

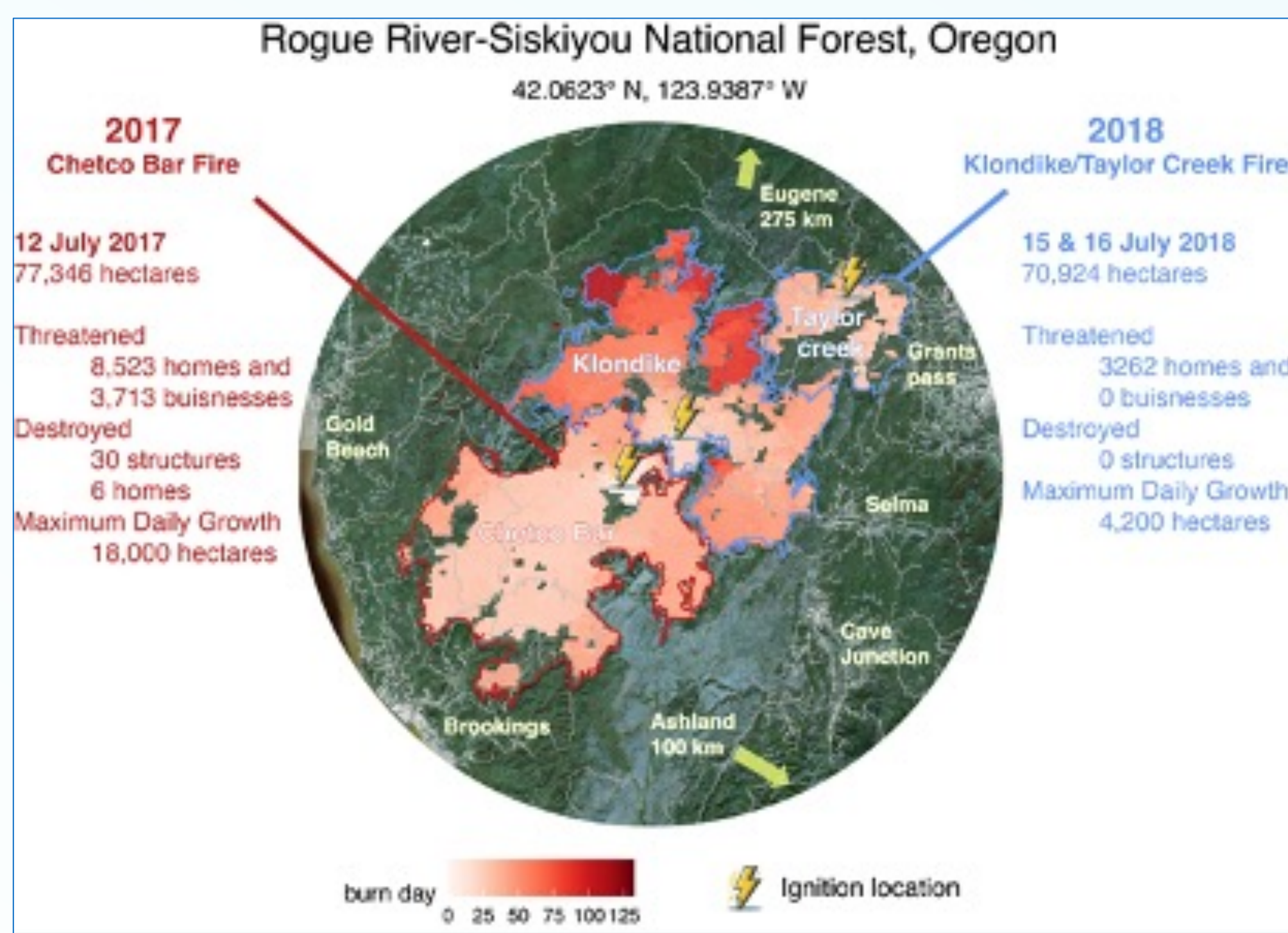
Decoding Community Reactions to Wildfire Management on Social Media

Lise Ann St. Denis (CIRES Earth Lab), Erin Belval (USFS), Branda Nowell (NCSU)
Ty Tuff (CIRES Earth Lab), Nicole Hemming-Schroeder (CIRES Earth Lab), and Jennifer Balch (ESIL)

Abstract

This study examines the temporal dynamics between incident management communications and community responses during two significant wildfire events in Southwest Oregon: the 2017 Chetco Bar Fire and the 2018 Klondike Fires. Leveraging novel machine learning techniques and qualitative methods, we analyzed social media data to capture local sentiment and community reactions. The Chetco Bar Fire was characterized by limited public engagement, intense community criticism, and negative sentiment. In contrast, reports from the Klondike Fires indicate improved interagency communication strategies and proactive public engagement, reflected in improved public sentiment and lower levels of criticism. Our findings highlight the importance of timely and transparent communications for managing public expectations and anxiety during crises. It underscores the value of developing public engagement strategies that span all levels of response from citizen-led to federal teams and that span multiple forms from online to on the ground.

A Tale of Two Fires



Similarities

- Lightning ignited fires originating within same national forest
- Both crossed forest boundaries, threatening homes
- Similar start dates, duration, and final size
- Overlapping communities, local stakeholders, and incident management teams
- Resource constraints across both fires

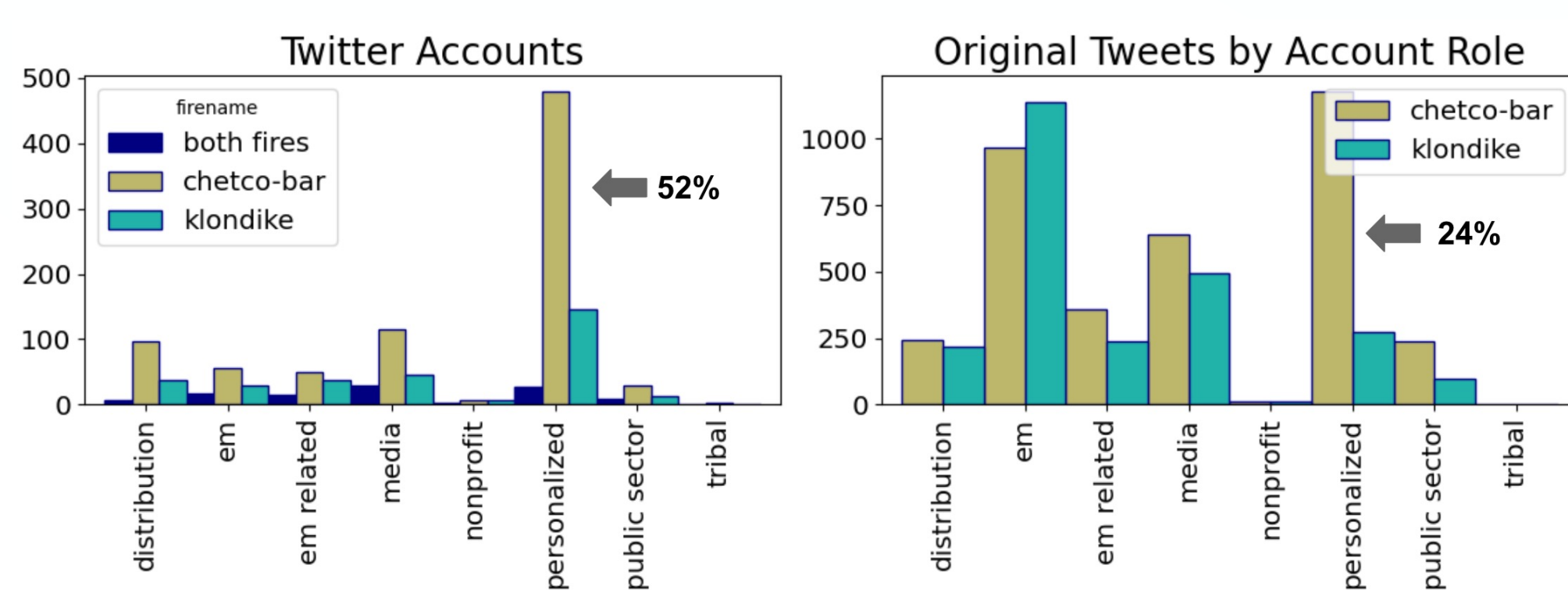
Differences

- Forest supervisor change
- Clear shift in communications with public and partners
- No competing disasters or concurrent events (Klondike fires)
- Differing growth patterns and magnitude of threat

Dataset Description

Our study combines multiple data sources including social media data (Twitter/X)⁵, daily incident reporting⁶, wildfire national daily incident management situation reports⁴, daily air quality reporting², and post-fire surveys and reporting^{1,3}.

We collected social media data using the Twitter/X Academic Research API (v2) for each of the wildfires selecting original tweets (no retweets) starting from each fire's discovery date until they reached their final size, resulting in collection of a total of 6,678 tweets from 1,368 unique accounts.

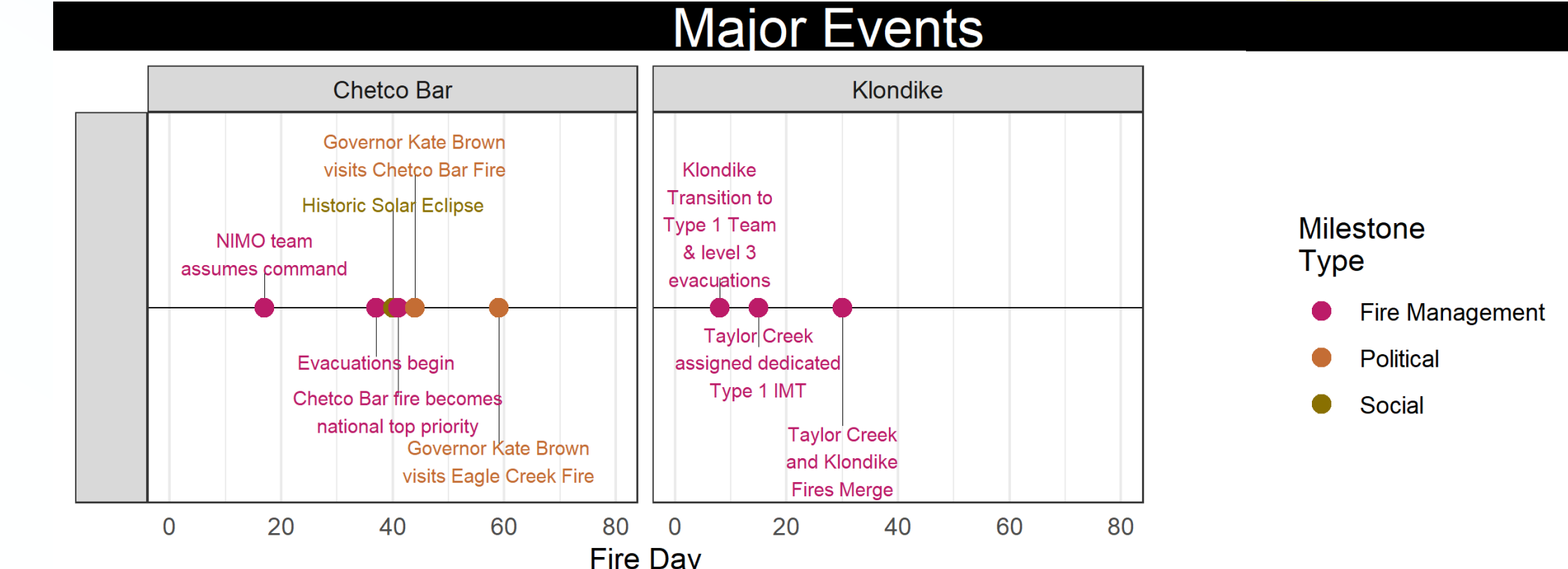
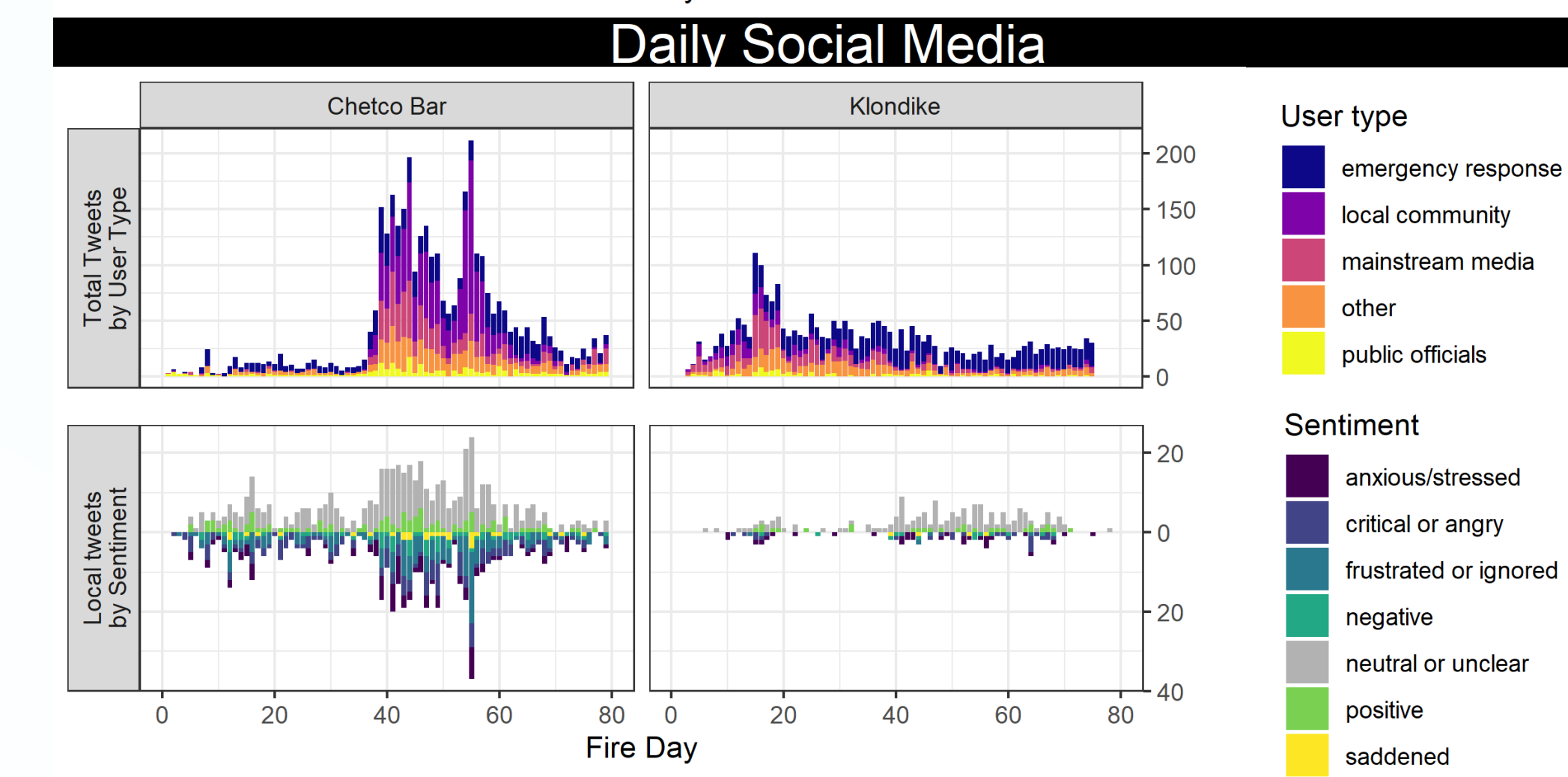
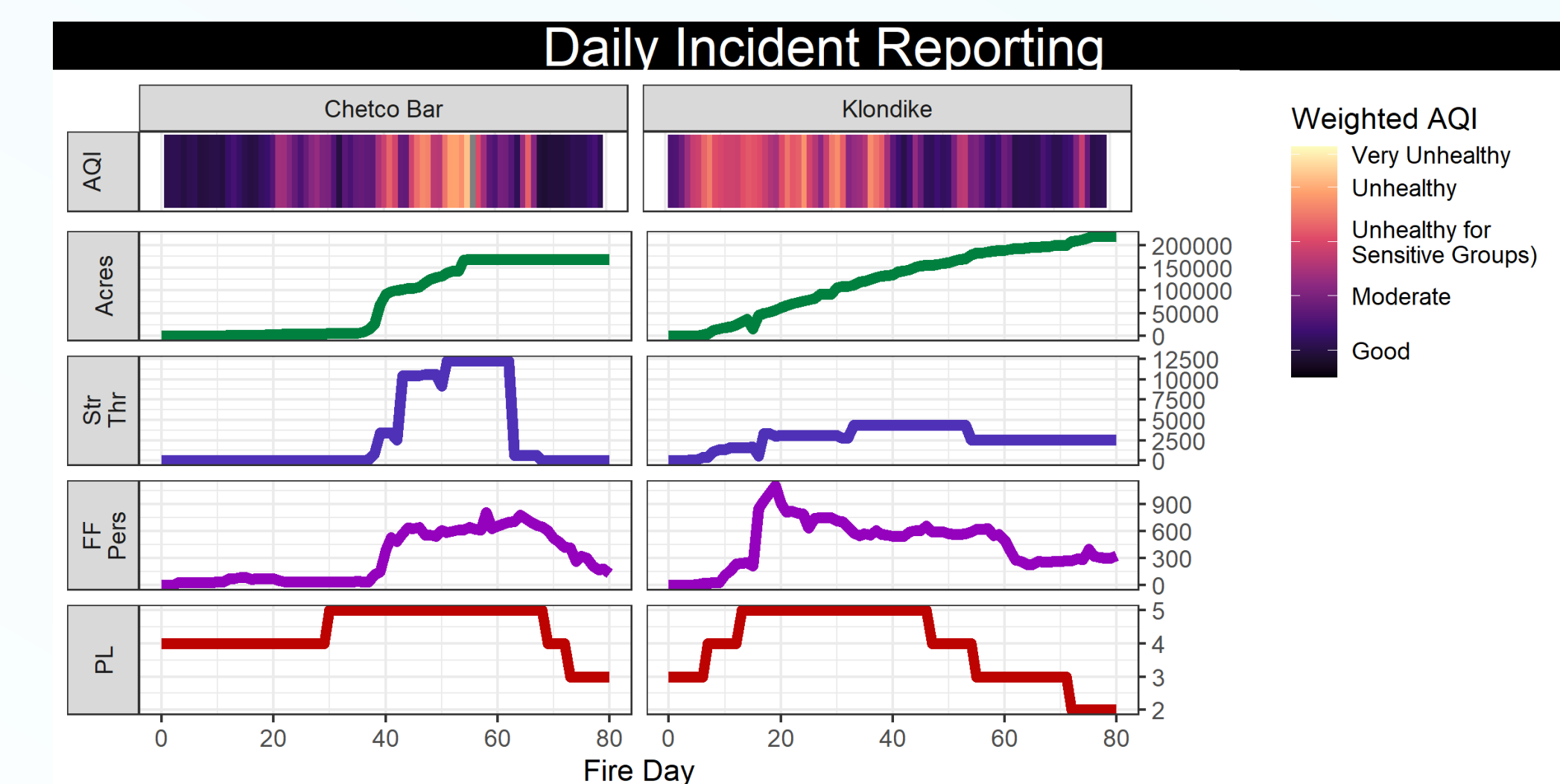


Analysis and Results

Each unique account was labeled according to an automated classification scheme⁶. Local community tweets (aka personalized) were further classified based on content, sentiment, and critical themes.

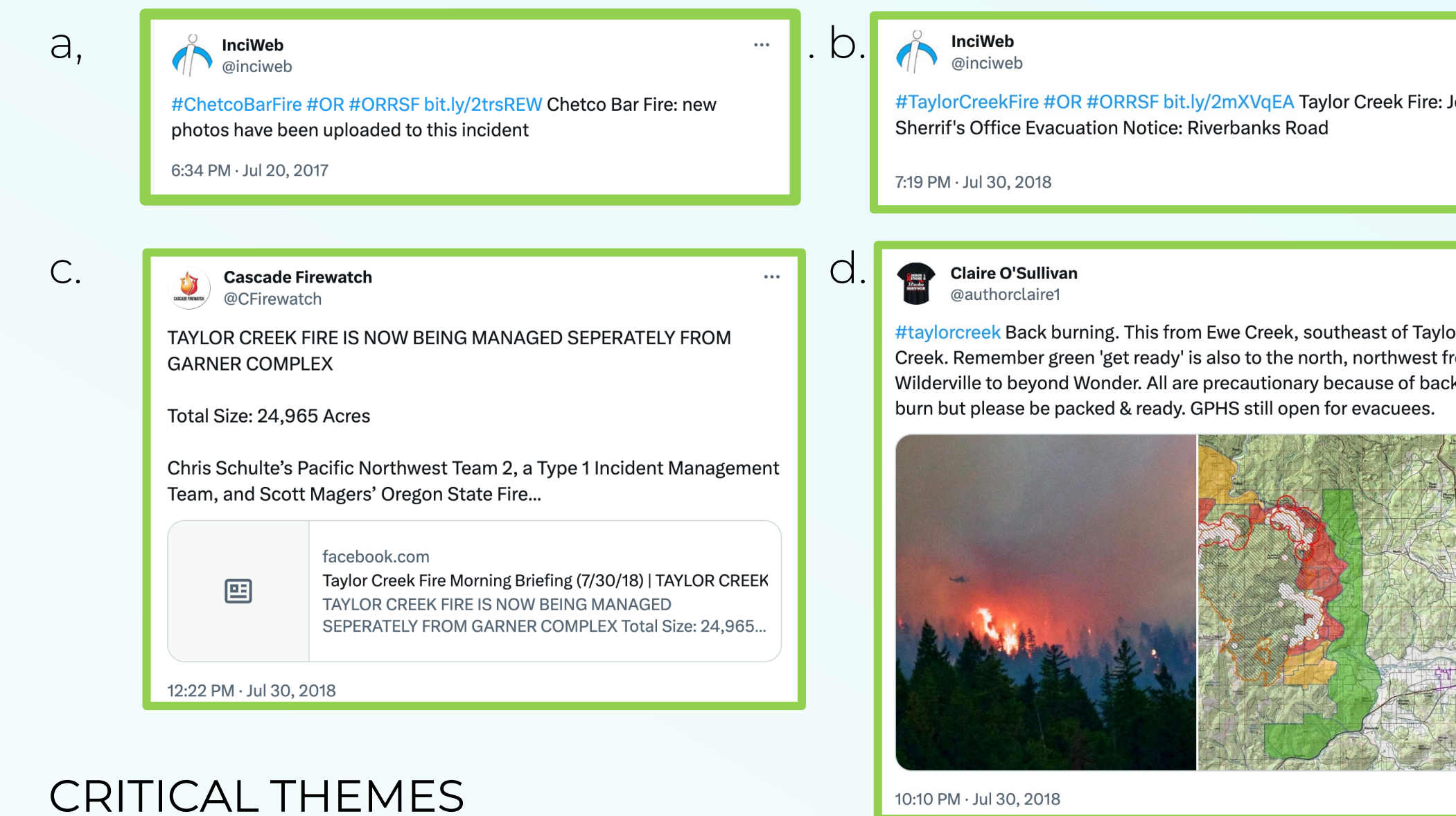
Social media data was then combined with daily incident reporting, air quality, and a timeline of significant events for temporal analysis (see combined plot below):

- Stronger local community response during the Chetco Bar Fire (52% of accounts 24% of tweets)
- Sharp increase corresponding with rapid fire growth and increased threat (Chetco Bar Fire) with significant negative sentiment, particularly surrounding the governor's visit to the Eagle Creek Fire.
- Early peak during Klondike fires corresponding with increasing threat. Local sentiment remained more even with a stronger emphasis on the distribution of wildfire updates.



INCIDENT MANAGEMENT COMPARISON

Comparison of incident management communications highlight important differences between the two fires. Limited early public engagement during the Chetco Bar Fire is contrasted with more proactive public engagement and tighter coordination during the Klondike Fires. Early communications during the Chetco Bar Fire were primarily auto-generated (A) whereas updates during the Klondike Fires shows tighter coordination of messaging across cooperating agencies (b & c). Official updates appeared more frequently in local posts and is reflected in more positive local mentions (d).



CRITICAL THEMES

Local commentary dominated the Chetco Bar Fire discourse, with stronger negative sentiment and criticism, aligning with observations from after action reporting and survey data.^{1,3} We dubbed the dominant sentiment *What about us?*, capturing local perception of being overlooked or ignored (e). Criticism focused on perceived failure of US Forest Service handling of the fire (f), availability of resources (g), forest management (h), and community stressors and impacts (i). These critical themes were minimal or absent during the Klondike Fires.



Conclusions

- This study provided a rare opportunity to look at the temporal dynamics of incident response messaging and related community reactions across two wildfires where there was a clear shift in public engagement.
- We were able to observe the factors that shaped negative outcomes during the Chetco Bar Fire and solutions from citizen-led efforts to improved interagency cooperation and messaging that led to more positive outcomes during the Klondike Fires.
- Through data synthesis from incident reporting, social media post-fire reports, and fire behavior characteristics, we can look at multiple aspects of a crisis event, from the pace of a wildfire to the suppression response and related community impacts.
- This work demonstrates how we can better understand hazard events and effective strategies for public engagement and improved community outcomes.
- It also paves the way to further automate the social media filtering process across a larger population of hazard events making it relevant for understanding emergency response and community reactions.
- This research provides a finger on the pulse of community stressors that contribute to negative public perceptions. We can observe how people are responding in the moment during a crisis event, thus making it applicable to any stress-inducing event, particularly for the natural hazards research community.

References

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