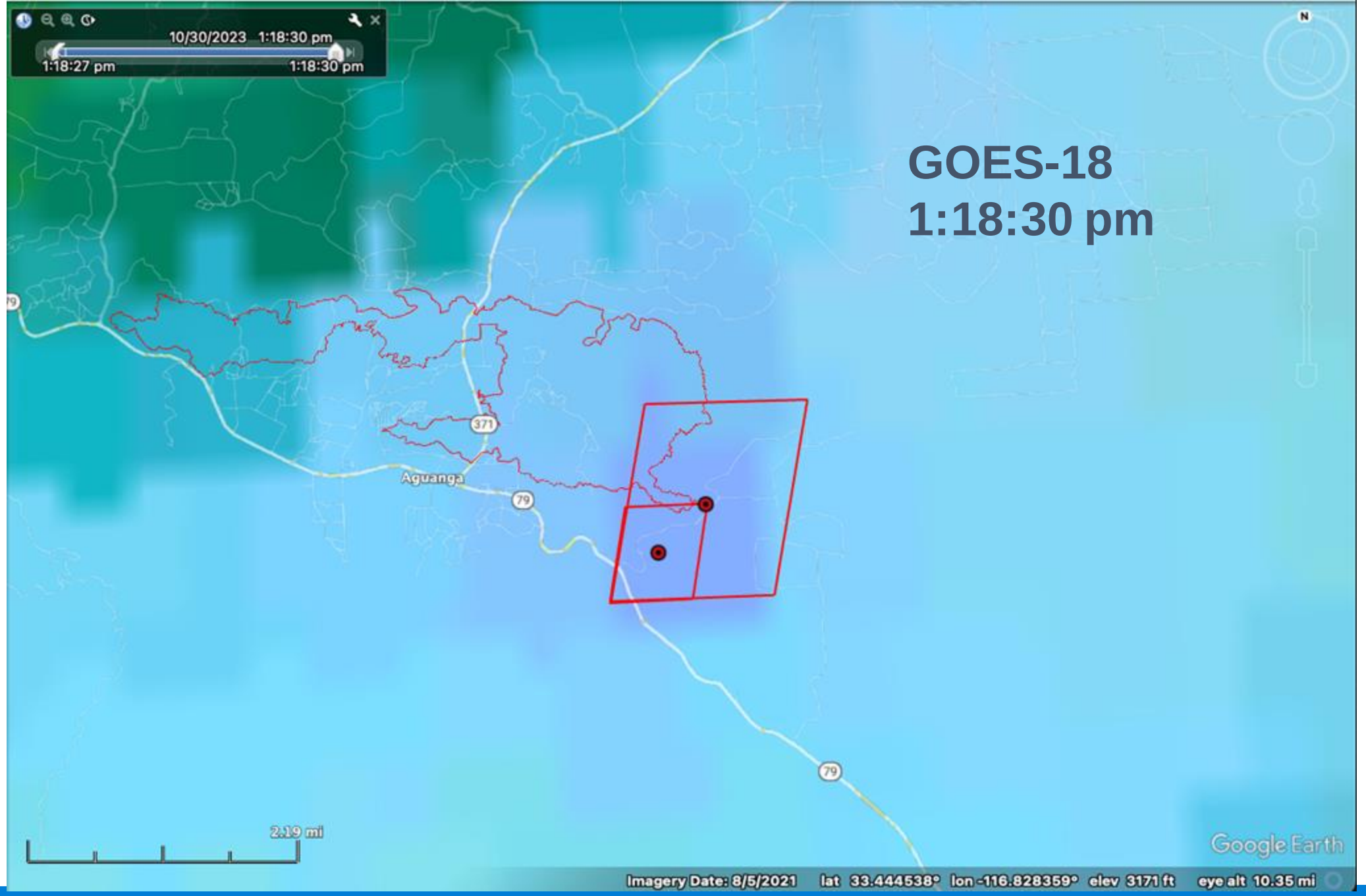
The corresponding alert was generated at 7:55:03 AM PDT

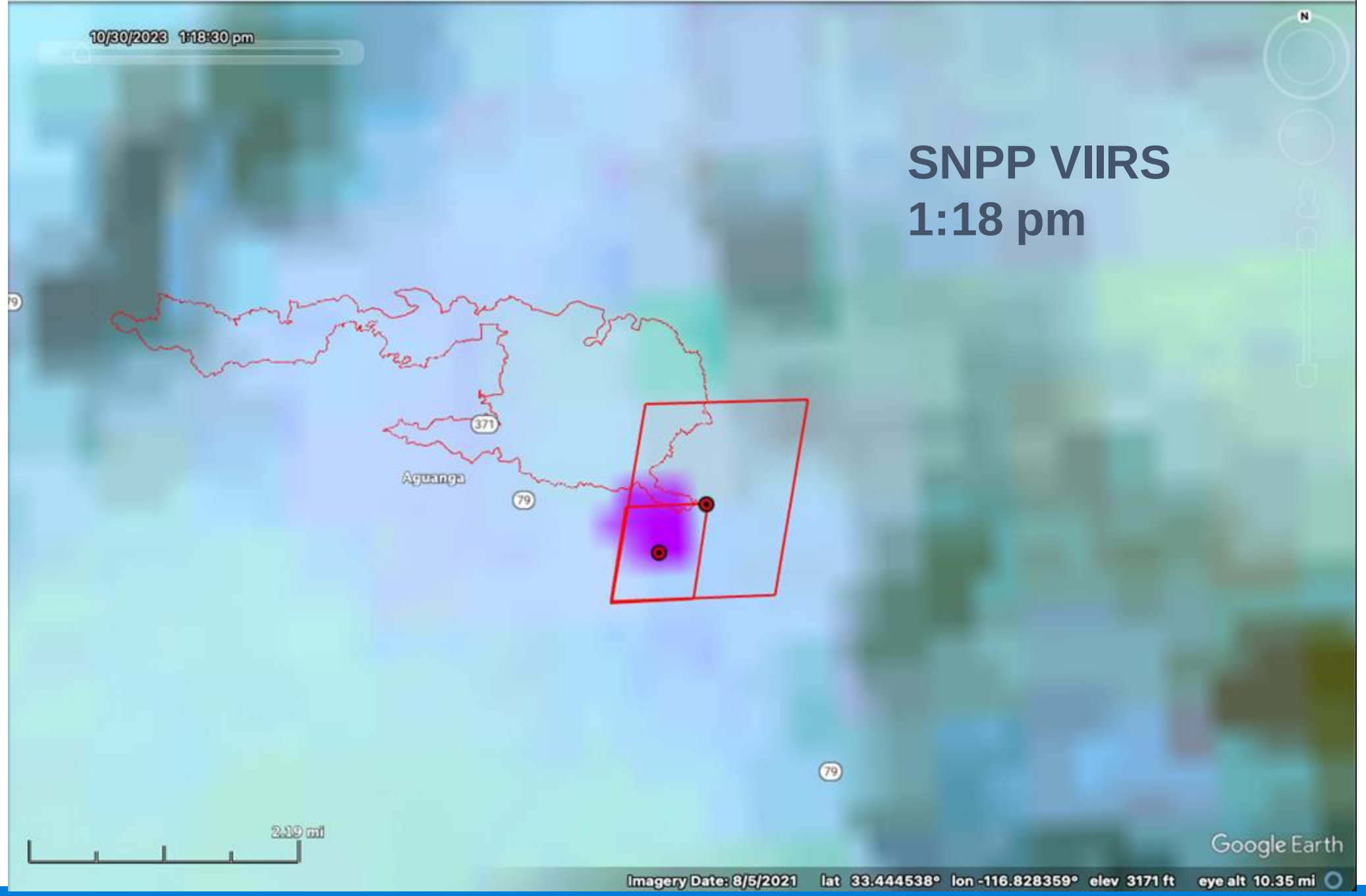


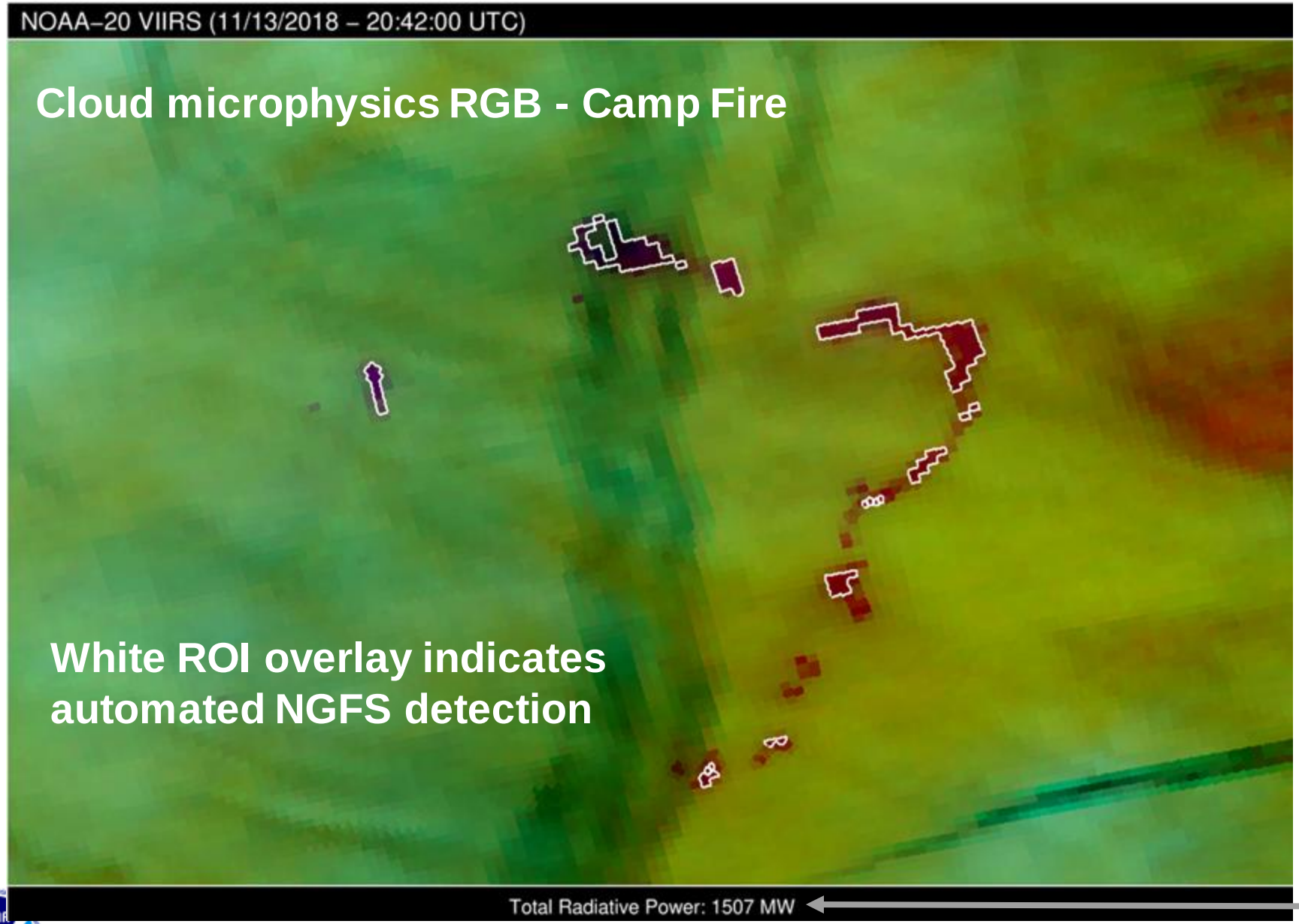
The red box shows the region where the NGFS detected heat.

Highland Incident - Riverside County - Oct 30, 2023



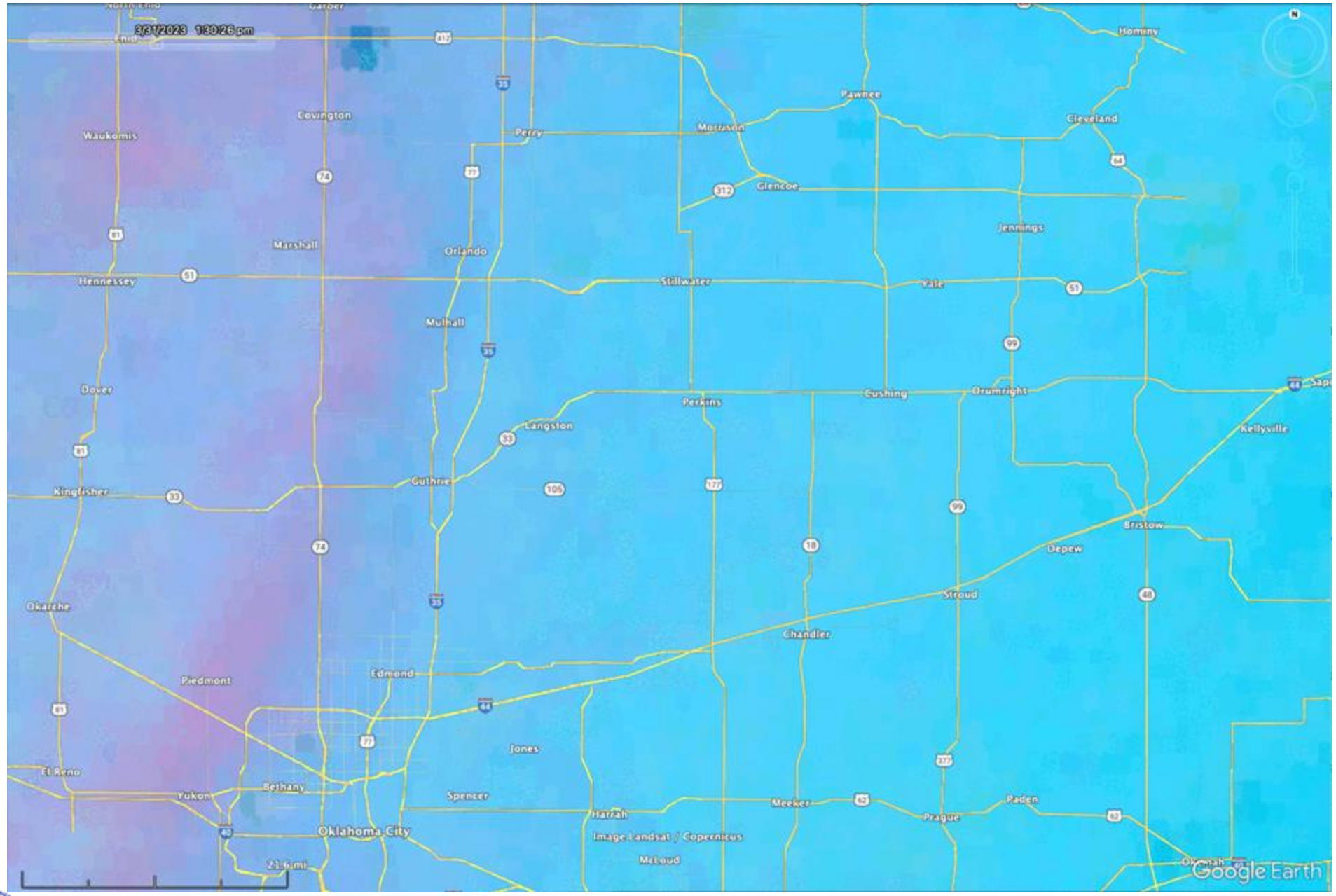

10/30/2023 1:18:30 pm
1:18:27 pm
1:18:30 pm
GOES-18
1:18:30 pm
371
Aguanga
79
79
2.19 mi
Google Earth
Imagery Date: 8/5/2021 lat 33.444538° lon -116.828359° elev 3171 ft eye alt 10.35 mi


10/30/2023 1:18:30 pm
SNPP VIIRS
1:18 pm
371
Aguanga
79
79
2.19 mi
Google Earth
Imagery Date: 8/5/2021 lat 33.444538° lon -116.828359° elev 3171 ft eye alt 10.35 mi

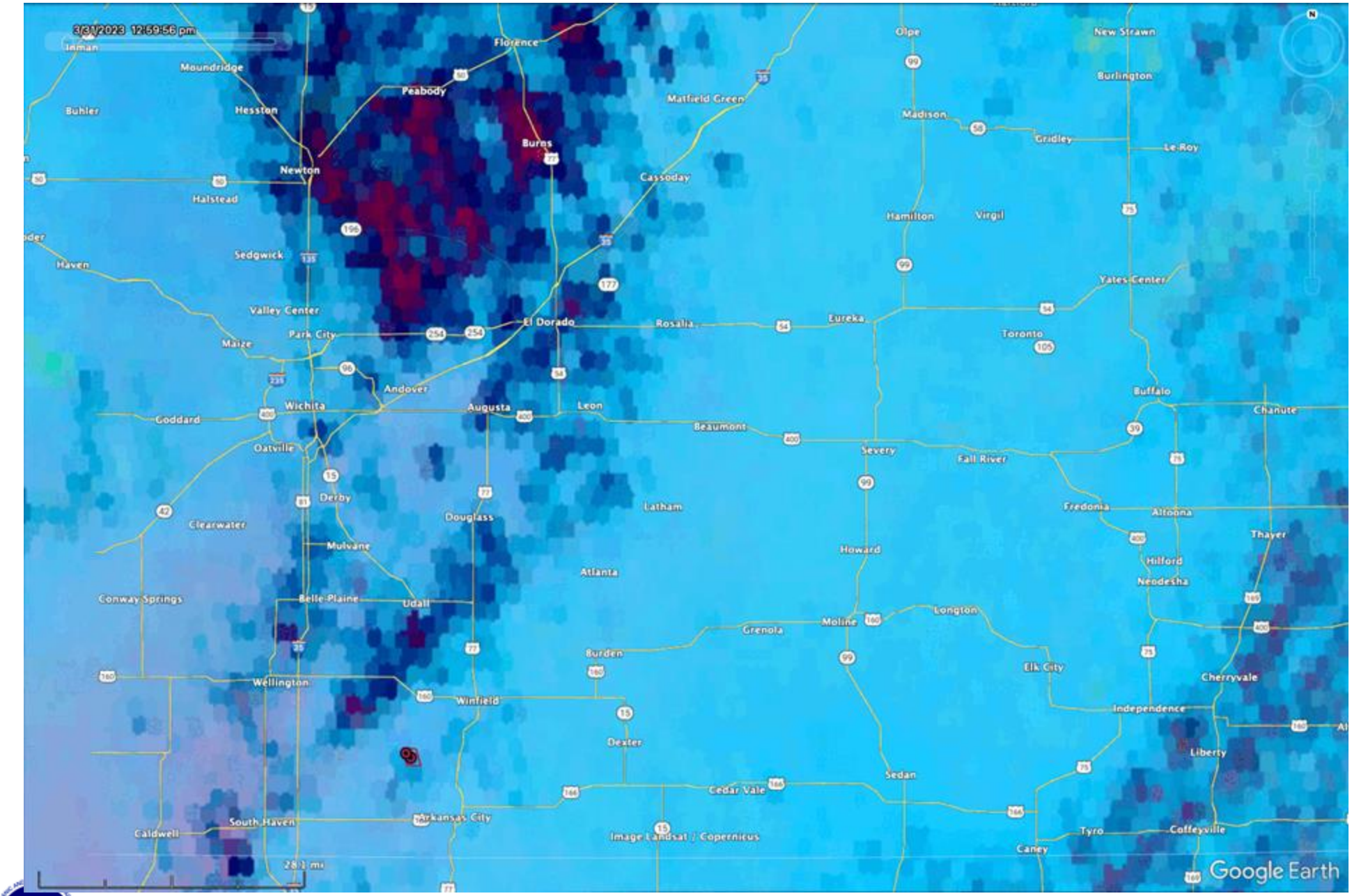


Cloud resilient approach to detection and FRP

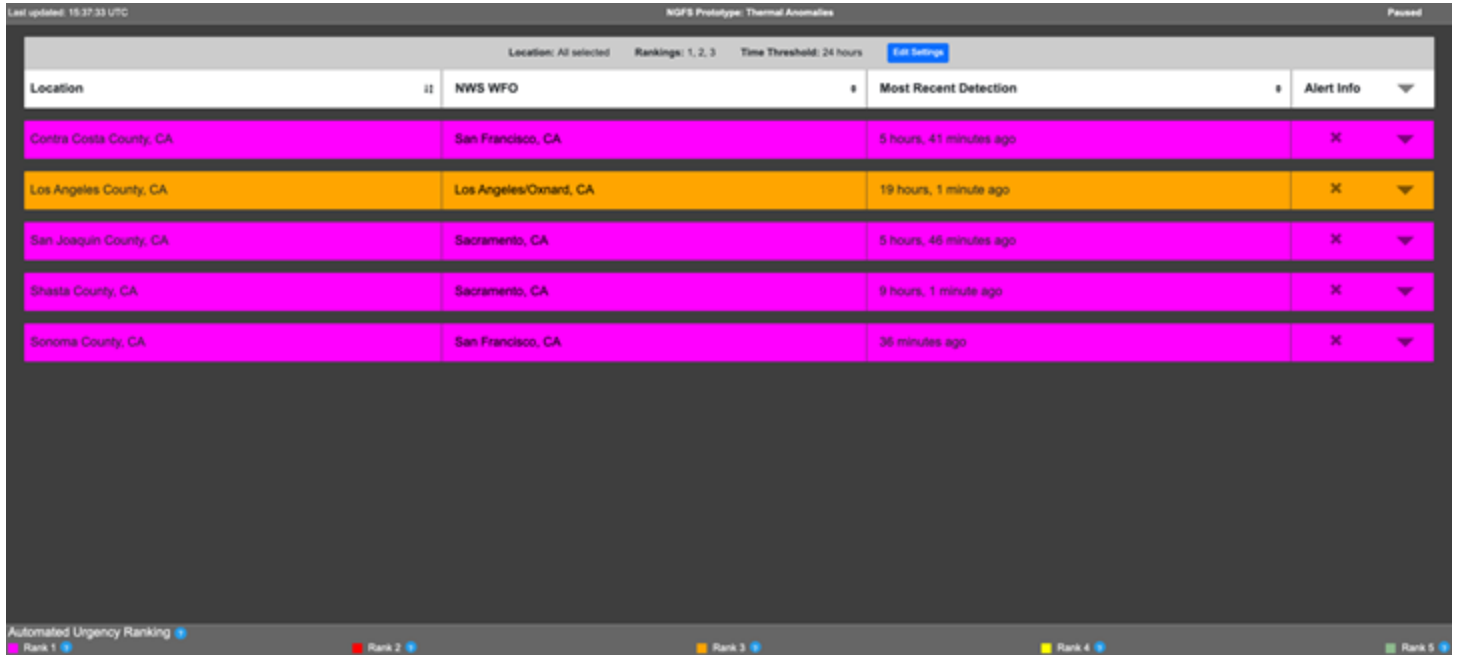
Automated detection under cloudy conditions is needed for near continuous monitoring of intensity and spread (coarse resolution)



Oklahoma:
March 31, 2023
1:30 - 2:00 pm CT
18:30 - 19:00Z

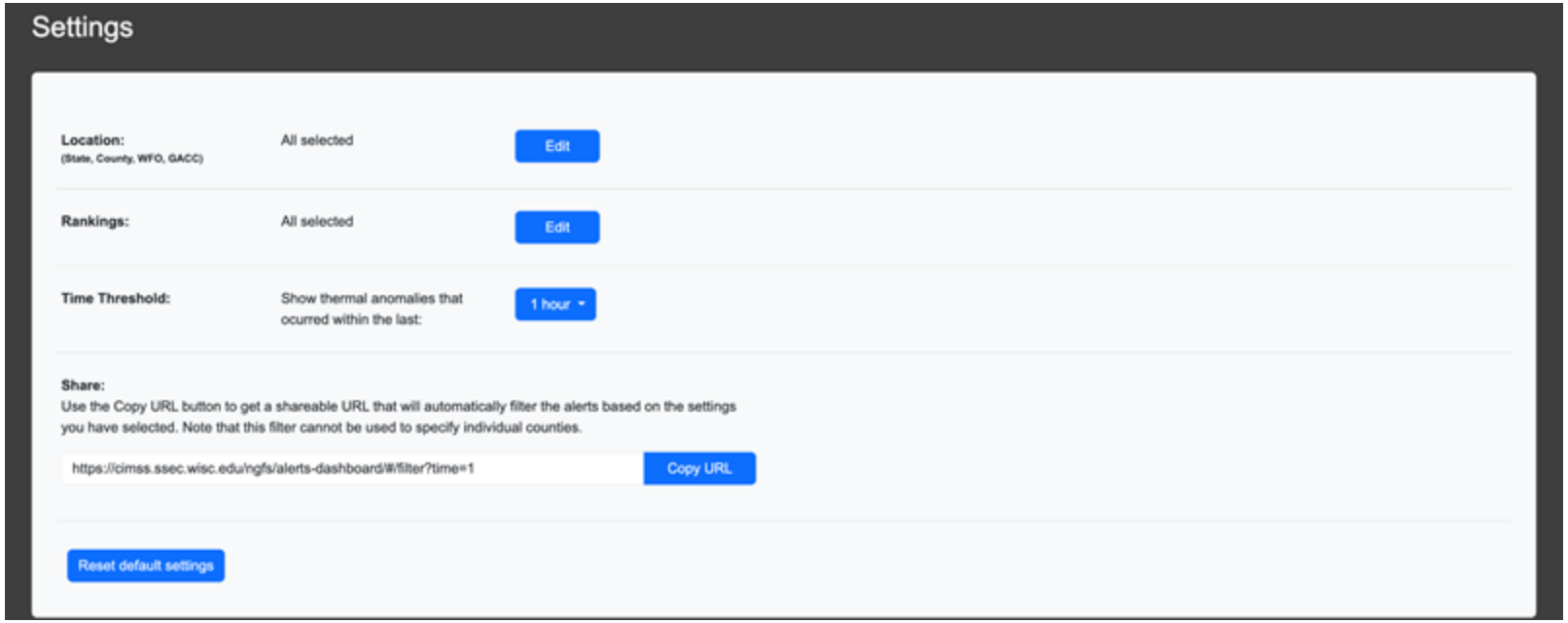


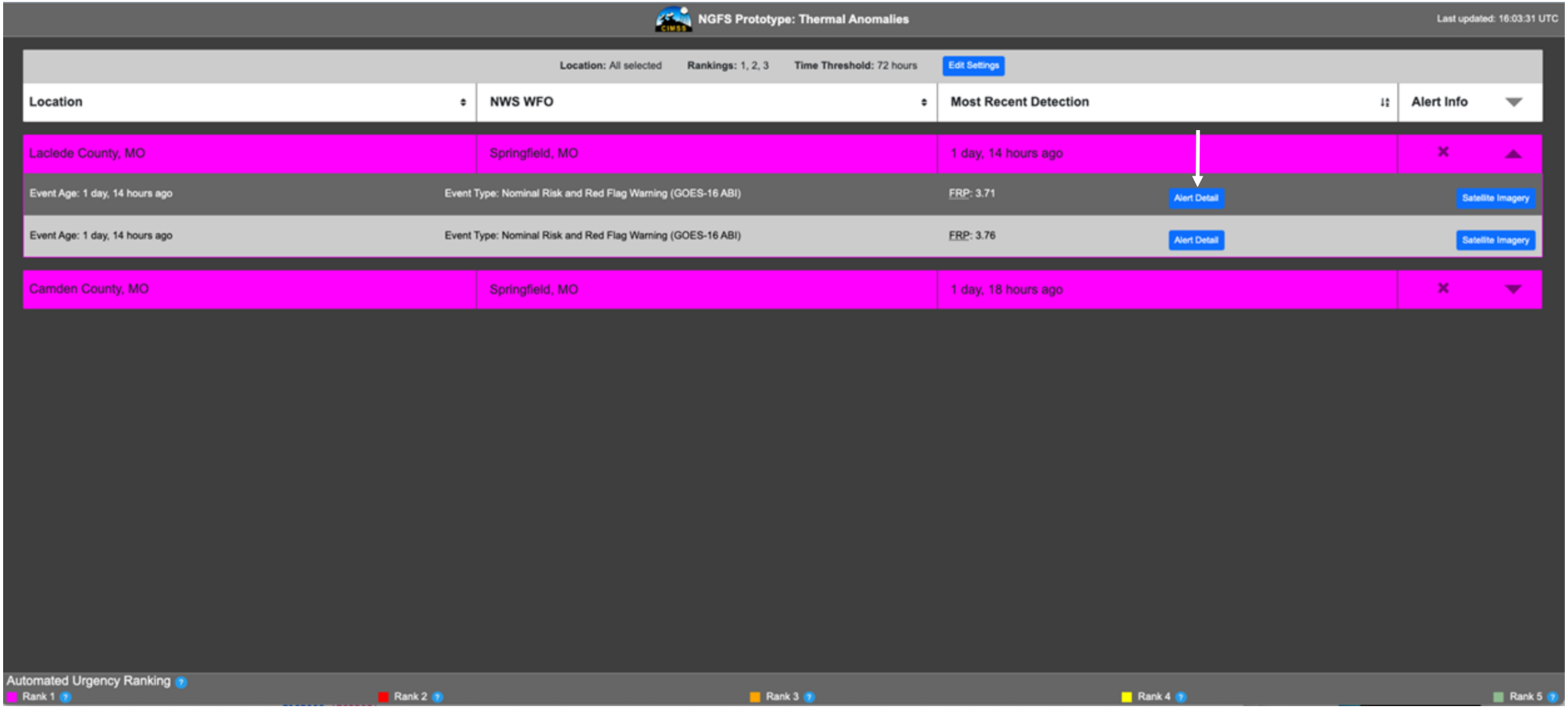
Kansas:
March 31, 2023
1:00 - 2:00 pm CT
18:00 - 19:00Z

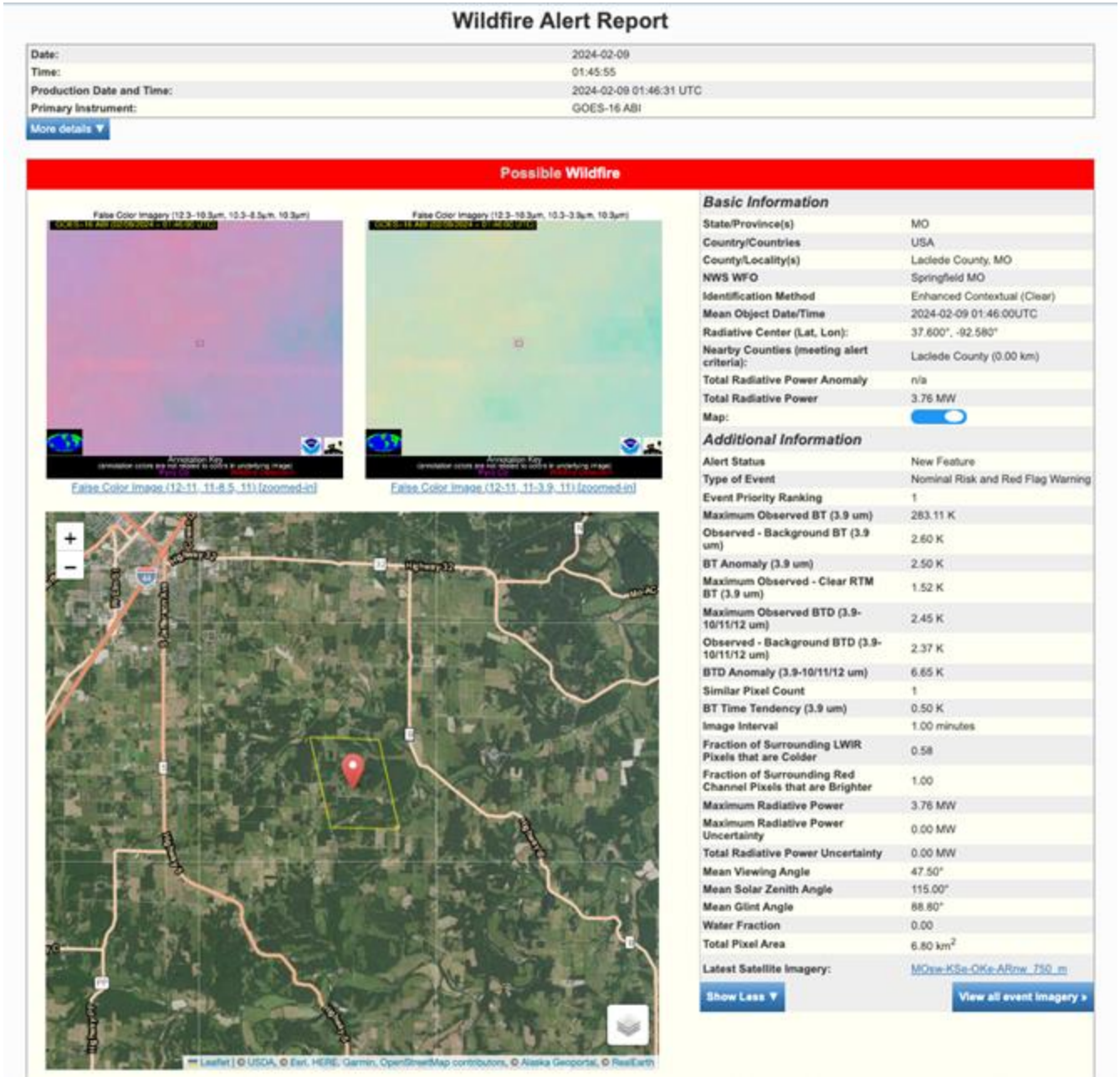


Dashboard interface for new fire detections as a function of fire weather conditions

Users can further filter events by location (GACC, NWS, state, or country), fire weather conditions, and age.




NGFS Prototype: Thermal Anomalies
Last updated: 16:03:31 UTC
Location: All selected
Rankings: 1, 2, 3
Time Threshold: 72 hours
Edit Settings
Location
NWS WFO
Most Recent Detection
Alert Info
Laclede County, MO
Springfield, MO
1 day, 14 hours ago
Event Age: 1 day, 14 hours ago
Event Type: Nominal Risk and Red Flag Warning (GOES-16 ABI)
FRP: 3.71
Alert Detail
Satellite Imagery
Event Age: 1 day, 14 hours ago
Event Type: Nominal Risk and Red Flag Warning (GOES-16 ABI)
FRP: 3.76
Alert Detail
Satellite Imagery
Camden County, MO
Springfield, MO
1 day, 18 hours ago
Automated Urgency Ranking
Rank 1
Rank 2
Rank 3
Rank 4
Rank 5



Wildfire Alert Report

Date:	2024-02-09
Time:	01:45:55
Production Date and Time:	2024-02-09 01:46:31 UTC
Primary Instrument:	GOES-16 ABI

More details ▼

Possible Wildfire

False Color Image (12-11, 11-8.5, 11) [zoomed-in]

False Color Image (12-11, 11-3.9, 11) [zoomed-in]

Leaflet | © USDA, © Esri, HERE, Garmin, OpenStreetMap contributors, © Alaska Geoportal, © RealEarth

Basic Information

State/Province(s)	MO
Country/Countries	USA
County/Locality(s)	Laclede County, MO
NWS WFO	Springfield MO
Identification Method	Enhanced Contextual (Clear)
Mean Object Date/Time	2024-02-09 01:46:00UTC
Radiative Center (Lat, Lon):	37.600°, -92.580°
Nearby Counties (meeting alert criteria):	Laclede County (0.00 km)
Total Radiative Power Anomaly	n/a
Total Radiative Power	3.76 MW
Map:	

Additional Information

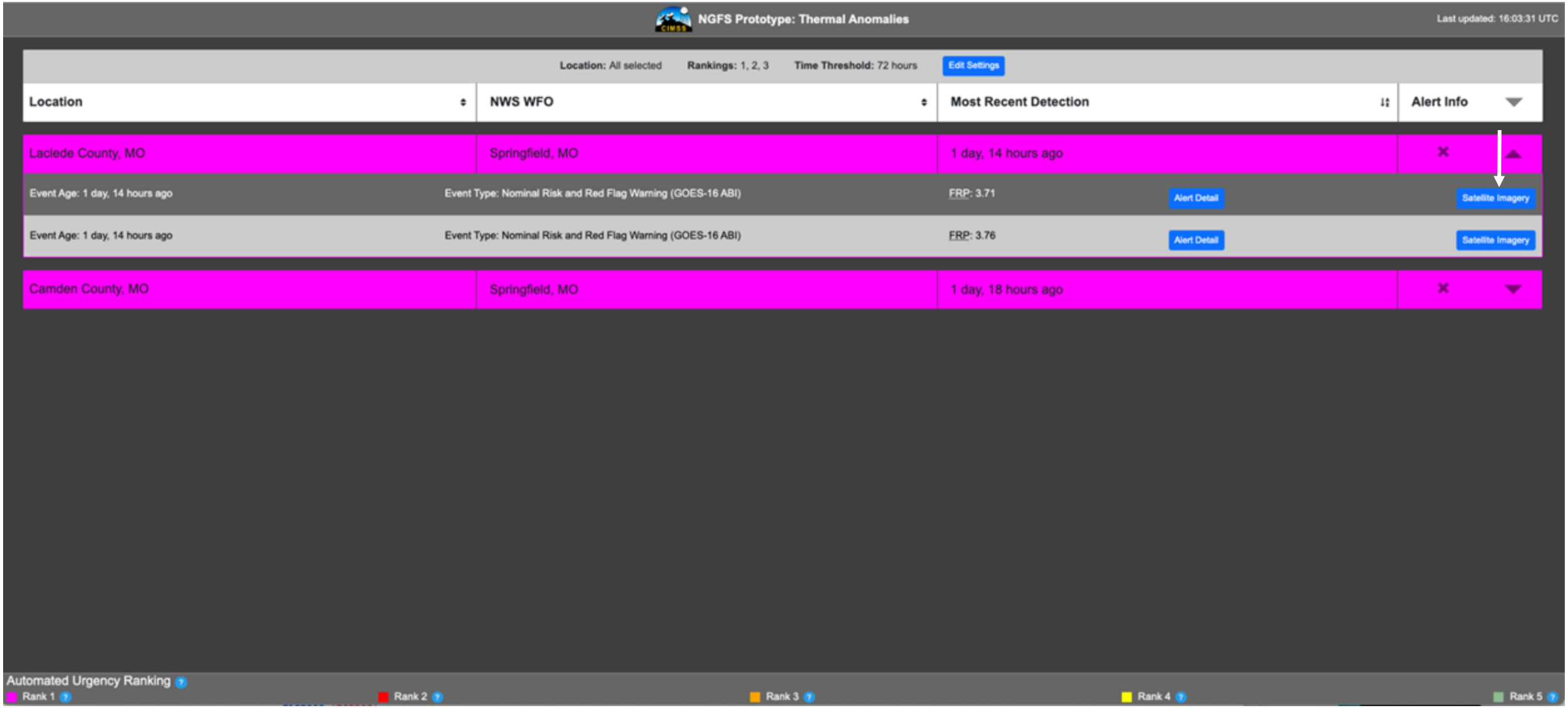
Alert Status	New Feature
Type of Event	Nominal Risk and Red Flag Warning
Event Priority Ranking	1
Maximum Observed BT (3.9 um)	283.11 K
Observed - Background BT (3.9 um)	2.60 K
BT Anomaly (3.9 um)	2.50 K
Maximum Observed - Clear RTM BT (3.9 um)	1.52 K
Maximum Observed BTD (3.9-10/11/12 um)	2.45 K
Observed - Background BTD (3.9-10/11/12 um)	2.37 K
BTD Anomaly (3.9-10/11/12 um)	6.65 K
Similar Pixel Count	1
BT Time Tendency (3.9 um)	0.50 K
Image Interval	1.00 minutes
Fraction of Surrounding LWIR Pixels that are Colder	0.58
Fraction of Surrounding Red Channel Pixels that are Brighter	1.00
Maximum Radiative Power	3.76 MW
Maximum Radiative Power Uncertainty	0.00 MW
Total Radiative Power Uncertainty	0.00 MW
Mean Viewing Angle	47.50°
Mean Solar Zenith Angle	115.00°
Mean Glint Angle	88.80°
Water Fraction	0.00
Total Pixel Area	6.80 km^2
Latest Satellite Imagery:	MOsw-KSe-OKe-ARnw_750_m

Show Less ▼ View all event imagery »

Pre-decisional information:

No automated system is perfect, so a human expert should verify the alert.

The alert report contains detection metrics and imagery needed to evaluate the automated detection.


NGFS Prototype: Thermal Anomalies
Last updated: 16:03:31 UTC
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Rank 1
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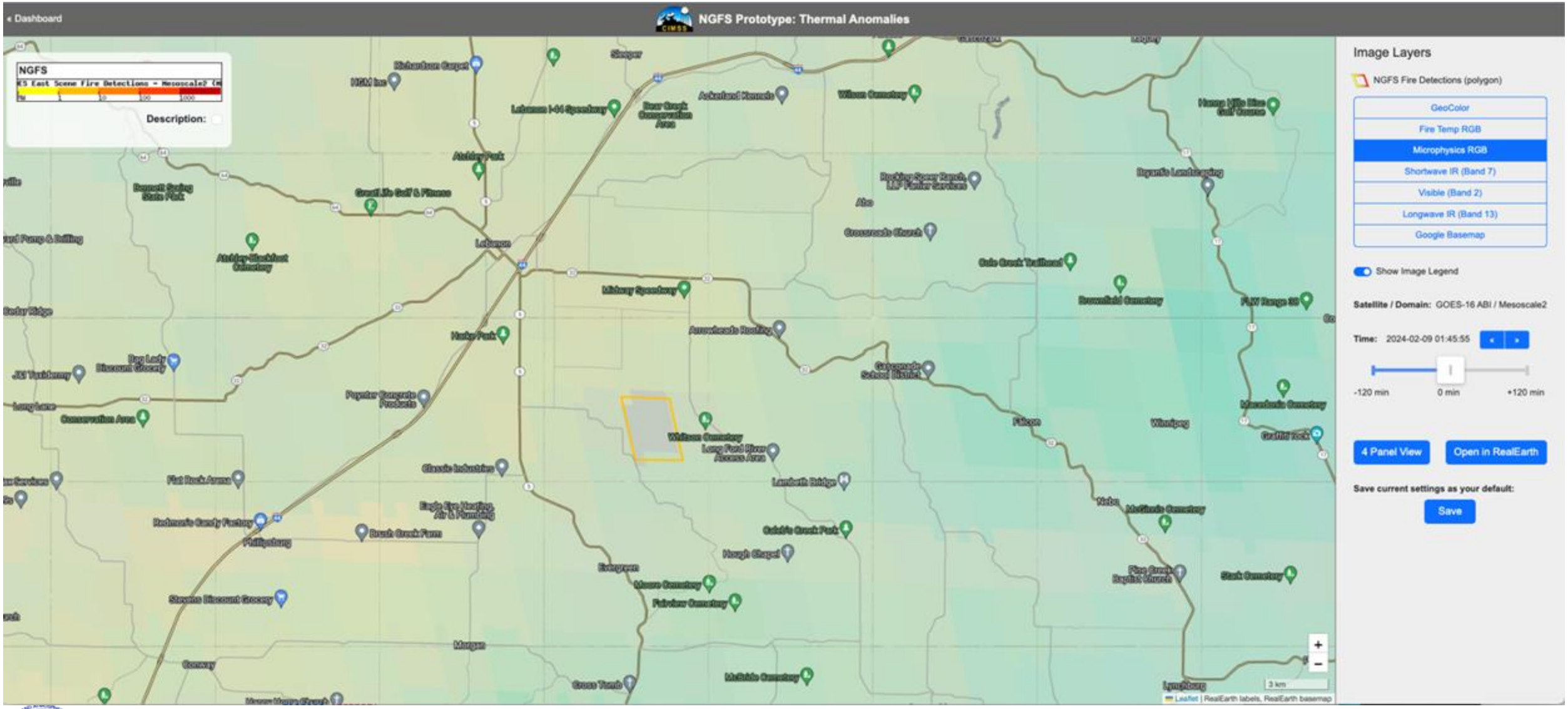
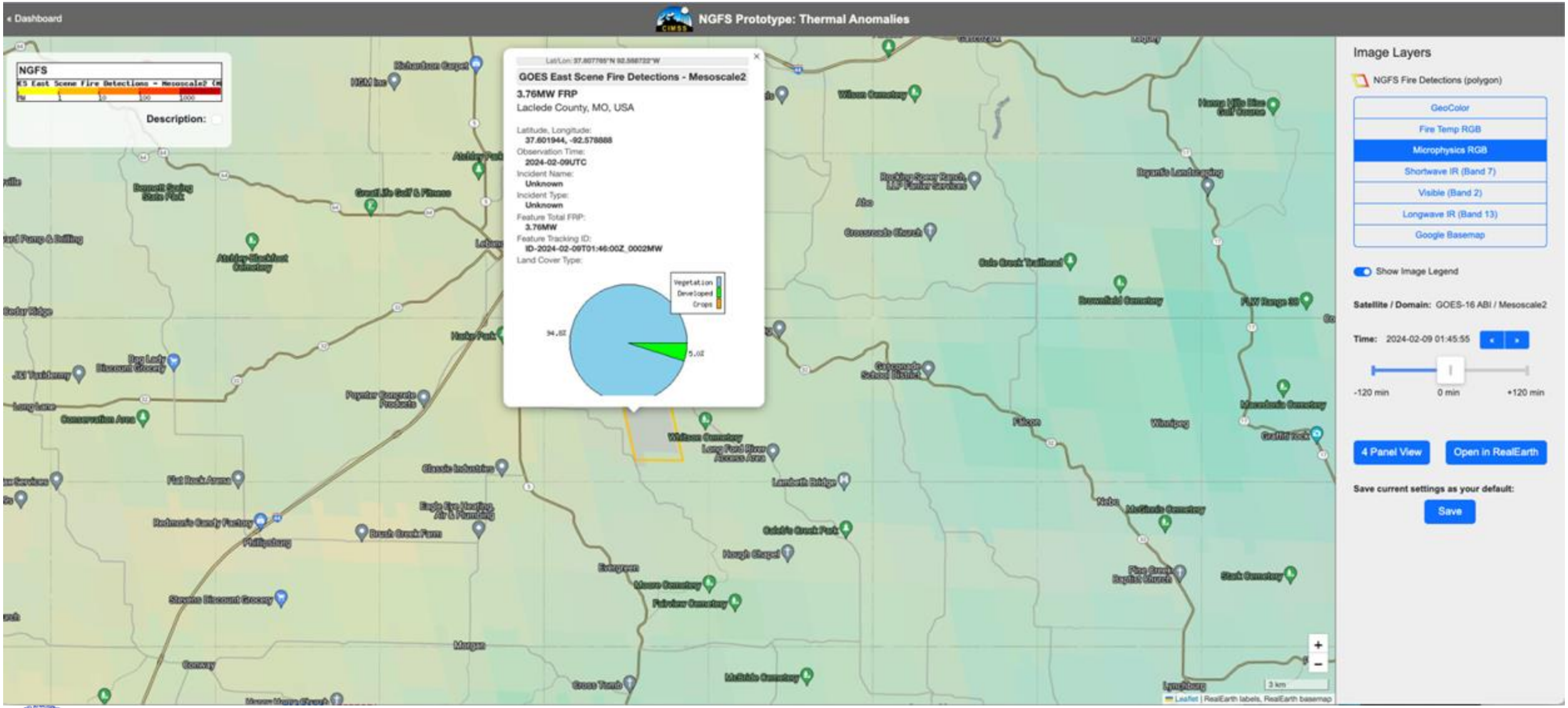
Rank 5

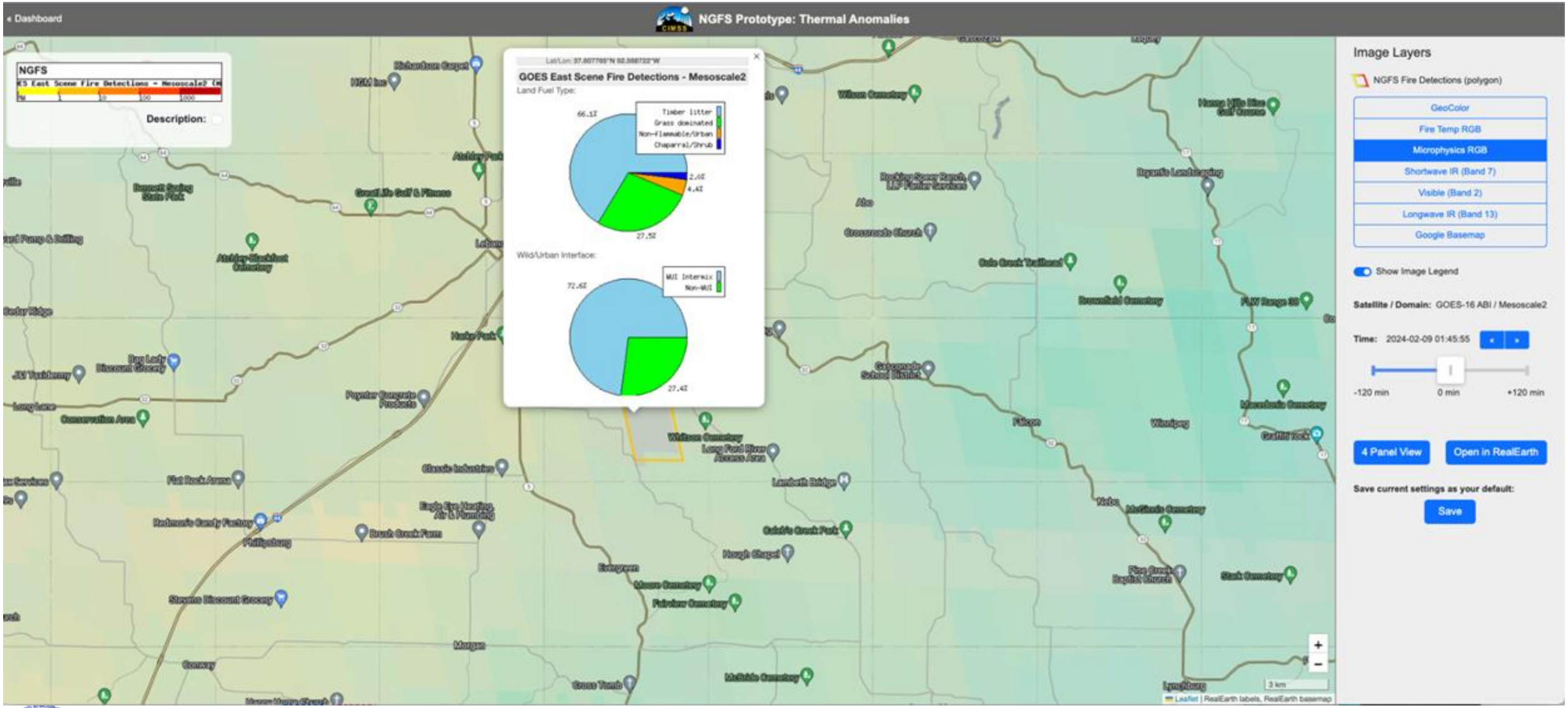
Web Map Tools



Web Map Tools

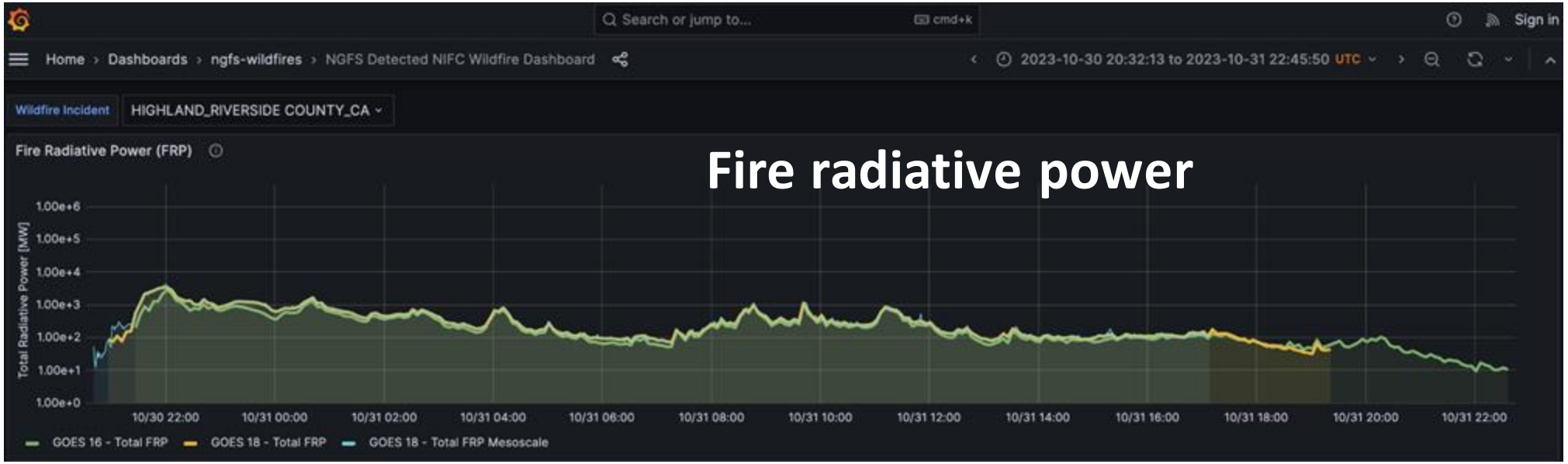


Web Map Tools

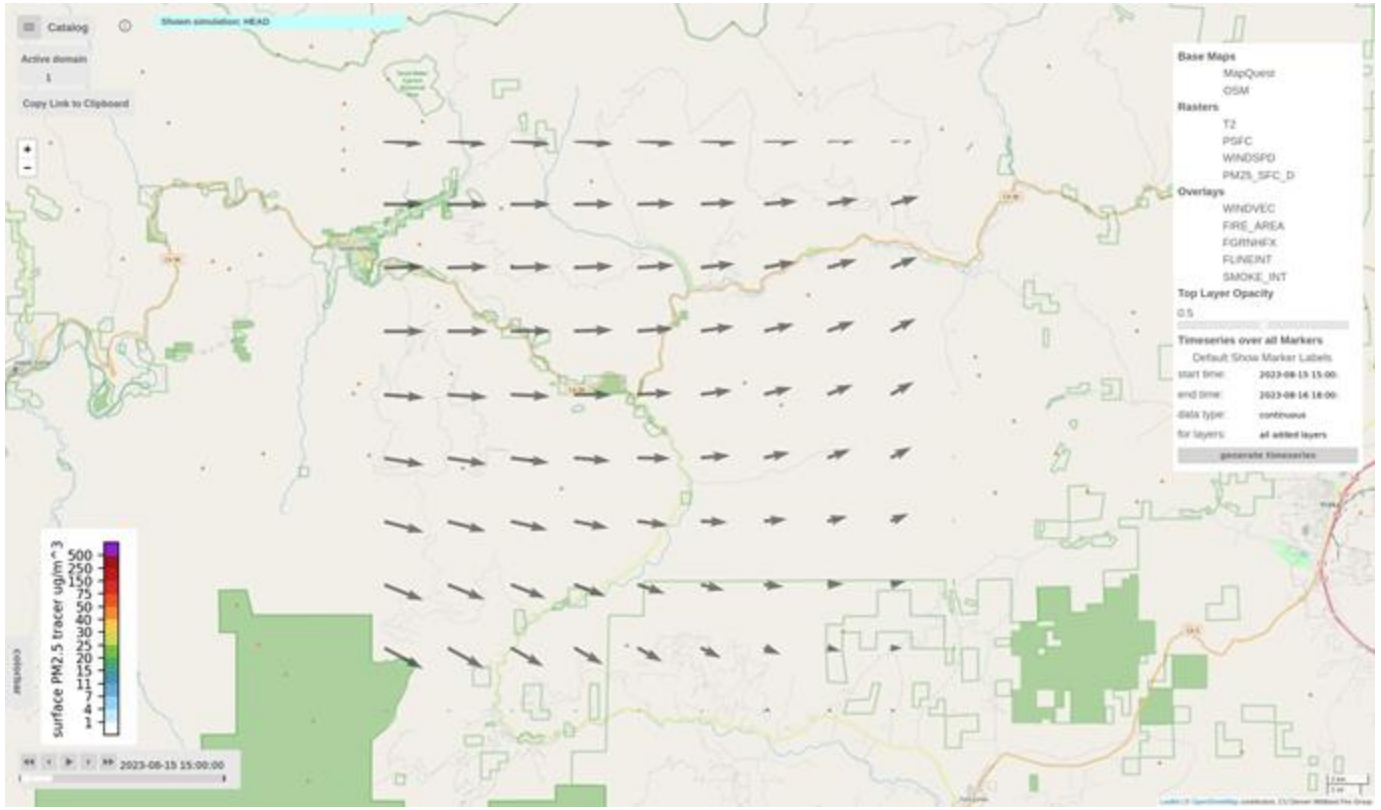


Applications for Incident Awareness and Assessment

ESRI Event Dashboards



Improved NESDIS fire detections have been integrated into an experimental fire spread forecast model workflow



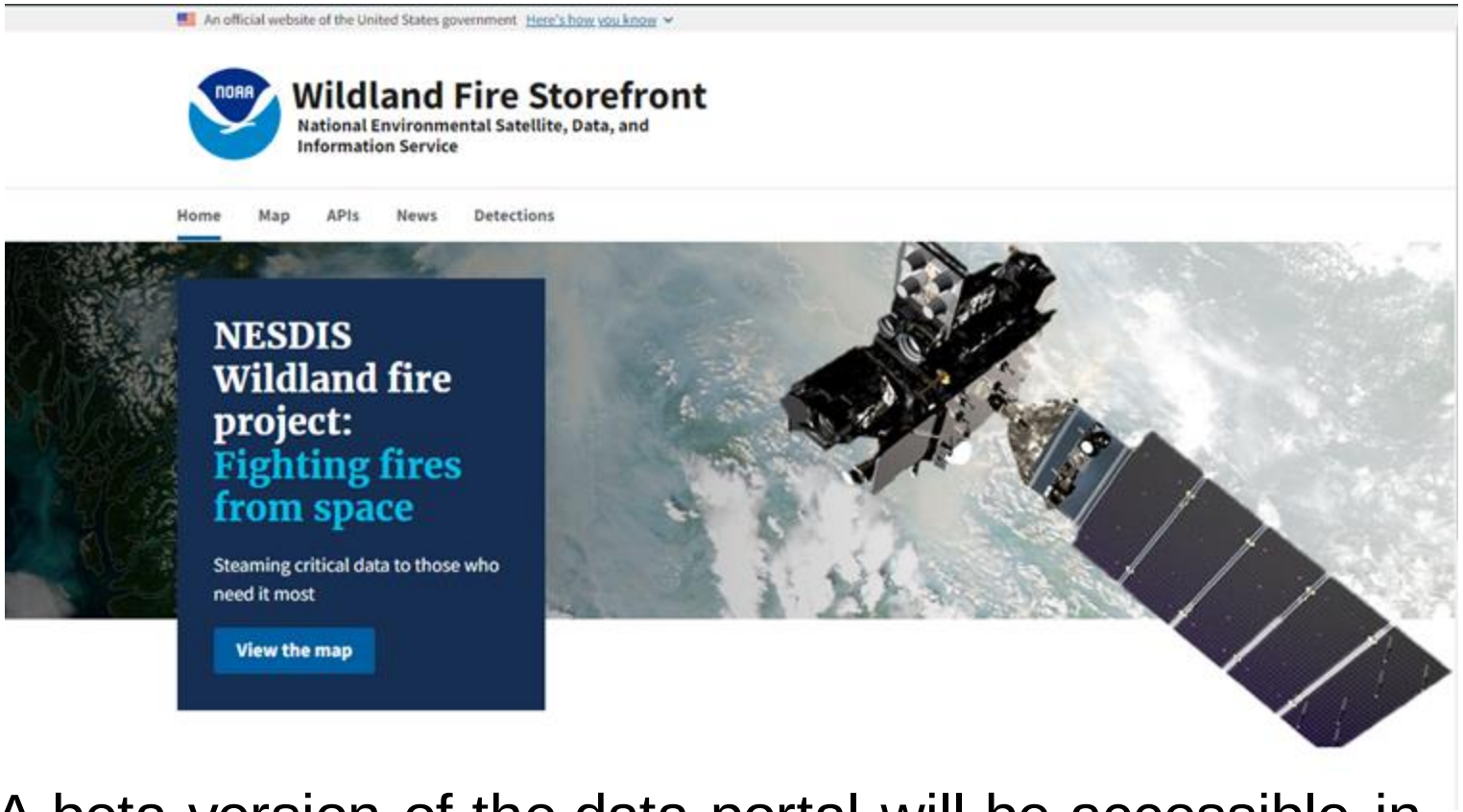
Head Fire (California) - August 15-16, 2023

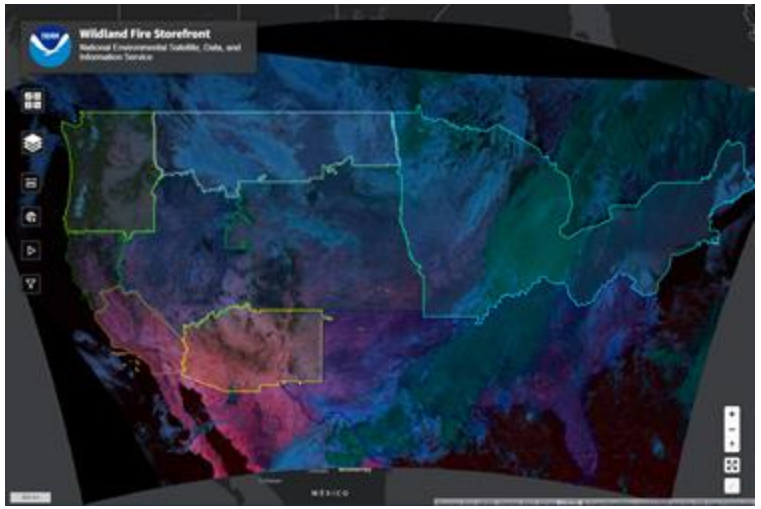
WRF-SFIRE forecasts for new named incidents with satellite fire detections:

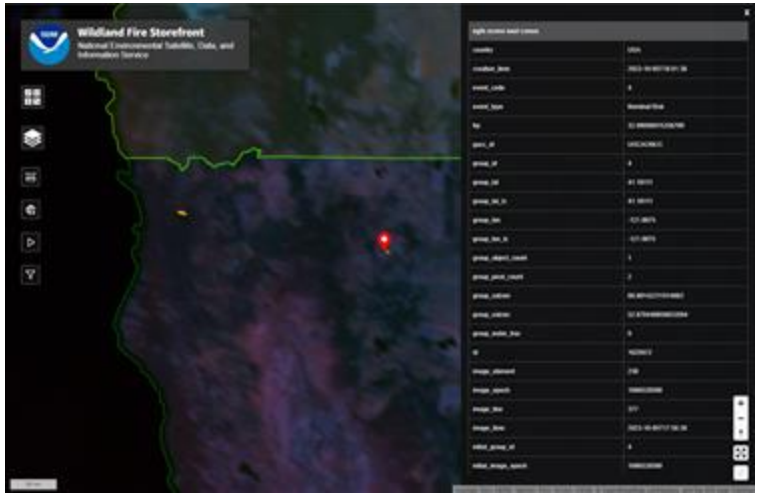
Incident	Forecast Start Time (UTC)	Forecast End Time (UTC)	Final Fire Area (acres)	Mean FRP* (GW)	Max FRP* (GW)	Final FRP* (GW)	Link to Interactive	Link to Video
MALONE	2023-08-15_20:00:00	2023-08-16_20:00:00	6,864	11.74	31.55	22.85	Interactive	Video
MOSQUITO-_O	2023-08-15_18:00:00	2023-08-16_18:00:00	5,087	8.86	20.63	17.12	Interactive	Video
HEAD	2023-08-15_22:00:00	2023-08-16_22:00:00	3,903	6.90	18.30	18.30	Interactive	Video
CHEROKEE_3200	2023-08-15_21:00:00	2023-08-16_21:00:00	3,823	4.21	7.30	4.64	Interactive	Video
3-9	2023-08-16_08:00:00	2023-08-17_08:00:00	474	0.32	1.42	0.68	Interactive	Video
TITUS	2023-08-15_15:00:00	2023-08-16_15:00:00	435	0.06	0.22	0.20	Interactive	Video
WHITE	2023-08-15_20:00:00	2023-08-16_20:00:00	339	0.28	2.40	0.29	Interactive	Video
SHORT	2023-08-15_20:00:00	2023-08-16_20:00:00	201	0.13	0.27	0.20	Interactive	Video
WACO_BEND	2023-08-15_15:00:00	2023-08-16_15:00:00	38	0.01	0.42	0.00	Interactive	Video

Credit: Kyle Hilburn and James Haley
Colorado St. University CIRA

Towards a Dedicated Cloud-based Data Portal for NESDIS Fire Products







A beta version of the data portal will be accessible in March

Timely hotspot alerts	Experimental NGFS (v2) alerts are available here. NOAA Fire Testbed and IAA with DOI+USFS will be used to further refine and improve interoperability.
Incident awareness and assessment	Fire Radiative Power (FRP) time series and incident dashboard tools will be demonstration ready later in 2024. Automated pyrocb detection is under dev.
Fire environment forecasting	NGFS products + WRF-SFIRE; LightningCast UI for wildland fire operations; Development of ML models for lightning ignition and fire intensity prediction.
Event-based data queries	Once the IT security review is complete, experimental NGFS fire products will be available via OGC data services
Smoke analysis and forecasting	Improved satellite-based fire emissions model (RAVE) is now operational in support of the CMAQ and RRFS
Climate monitoring	Ongoing and planned satellite data record re-processing; GHG monitoring

NOAA Fire Weather Request for Information (RFI)

Response Date:
February 16, 2024, 2 P.M. EST

Backup Slides

Links

NOAA Center for Artificial Intelligence

NOAA and Wildland Fire

GOES-R Satellites

JPSS Satellites

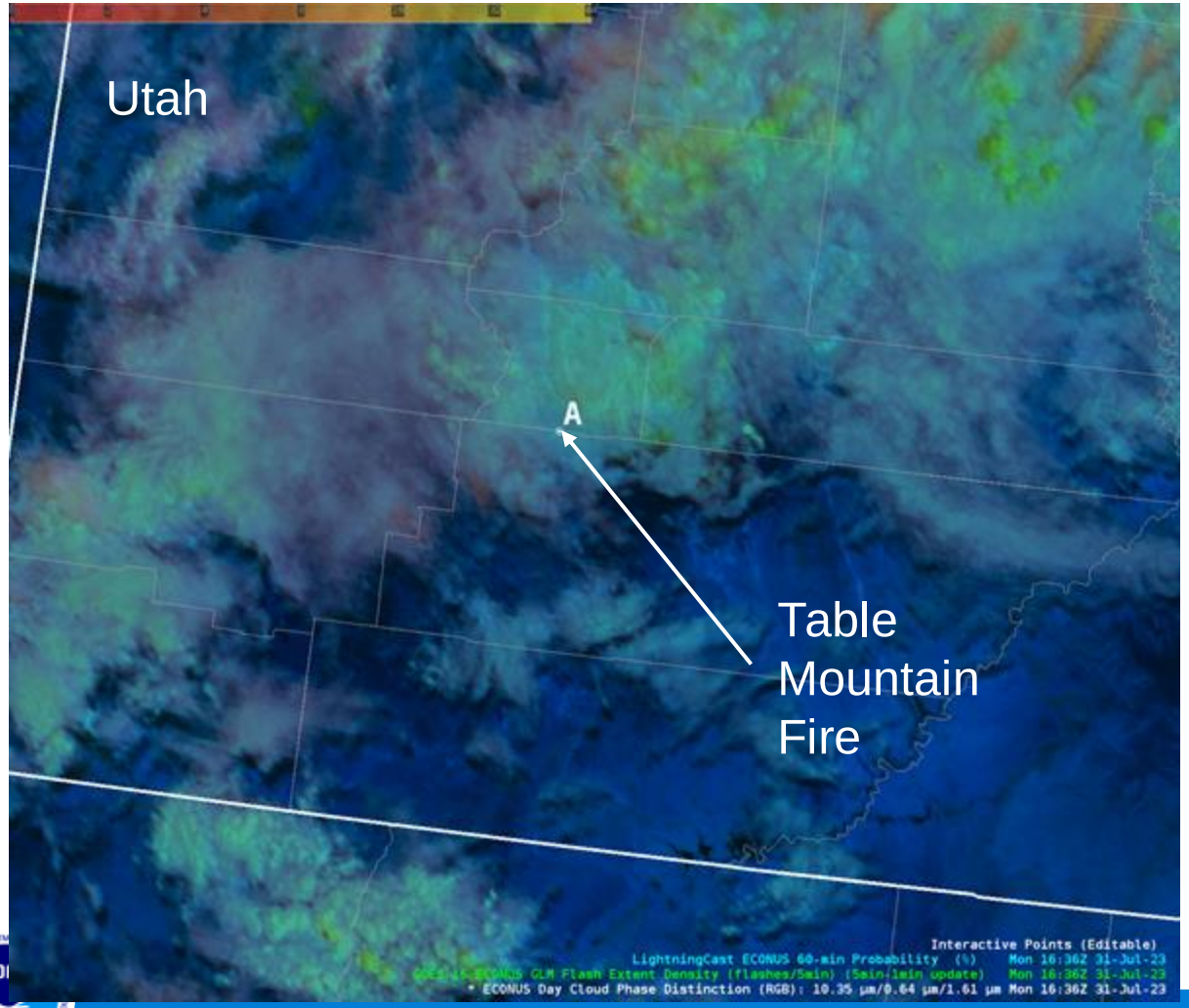
NOAA/NESDIS Hazard Mapping System

NOAA LightningCast:

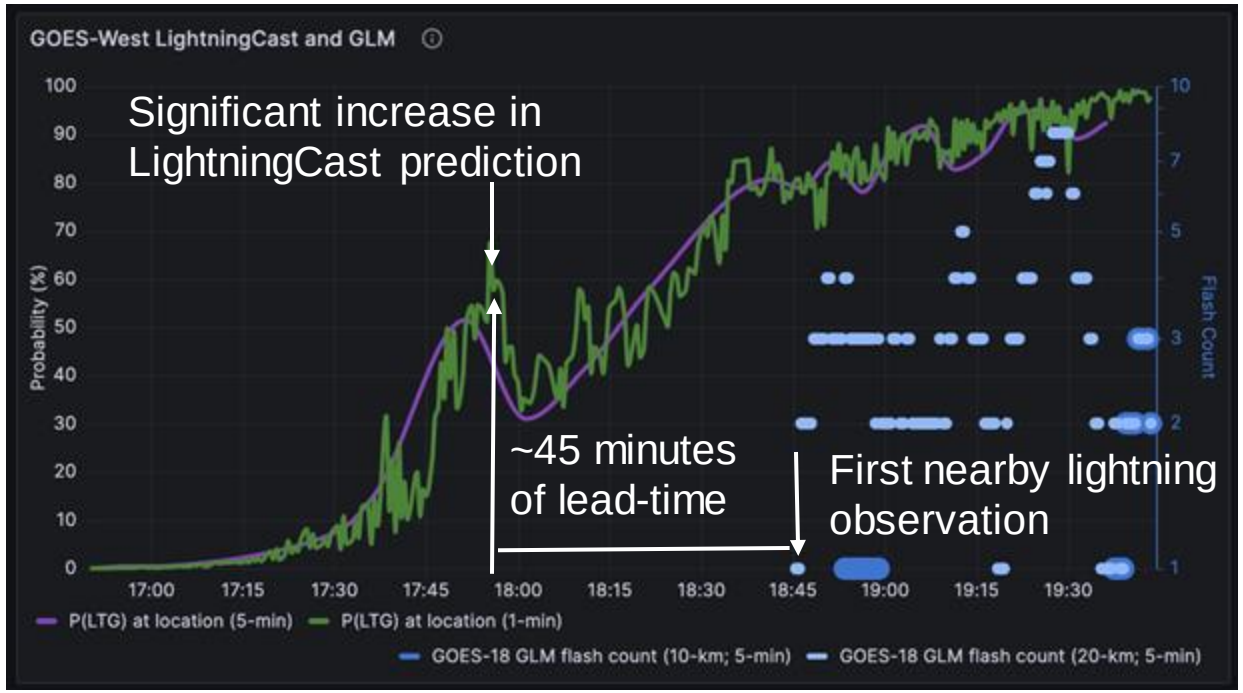
- About
- Near real-time access

LightningCast: AI Lightning Nowcasting for Incident Safety

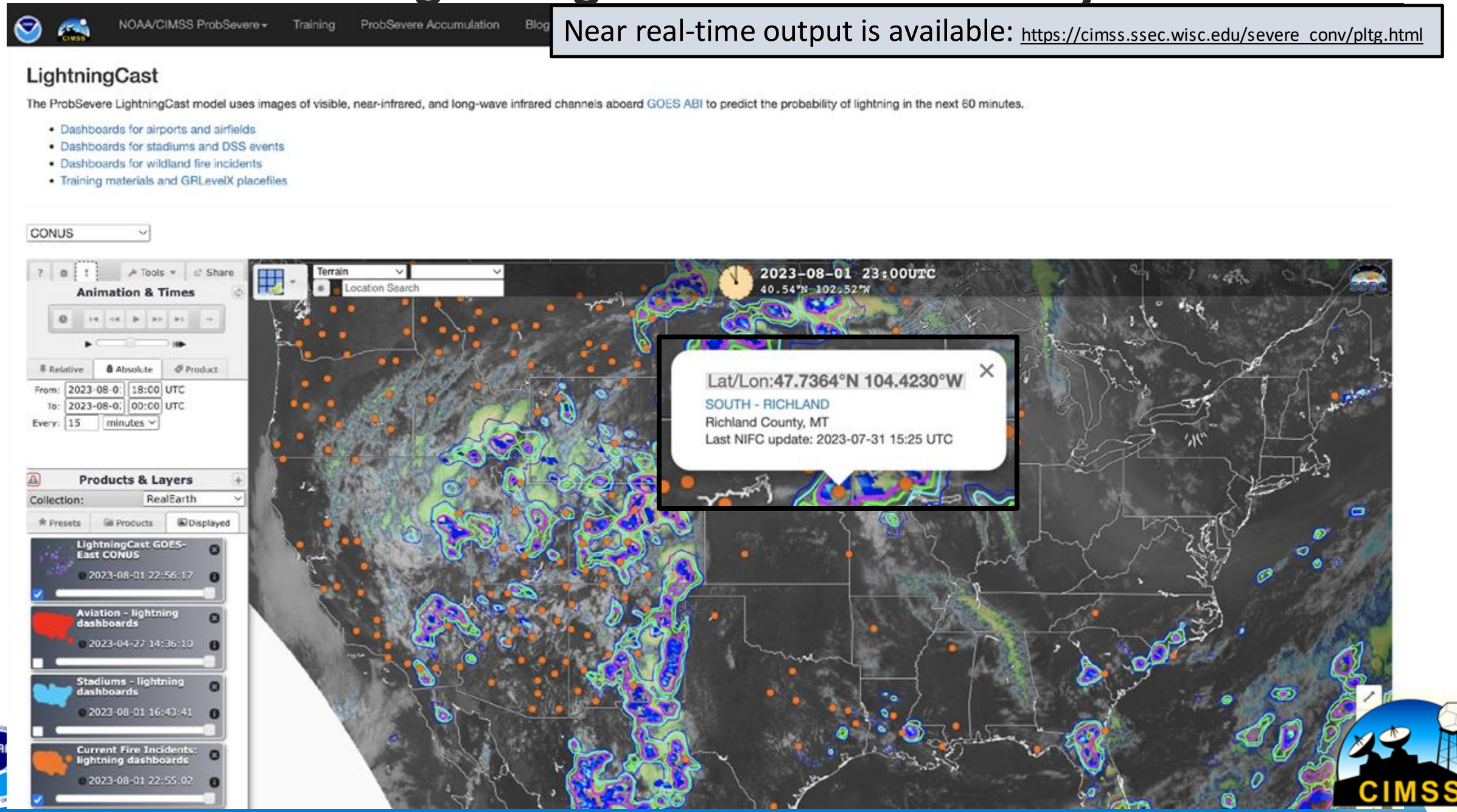
GOES-West satellite imagery + LightningCast prediction contours + GOES-West lightning mapper observations



Pinpoint LightningCast forecast for Table Mountain fire



Credit: NOAA/NESDIS and University of Wisconsin CIMSS

LightningCast web availability

Near real-time output is available: https://cimss.ssec.wisc.edu/severe_conv/pltg.html