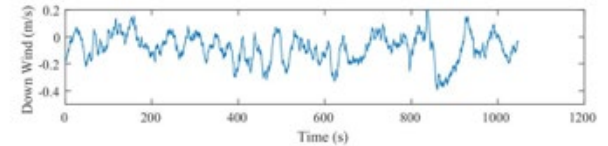
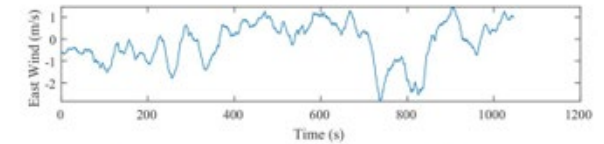
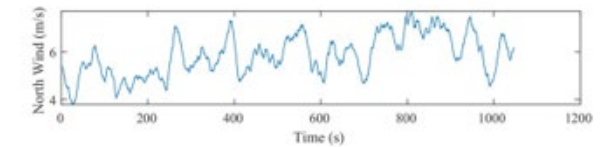
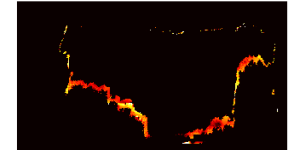
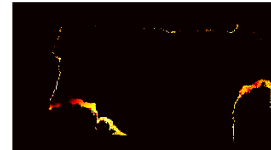
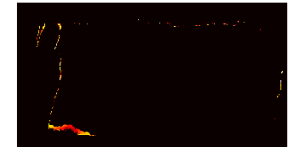
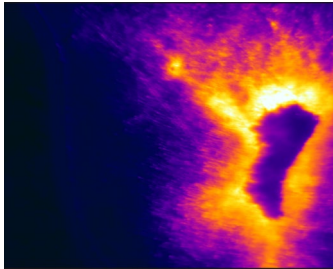


Fire Data Collection and Sharing



Saket Gowravaram
Ph.D. Candidate

Cooperative Unmanned Systems Lab (CUSL), University of Kansas

Nov 17, 2021



Data Sharing

- We can share UAS-acquired fire data that is available for download and use by researchers and engineers.
- This data will benefit the following groups:
 - Fire spread researchers;
 - Post-fire ecology researchers;
 - Prescribed fire community;
 - Fire fighters/first responders;
 - UAS groups.

USDA FOREST SERVICE

Fire Data in Google Earth

Current Large Incidents (Home)
 New Large Incidents
 Fire Detection Maps
 Satellite Imagery
 Fire Detection GIS Data
 Fire Data in Google Earth
 Fire Data Web Services
 Latest Detected Fire Activity
 NASA Near Real-Time Data and Imagery Products
 Frequently Asked Questions
 About Active Fire Maps

MODIS VIIRS AVHRR GOES

Continental United States

KML Access:
 The links below provide access to several geospatial datasets relevant to fire management in Google Earth and other virtual globe applications. These datasets are organized by specified geographic region and include location and characterization of current large incident locations and NWS fire weather forecasts.

All KMLs update automatically to ensure availability of the latest information. (Current link series KMLs are provided for the latest updates of each of the fire detection data layers to KMLs for previous dates are provided for relevant data layers (Historic link).)

KML Descriptions:
Fire Detections - MODIS (1km), VIIRS (375m and 750m), AVHRR (1km) and GOES (4 time/date of occurrence within the last 6, 12 and 24 hours, and the 6 days previous to the last 24-hour period). Available for MC
Fire Radiative Power - Measured fire radiative power (fire intensity) for MODIS fire d 6, 12 and 24 hours, and the 6 days previous to the last 24-hour period. Available for MC
Large Incidents - Location and intelligence information of large wildfire incidents from the National Interagency Fire Center (NIFC) and Canadian provincial and territorial fire agencies.
Fire Weather - Current National Weather Service fire weather watch and red flag warnings.

NASA FIRMS
 Fire Information for Resource Management System

Announcements Feedback

Lat: 40.180° Lon: -145.930° Fires: Last 24hrs

CURRENT **HISTORICAL**
 TODAY 24 HRS 7 DAYS
 From Yesterday 00:00:00 GMT to present

BASIC MODE **ADVANCED**

Fires / Hotspots
 Simple Time Based
 VIIRS (S-NPP & NOAA-20)
 MODIS (Aqua & Terra)

Overlays
 Dynamic Imagery
 VIIRS NOAA-20 Corrected Reflectance (true color)
 VIIRS S-NPP Corrected Reflectance (true color)
 MODIS/Terra Corrected Reflectance (true color)

Static Backgrounds
 Blue Marble
 Streets
 Topographic

NOTE: ACTIVE FIRES / THERMAL ANOMALIES





Fire Data Overview

- **Satellites**

- Multispectral imagery;
- Vegetation indices/Land cover change products.



- **Aerial**

- Remote sensing:
 - Optical (RGB, NIR, Thermal) imagery;
 - Lidar data.
- In-situ sensing:
 - 5-hole pressure data for 3D wind and turbulence measurement;
 - Atmospheric sensors: humidity, temperature, CO₂, etc.



- **Ground**

- Ground multispectral pictures;
- Weather station for wind, temperature, humidity measurements;
- Location of fire setting crew (prescribed fire) and fire fighting crew (wildfires);
- Field measurements:
 - Biomass (pre and post fire);
 - Moisture.



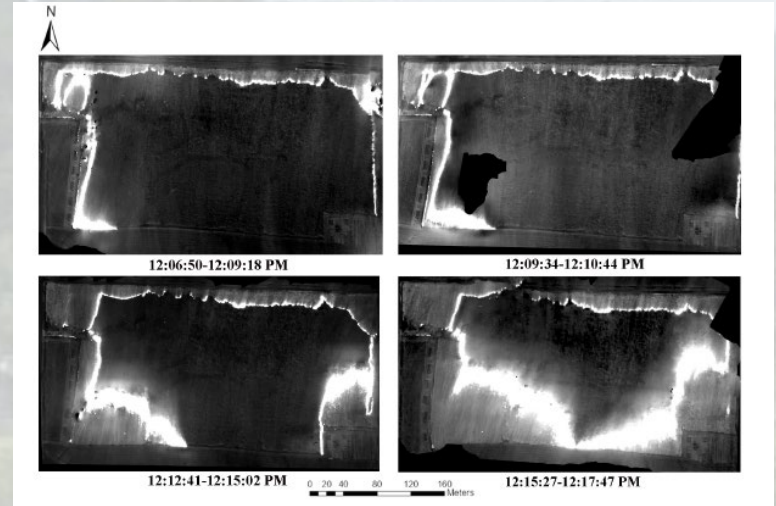
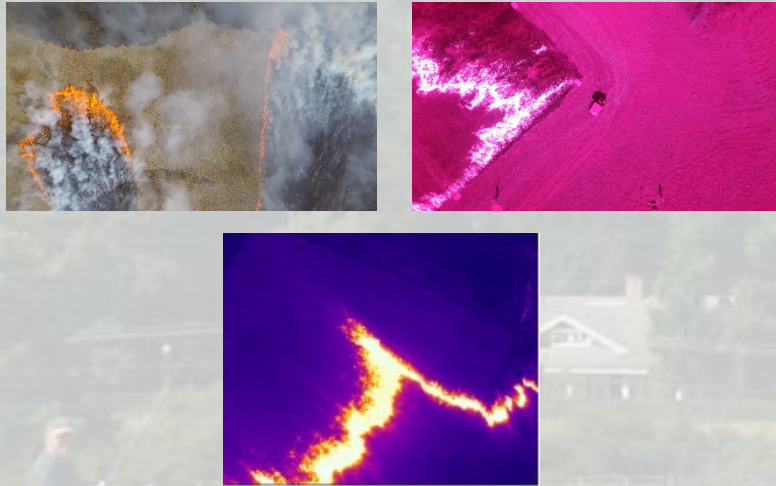


What Research Questions can be Addressed?

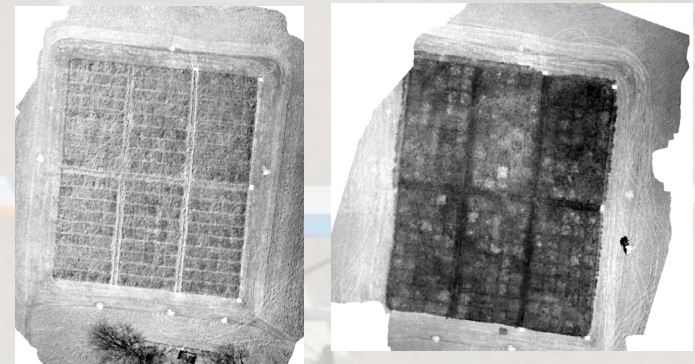
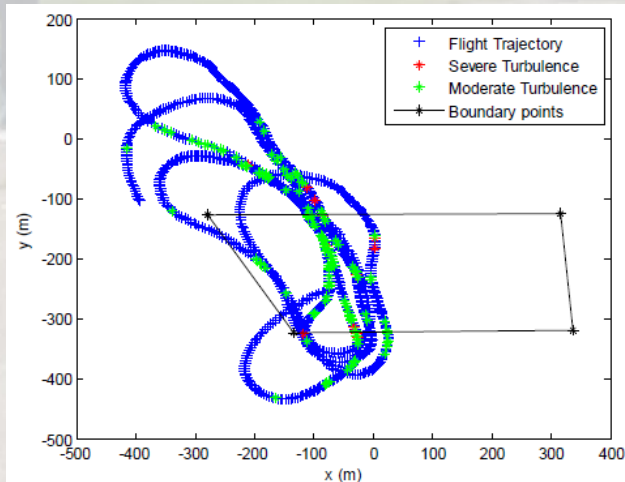
- **Accurate data-driven models for wildfire prediction and prevention.**
 - Pre-burn fuel and moisture conditions, weather conditions, terrain types.
- **Accurate data-driven models for prescribed prediction and planning.**
 - Pre-burn fuel and moisture conditions, weather conditions. When to burn?
- **What are the ecological effects of fires under different conditions??**
 - Burn severity, land cover change, and CO2 emissions.
- **How do fires behave under different conditions?**
 - Fire location, Fire ROS, Flame height, and temperature.
- **How to plan a robust and safe path for UAS for fire observation??**
 - Smoke-generated turbulence, flight performance, desired flight path and altitude
- **Test-beds of development of UAS real-time fire following algorithms.**
 - Direct georeferencing algorithm validation, UAS guidance development.



Examples of Aerial Data



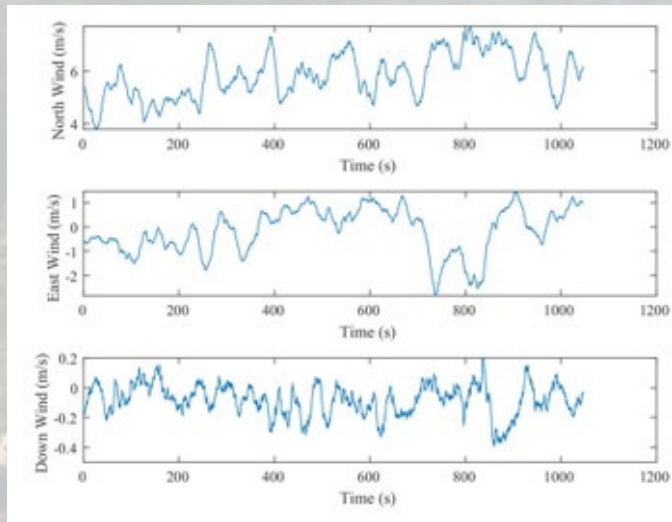
Individual Multispectral Frames



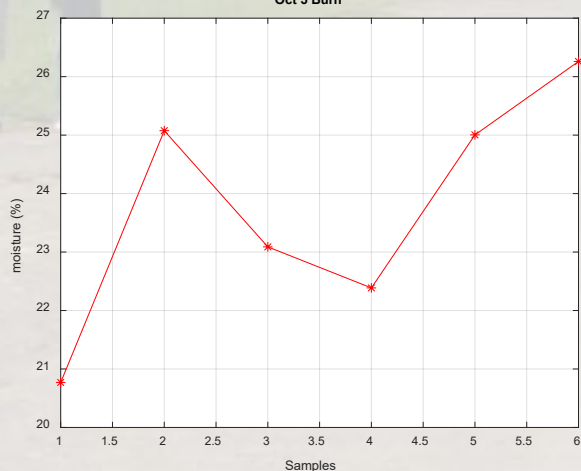
Orthorectified and Registered Images



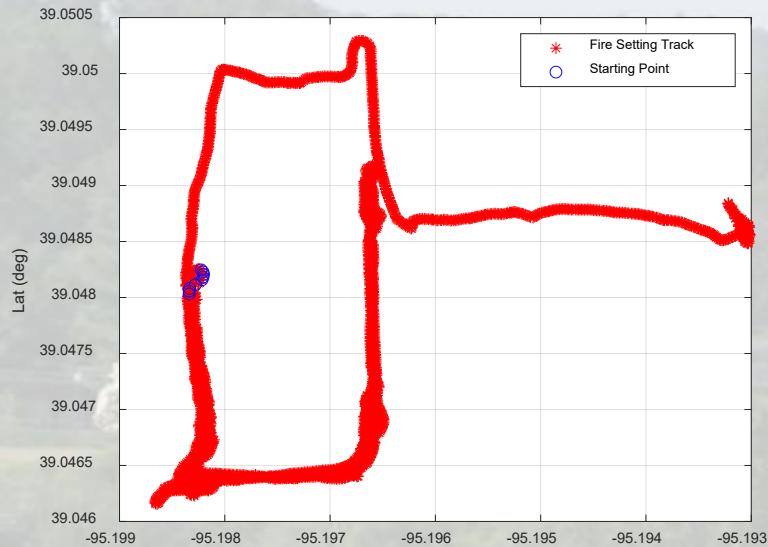
Examples of Ground Data



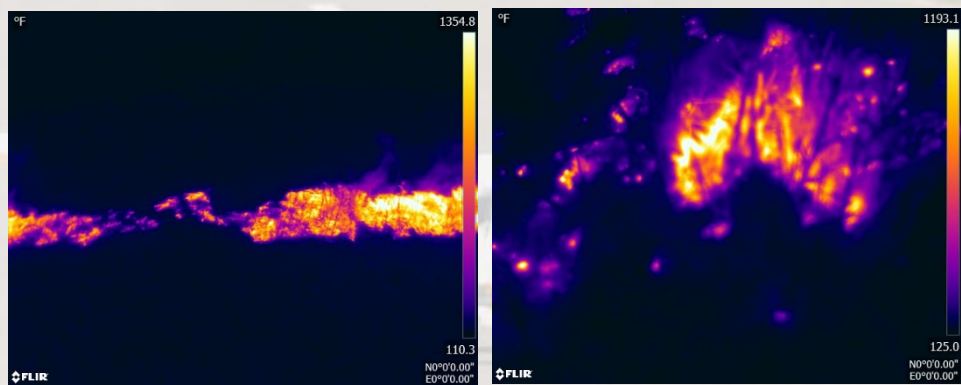
Weather Station: 3D Midflame Wind



Fuel Moisture



Prescribed Fire Setting Crew Locations



Ground pictures