Colorado DFPC & Lockheed Martin Pilot Program Overview

Firefighting Intelligence

Scott Eichelberger – Program Manager
Tim Burdick – Chief Engineer

August 13, 2024

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Program Overview & History

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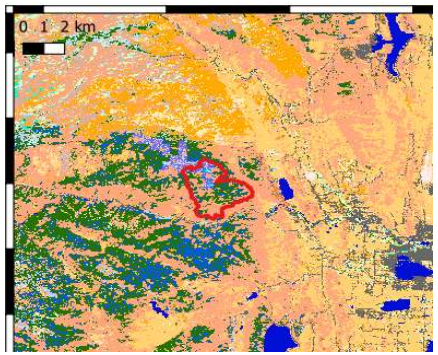
Firefighting Intelligence AI Product Offerings

(1) Fuels Mapping – monthly fuel & vegetation change map

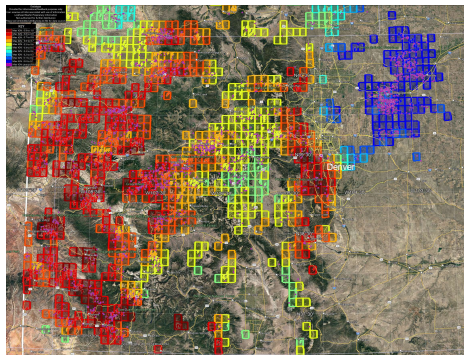
(2) FlashTracker™ – lightning-induced ignition potentials

(3) Fire Perimeter Mapping – persistent satellite fire perimeters

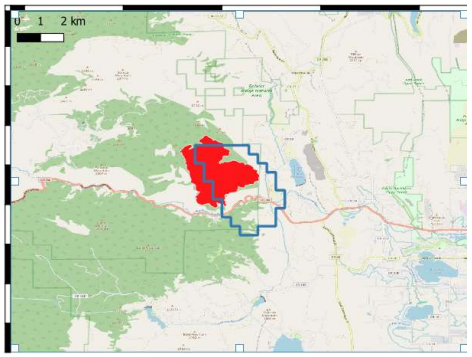
(4) Fire Prediction – automated near real-time fire spread predictions



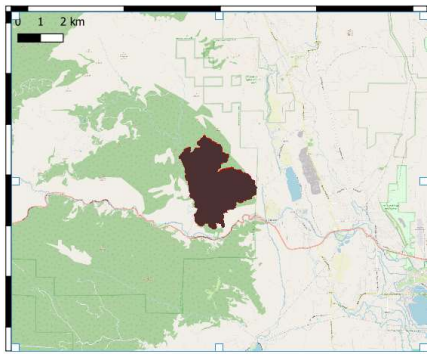
(1) Fuels



(2) FlashTracker



(3) Perimeter



(4) Prediction

AI technologies rapidly turns data into actionable intelligence

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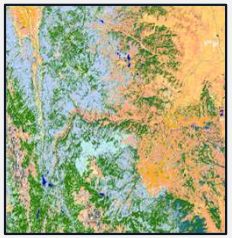
Recent DFPC Pilot & Fire Activities Support

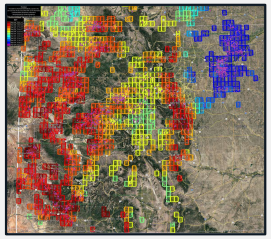
Pre-Fire

Fuels Mapping



- Delivered 3 monthly fuel maps
  - ➢ June, July, and August Maps
  - ➢ Identifying monthly changes to higher spread rate
  - ➢ Identifying monthly water shed changes

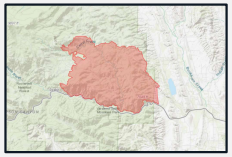
FlashTracker



- Generated 811K FlashTracker predictions
- Delivered 51 daily maps to MMA team
- 96% of 178 natural fires had high ignition potential lightning events within the preceding 72 hours
- Average lead time: 23 hours (from lightning to reported fire)

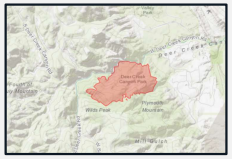
Active Fire

Alexander Mountain Fire



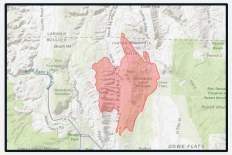
- First LM posted Perimeter to DFPC on 29 July at 11:10 AM MT
  - ➢ Delivered over 200 satellite perimeters to DFPC
  - ➢ Delivered 4 daily fire behavior predictions

Quarry Fire



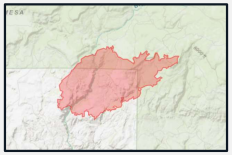
- First LM Posted Perimeter to DFPC on 31 July at 10:00 PM MT
  - ➢ Delivered 3 satellite perimeters to DFPC

Stone Canyon Fire



- First LM Posted Perimeter to DFPC on 30 July at 2:09 PM MT
  - ➢ Delivered over 100 satellite perimeters to DFPC
  - ➢ Delivered 2 daily fire behavior predictions

Bucktail Fire



- First LM Posted Perimeter to DFPC on 01 August at 2:00 PM MT
  - ➢ Delivered14 satellite perimeters to DFPC

Real-Time Accessible Intelligence

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Alexander Mountain Fire

9,668 Acres; $12M Est. Cost to Date (as of 8/12); cause undetermined

Land & Ignition Potential Mapping

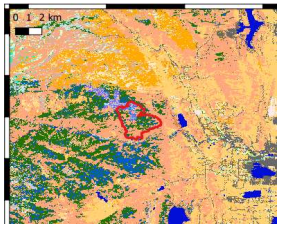
- **August (monthly) Fuel Map:** 270k acres updated (5.8% of zone)
  - Fuel type changed to more burnable (higher spread rate, larger flame length, lower moisture content)

Detection

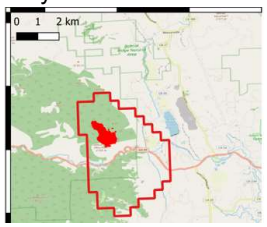
- **First LM Satellite Perimeter:** 10 minutes after fire reported
- **First MMA Perimeter:** 49 minutes after fire reported
- Over 200 satellite perimeters shared to DFPC throughout week of 29 July

Spread Prediction

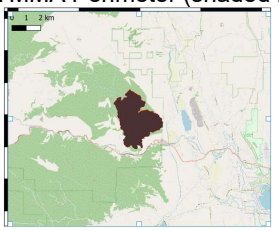
- **First Prediction:** 80 minutes after fire reported
  - One spread prediction provided each day to DFPC (4 total) 30 minutes after MMA perimeter received



LM Fuel Map
(MMA July 30 Perimeter red outline)



First Satellite Perimeter (outline) &
First MMA Perimeter (shaded red)



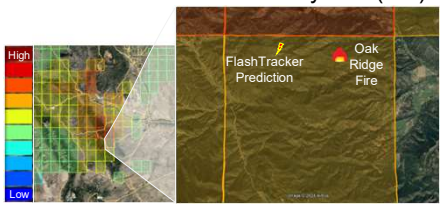
Spread Prediction on
Alexander Mountain fire July 30th (red)

Oak Ridge Fire

1,310 Acres; $18M Est. Cost to Date (as of 8/12); natural cause

FlashTracker (Lightning-Induced Ignition Potential Mapping)

- Characterized high ignition potential lightning event within 2.7 km of fire location, 42 hours before reported fire (as in WFIGS)



FlashTracker Ignition Potential Map
(Oak Ridge Fire) June 21st

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Summary & Next Steps

Pilot Program Goal

- Provide first responders with near real-time intelligence to enhance pre-fire and aggressive initial attack operations

Next Steps

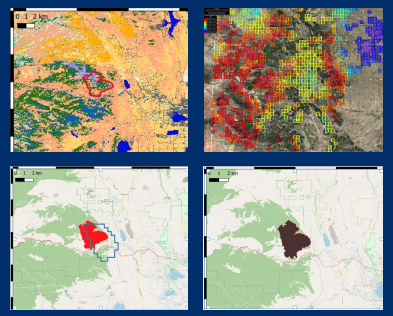
- Extend Pilot Program, continue working closely with CO DFPC Center of Excellence (CoE), Multi-Mission Aircraft team, and Intelligence Unit
- Continue collaboration across CO DFPC to transition capabilities into operations and expand geographically

Uniquely positioned to evaluate and drive innovations in wildland fire

Colorado Field Pilot

*"… the (Lockheed) **partnership** has been open, productive and success centric. Many times in my career I've watched industry not give ops folks the credit they deserve in truly knowing the environment they work in and the real implications of a proposed solution and a perceived, "what would you know, you're not an engineer" attitude. What I saw (throughout the pilot) was none of that. In fact the **collaboration** made me a bit proud. It was **awesome** to see."*

– Ben Miller, Director CO DFPC CoE



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Alexander Mountain Fire

9,668 Acres; $12M Est. Cost to Date (as of 8/12); cause undetermined

Land & Ignition Potential Mapping

- **August (monthly) Fuel Map:** 270k acres updated (5.8% of zone)
  - ➢ Fuel type changed to more burnable (higher spread rate, larger flame length, lower moisture content)
- **FlashTracker:** characterized high ignition potential lightning event within 1.5 km of fire location, 40 hours before reported fire (as in WFIGS)

Detection

- **First LM Satellite Perimeter:** 10 minutes after fire reported
- **First MMA Perimeter:** 49 minutes after fire reported
- Over 200 satellite perimeters shared to DFPC throughout week of 29 July

Spread Prediction

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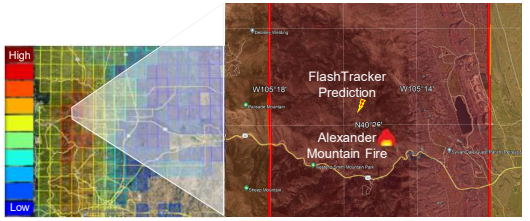
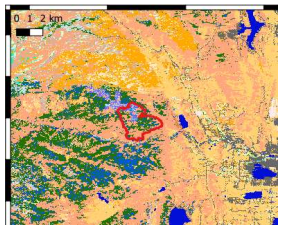
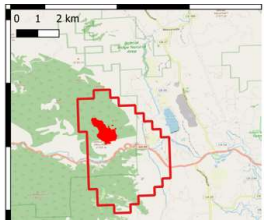


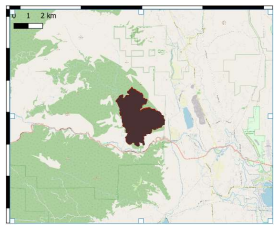
FlashTracker Ignition Potential Map July 28th



LM Fuel Map
(MMA July 30th Perimeter red outline)



First Satellite Perimeter (outline) &
First MMA Perimeter (shaded red) July 29th


Spread Prediction on Alexander Mountain fire July 30th (red)

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Changes to Fuel in area of Alexander Mountain Incident

Overview:

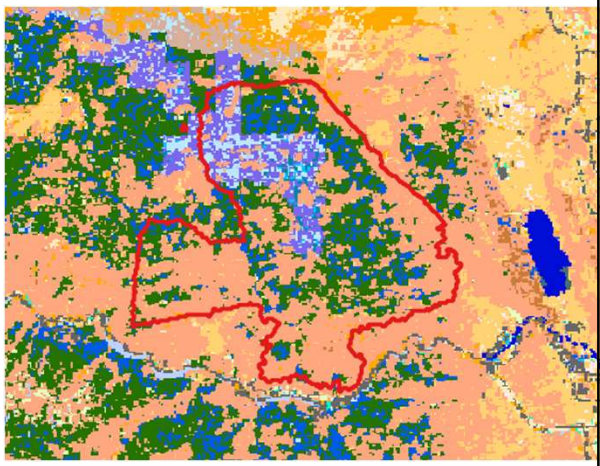
- Lockheed Martin Fuel Maps capture seasonal variation in vegetation to represent actual fuels on ground

Changes Made: Updated 270k acres - 5.8% of zone

- LM Fuel changed Timber Understory 5 to Grass Shrubs 2.
- LM Fuel changed Timber Litter 4 and 8 to Grass Shrubs 2

Significance:

- Grass Shrub 2: Spread rate high; flame length moderate. Extinction moisture content 15%
- Timber Understory 5: Spread rate moderate; flame length moderate. Extinction moisture content 20%
- Timber Litter 4: Spread rate low; flame length low
- Timber Litter 8: Spread rate moderate; flame length low



Alexander Mountain MMA Perimeter 30 July 24 with LandFire Base Map and LM Fuel Map Change mask gif

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