

UMBC

*Calwood Fire, CO along the Peak-to-Peak
Highway – Malachi Brooks*

Remote Sensing Applications for Post-Fire Hazard Assessments

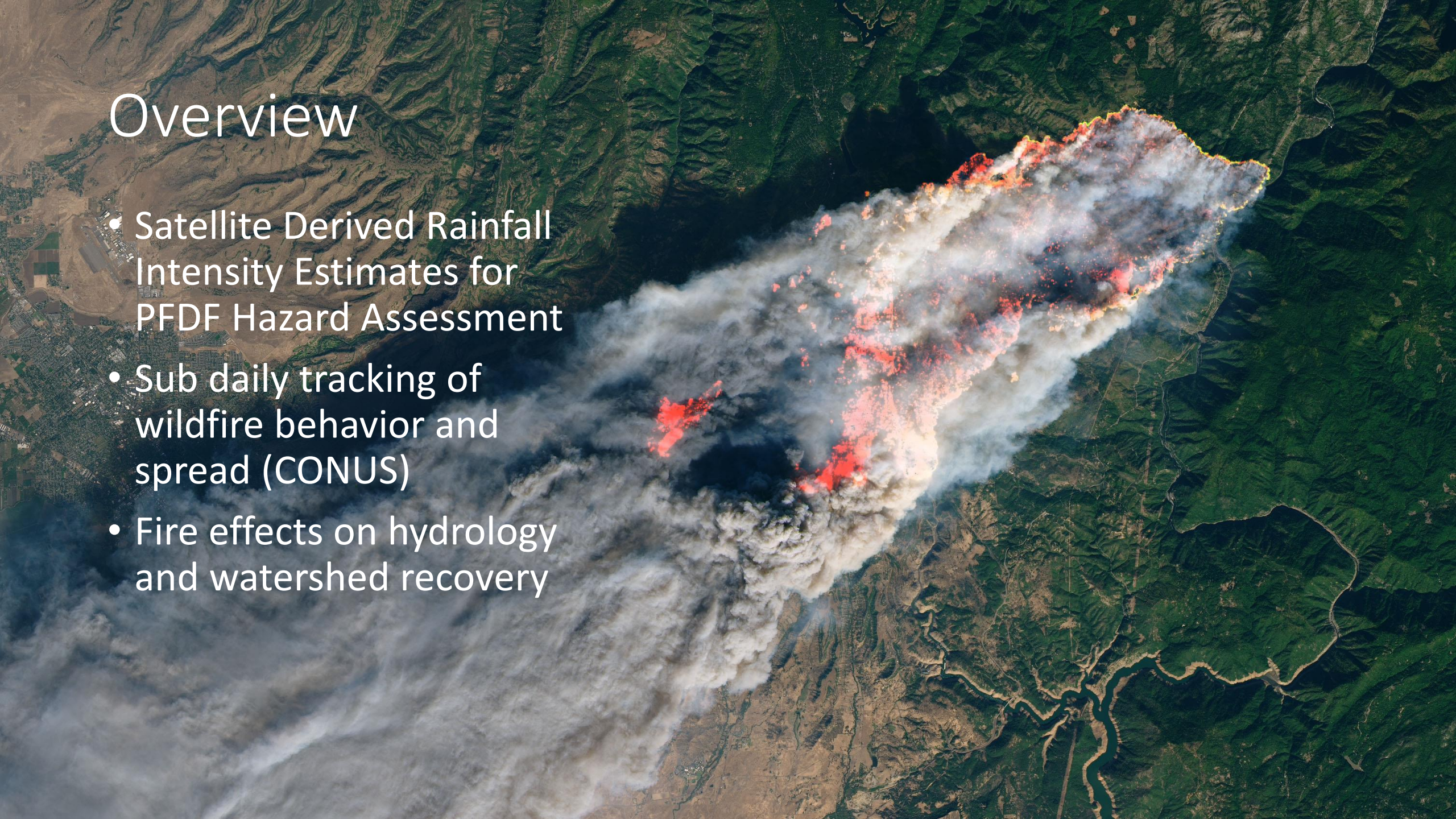
Elijah Orland^{1,2}, Dalia Kirschbaum², Douglas Morton², and Thomas Stanley^{1,2}

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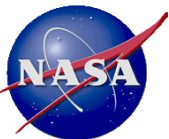
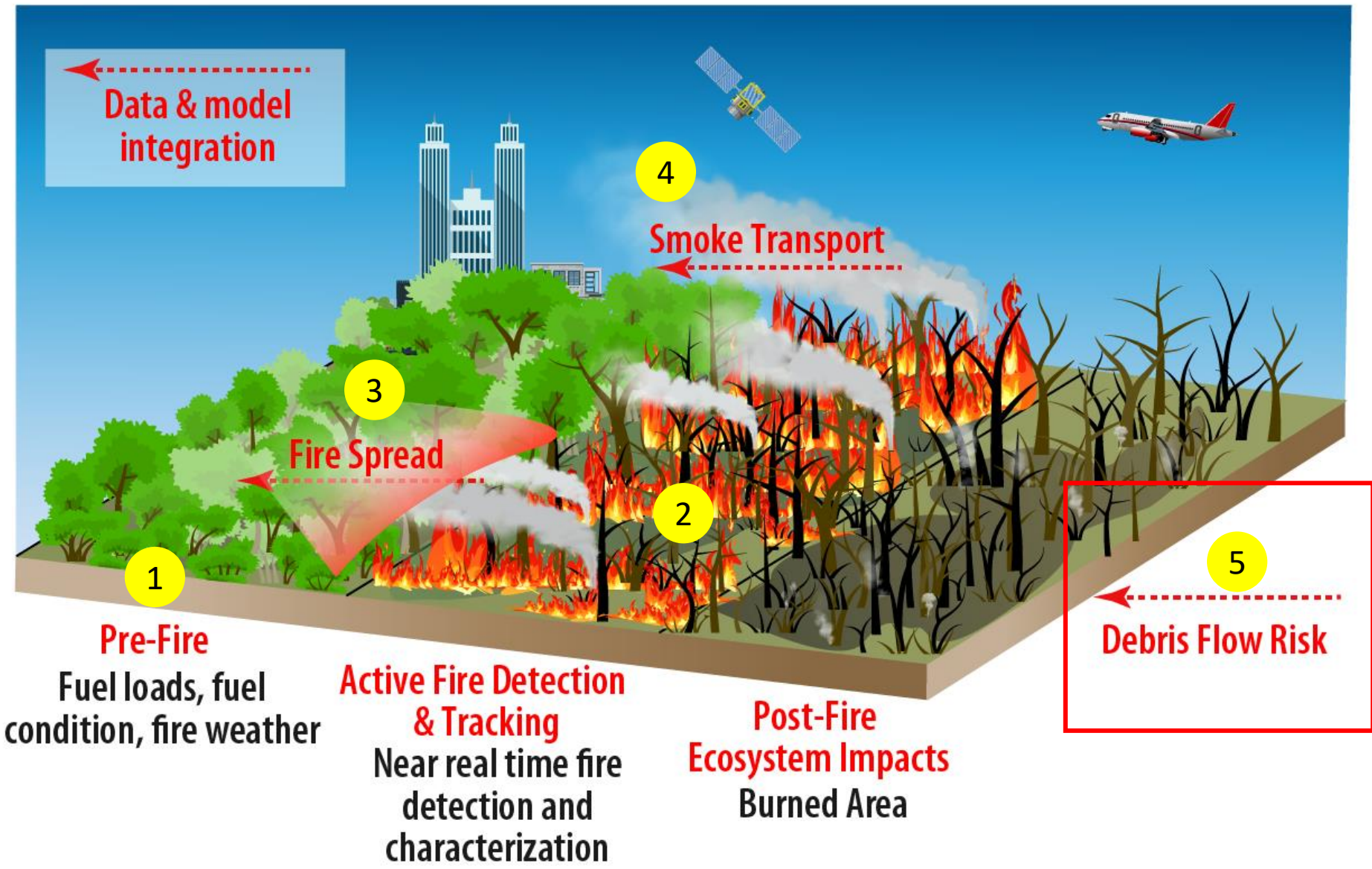
Overview

- Satellite Derived Rainfall Intensity Estimates for PFDF Hazard Assessment
- Sub daily tracking of wildfire behavior and spread (CONUS)
- Fire effects on hydrology and watershed recovery



NASA Earth Information Systems (EIS)

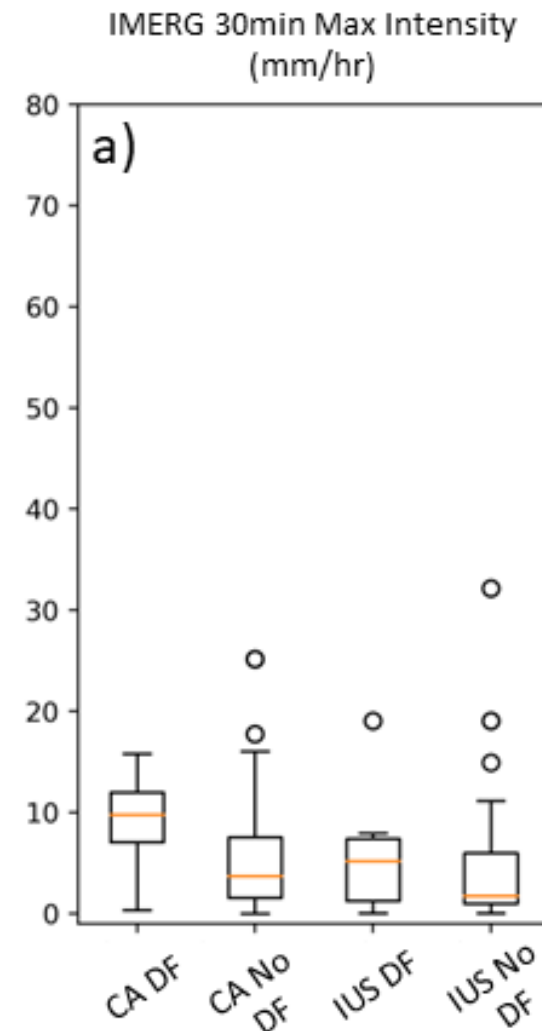
Satellite and ground-based
atmospheric chemistry
Fire Emissions



Orland, E., Kirschbaum, D., & Stanley, T. (2022). A scalable framework for post fire debris flow hazard assessment using satellite precipitation data. *Geophysical Research Letters*, 49, e2022GL099850. <https://doi.org/10.1029/2022GL099850>

- Model analogous to the Staley et al (2016) Logistic Regression model for rapid PFDF hazard assessment – focus on global scale data
- Rainfall estimates via Integrated Multi-Satellite Retrievals for GPM (IMERG) v6 algorithm
- Uses globally available input data, calibrated for NRT assessments every 30min at ~3hrs global latency and 0.1° Resolution

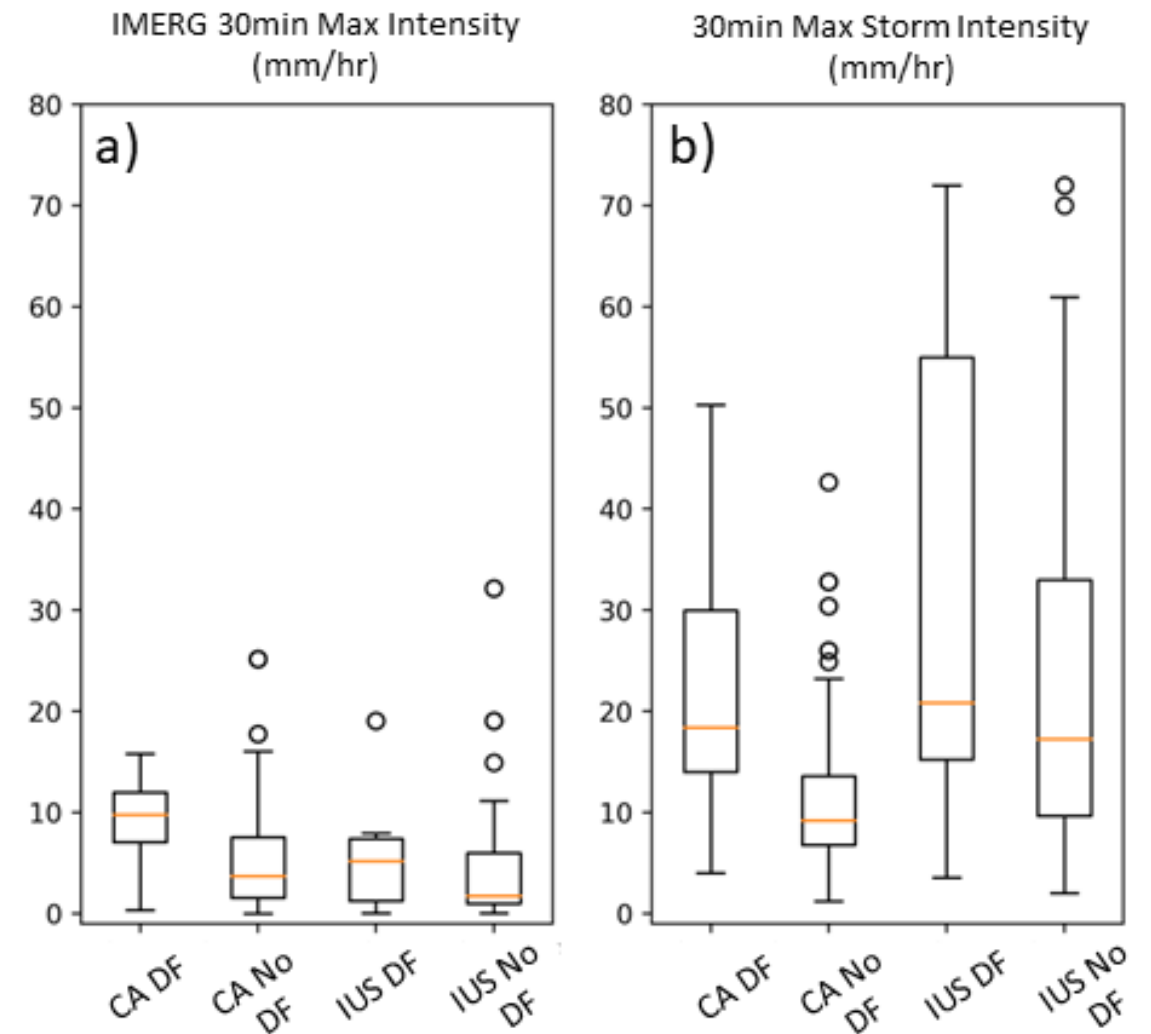
CA = California
IUS = Interior United States



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Current work:
subdaily
monitoring of
active fire
behavior and
spread

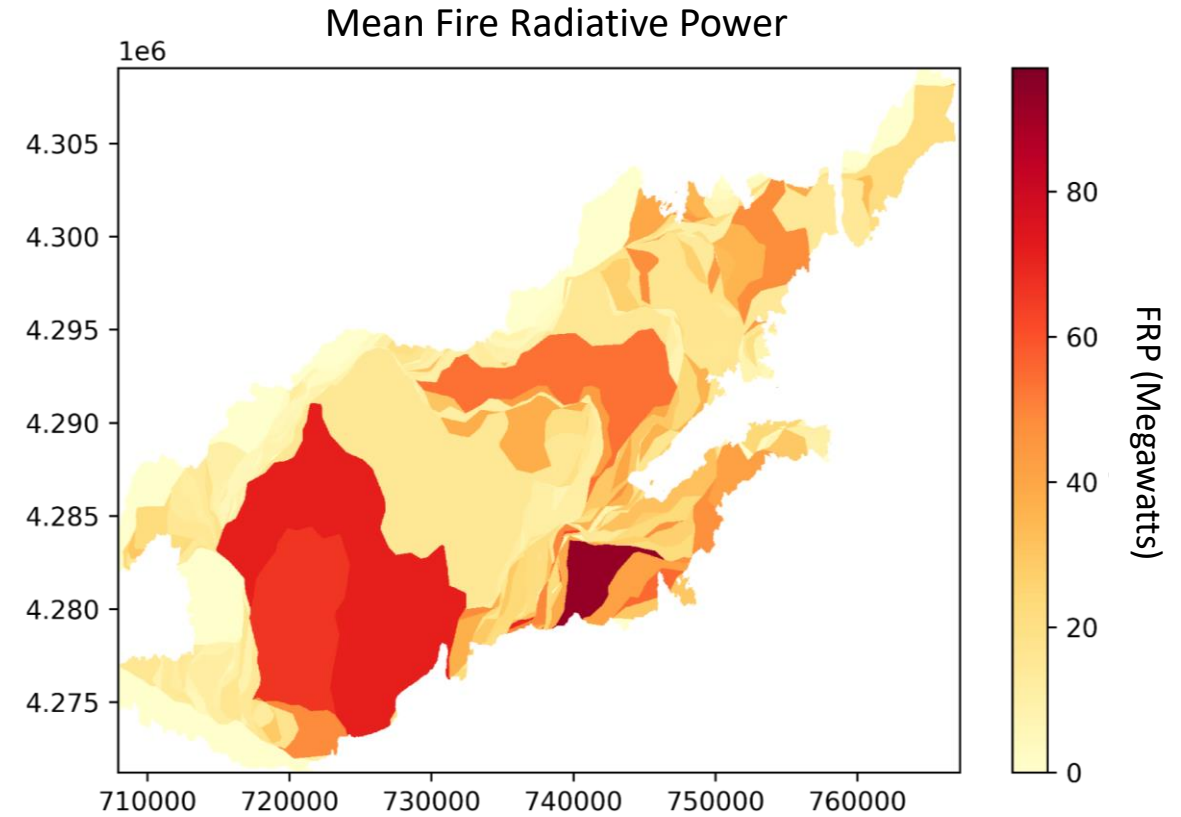
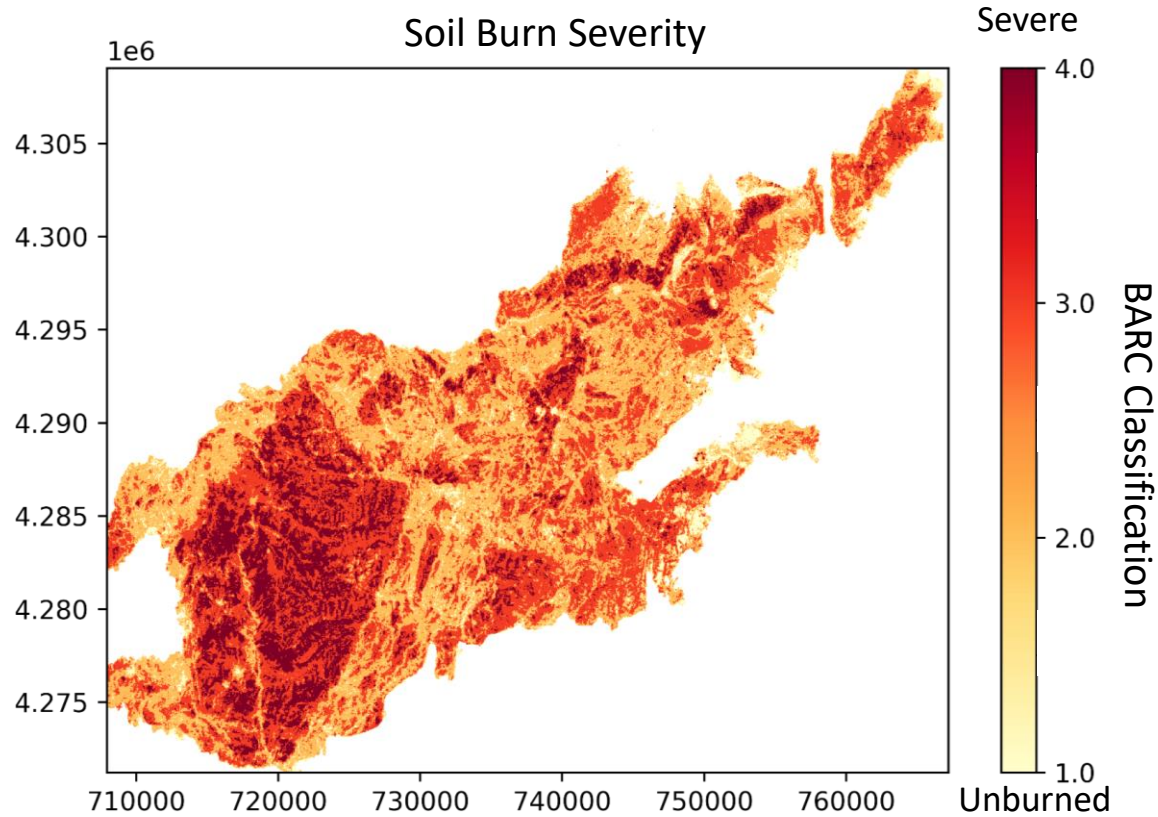
- SNPP and NOAA-20 VIIRS (*The Visible Infrared Imaging Radiometer Suite*) sensors for active fire detection at ~375m w/ 2-4 overpasses daily
 - Clustering of pixels → burn area construction
- Updated tracking and a new fire perimeter every 12hrs

Relevant paper: Chen et al., 2022. *California wildfire spread derived using VIIRS satellite observations and an object-based tracking system*

Aug 11 2021

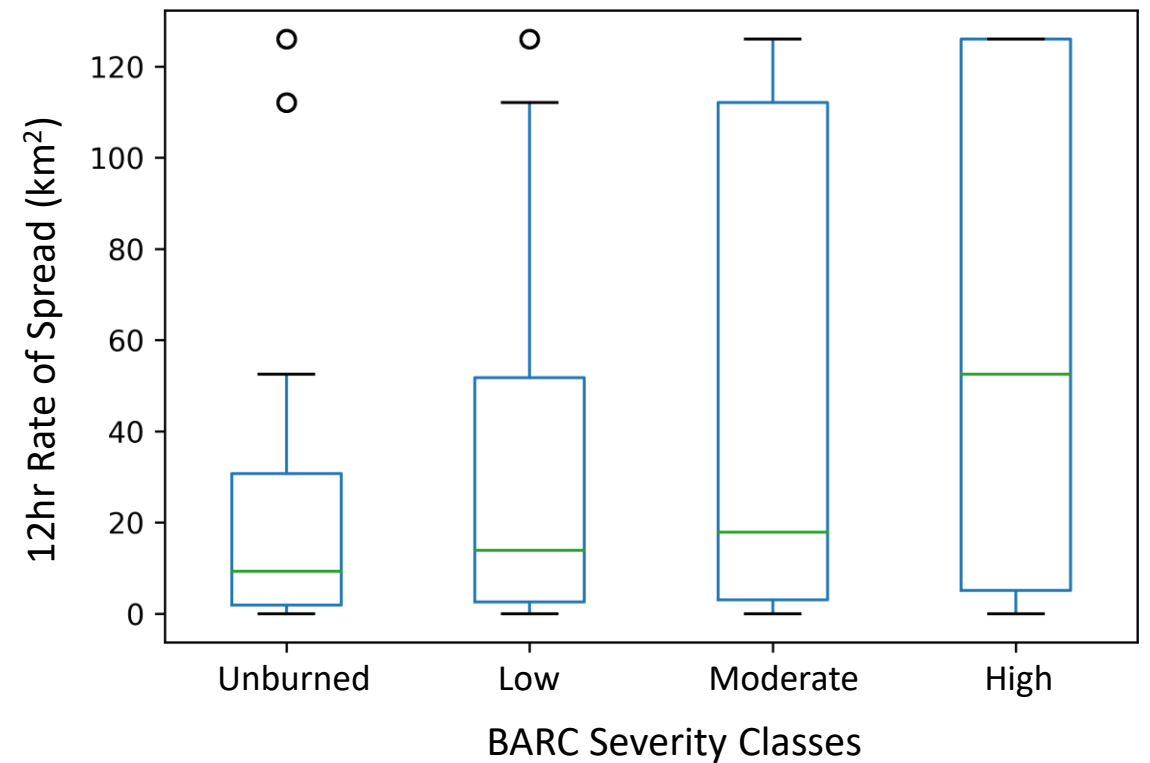
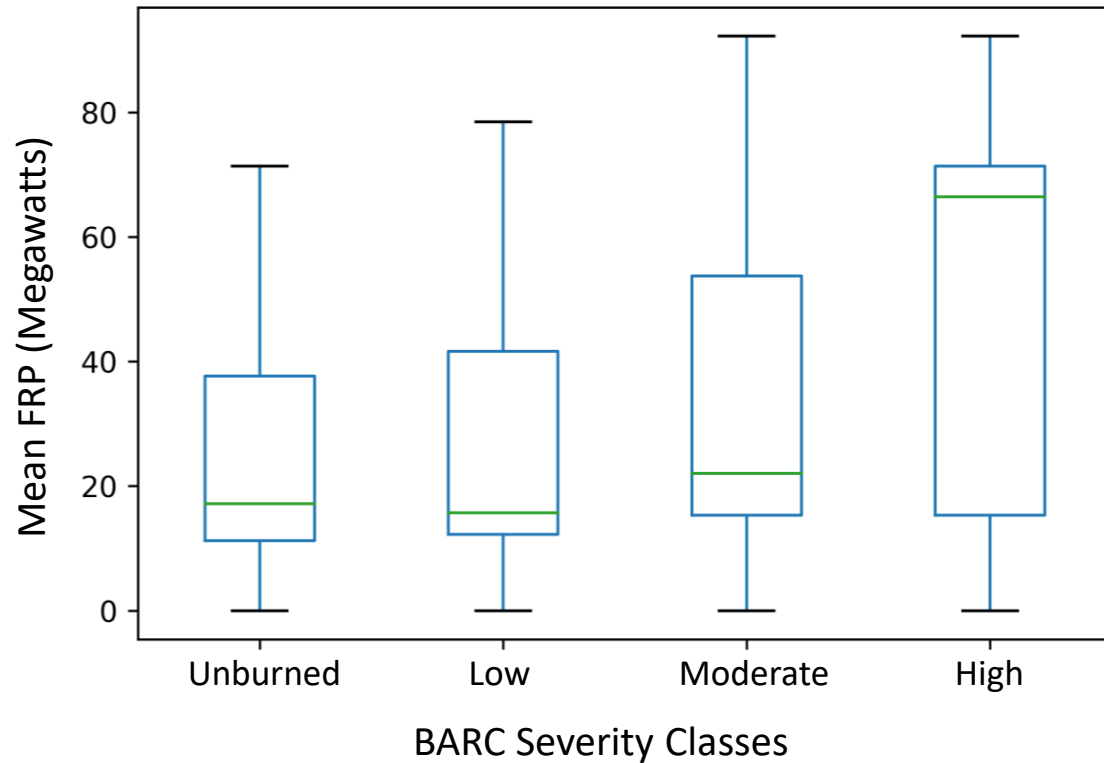


Relationship between Fire Behavior and Burn Severity



Source: BAER Emergency Assessment

Caldor Fire Soil Burn Severity



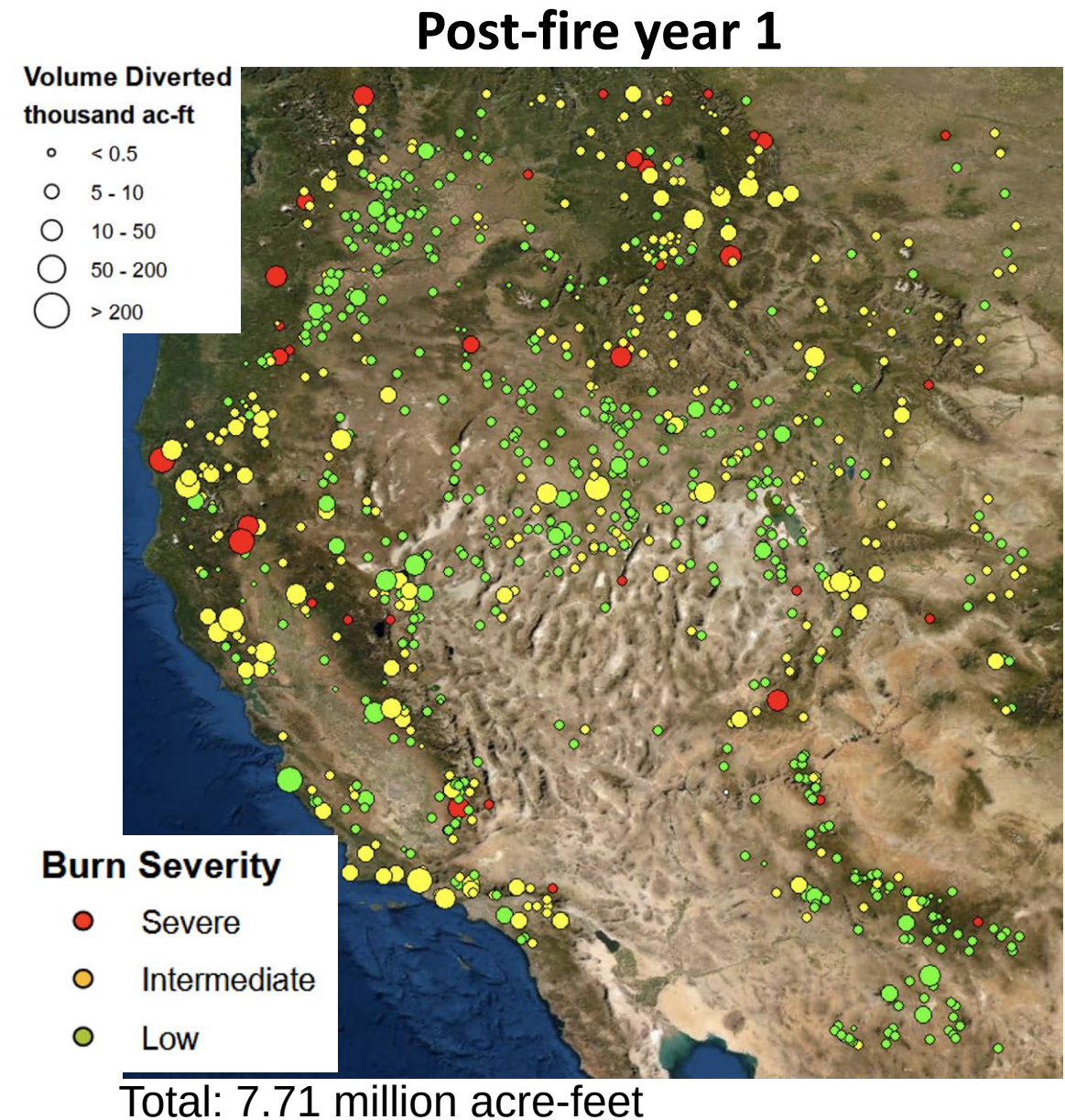
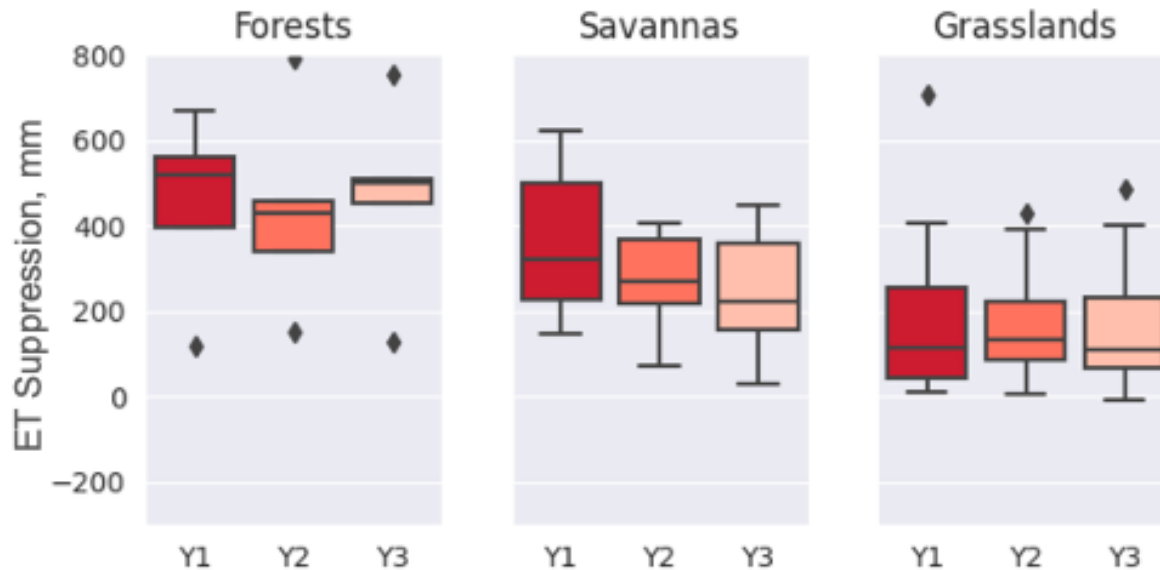
Working with USGS EROS to produce rapid burn severity estimates to highlight most severely impacted areas before fire is contained and cloud free imagery is available

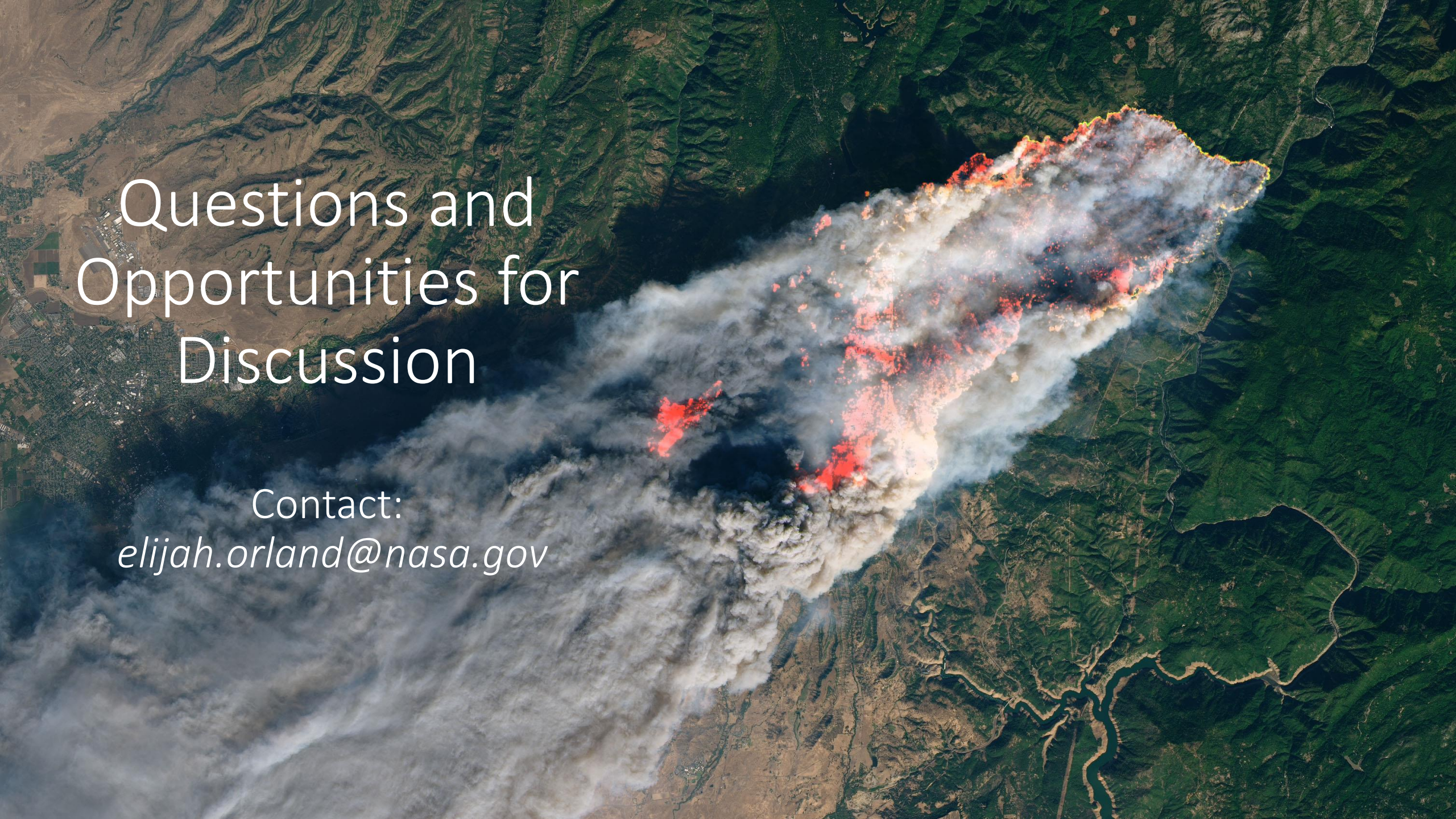
Post-fire impacts on hydrology

(Related Work at Goddard via Shahryar Ahmad et al.)

What is the role of fire severity and total burned area on observed ET suppression*?

*Defined as the water which would have been released via evapotranspiration which instead is diverted as runoff due to soil hydrophobicity





Questions and Opportunities for Discussion

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Test Case: 2009 Beechworth Fire, Victoria, Australia



Observed Debris Flow Location

