Tracking and classifying Amazon fire events in near real-time

Niels Andela[1,2], Douglas C. Morton, Wilfrid Schroeder, Yang Chen, Paulo M. Brando, James T. Randerson, Matthias Forkel, Jos de Laat and Vincent Huijnen

[1]School of Earth and Environmental Sciences, Cardiff University

[2]BeZero Carbon

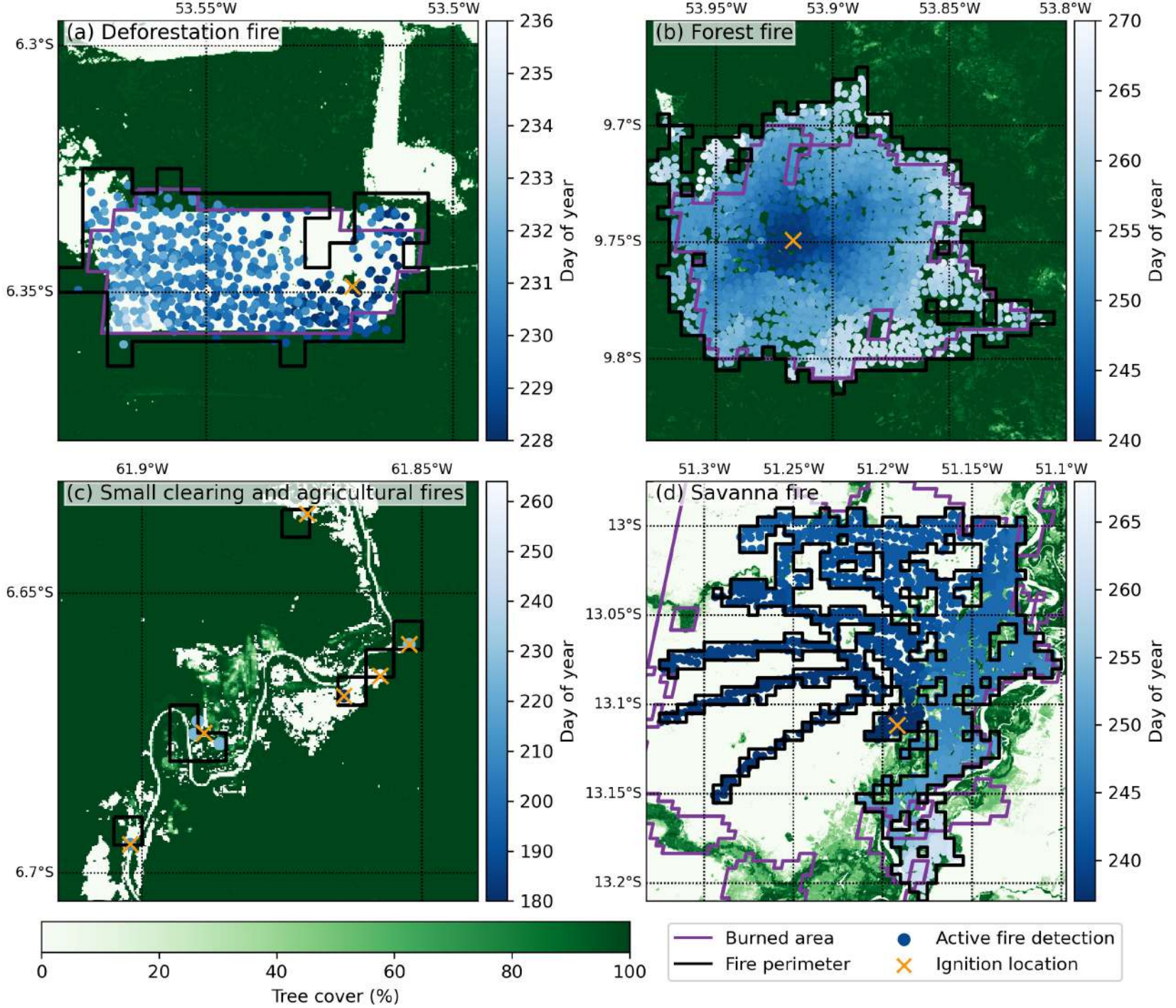
NASA SERVIR AMAZONIA esa Sense4 Fire BeZero CARDIFF UNIVERSITY PRIFYSGOL CAERDYDD

Not all fires are the same

- In the Amazon region, deforestation (a) and understory (b) fires result in long-term losses of carbon from the biosphere.
- Small agricultural burns (c) and savanna fires (d) have shorter term impacts on climate, for example through aerosols.

Track wildfires and their behaviour

- We developed a new tool to track individual wildfires and their behaviour.
- This object-based approach provides many advantages, including the characterization of fire types in near-real time.
- Each fire type exhibits unique characteristics in terms of spread, intensity, and land cover.

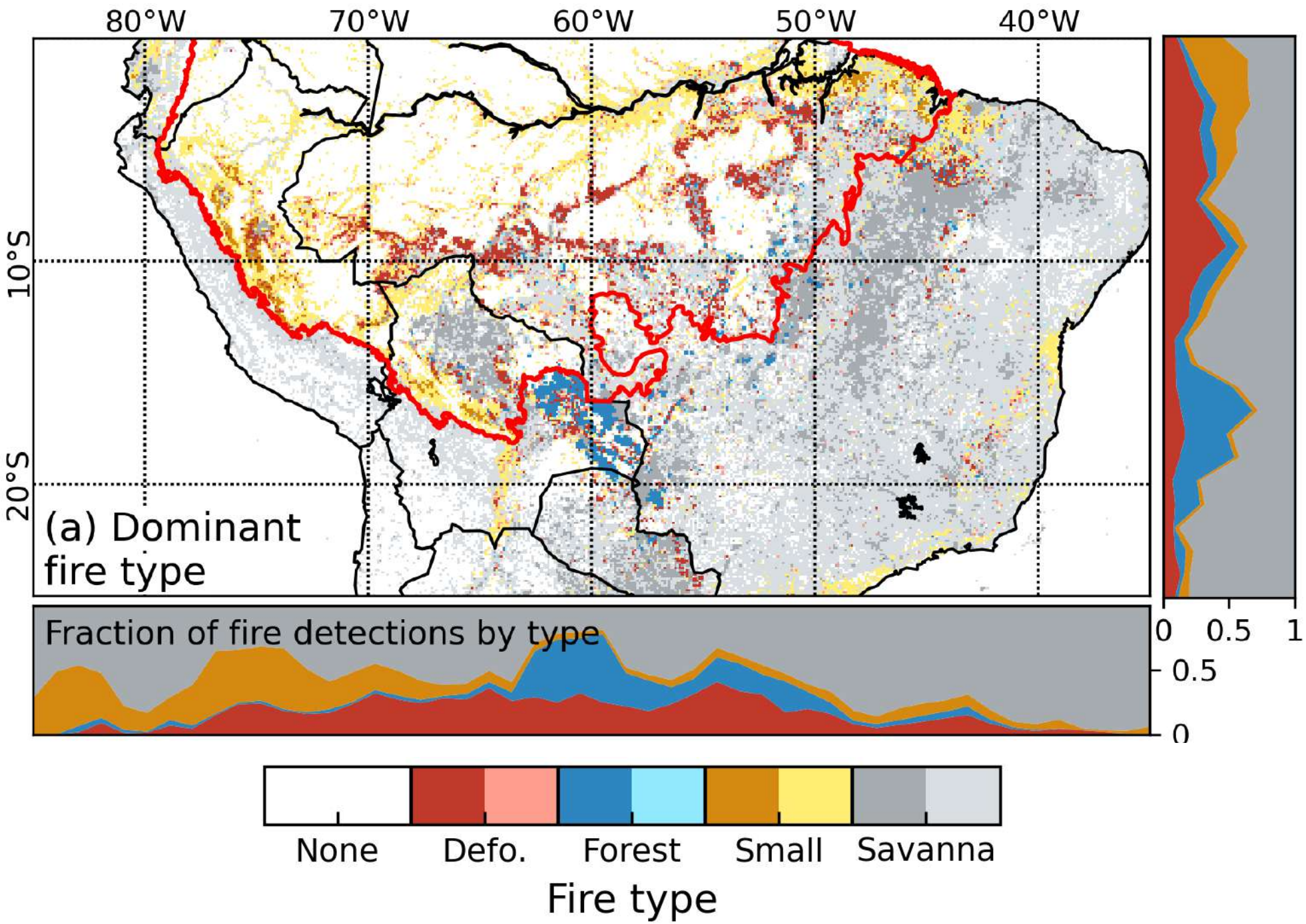


Map accuracy

- Stratified random sample of 100 deforestation and forest fires (118 Sentinel-2 pairs)
- Accuracy of 66% for fire events but 92% for fire detections (carbon emissions)

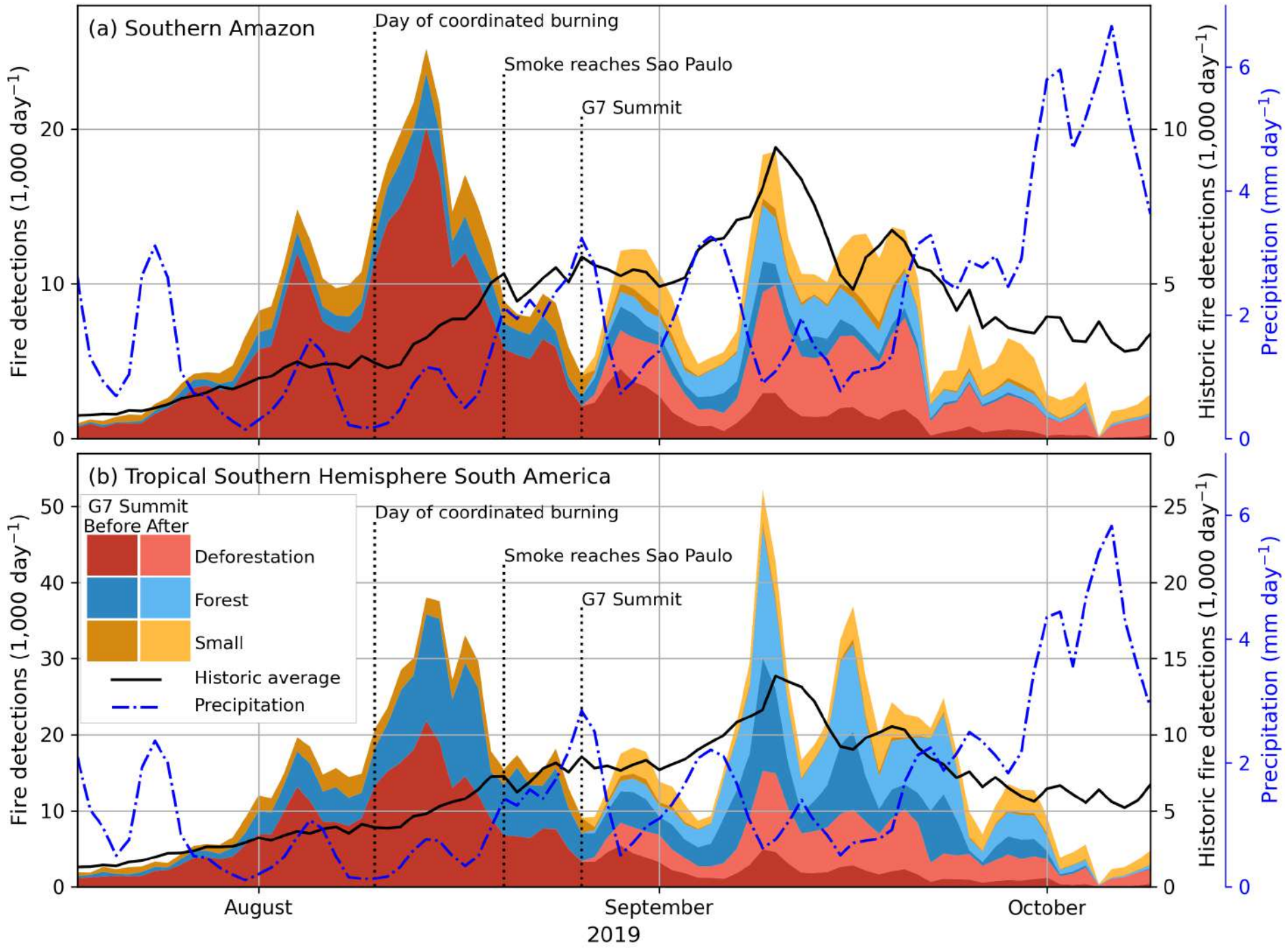
The 2019 fire season explained

- Dominant fire type by active fire detection

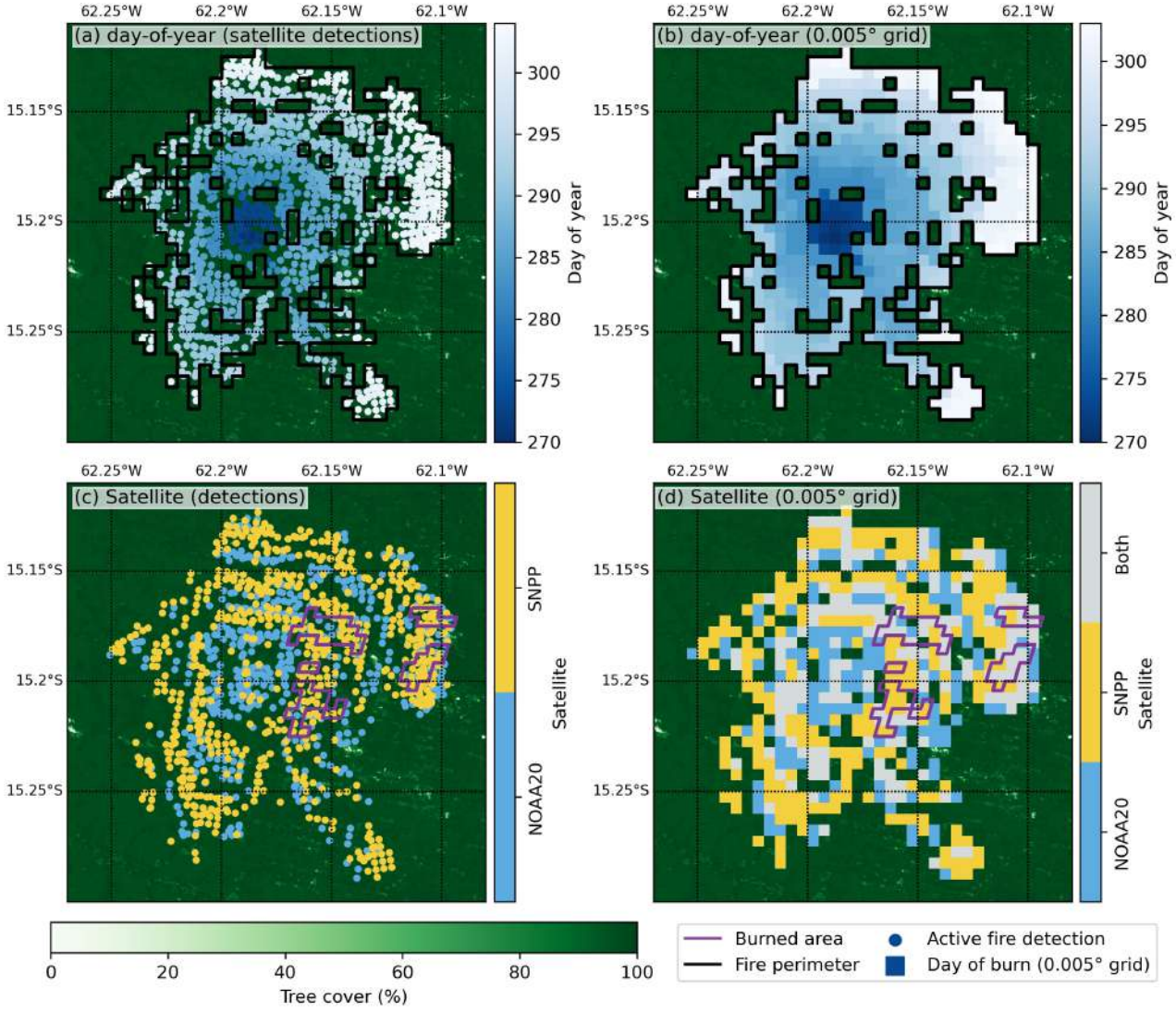


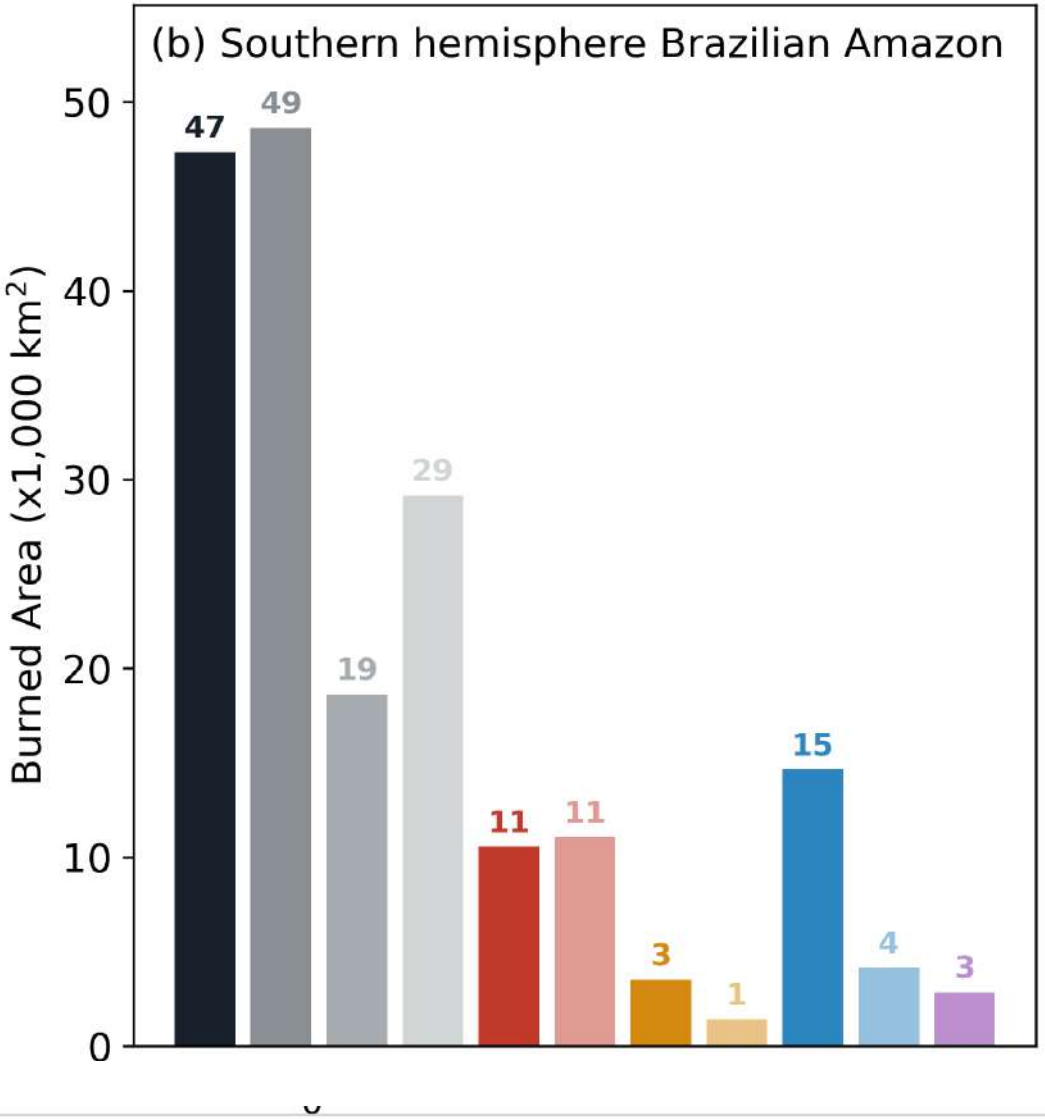
The 2019 fire season explained

- Active fire detections by type

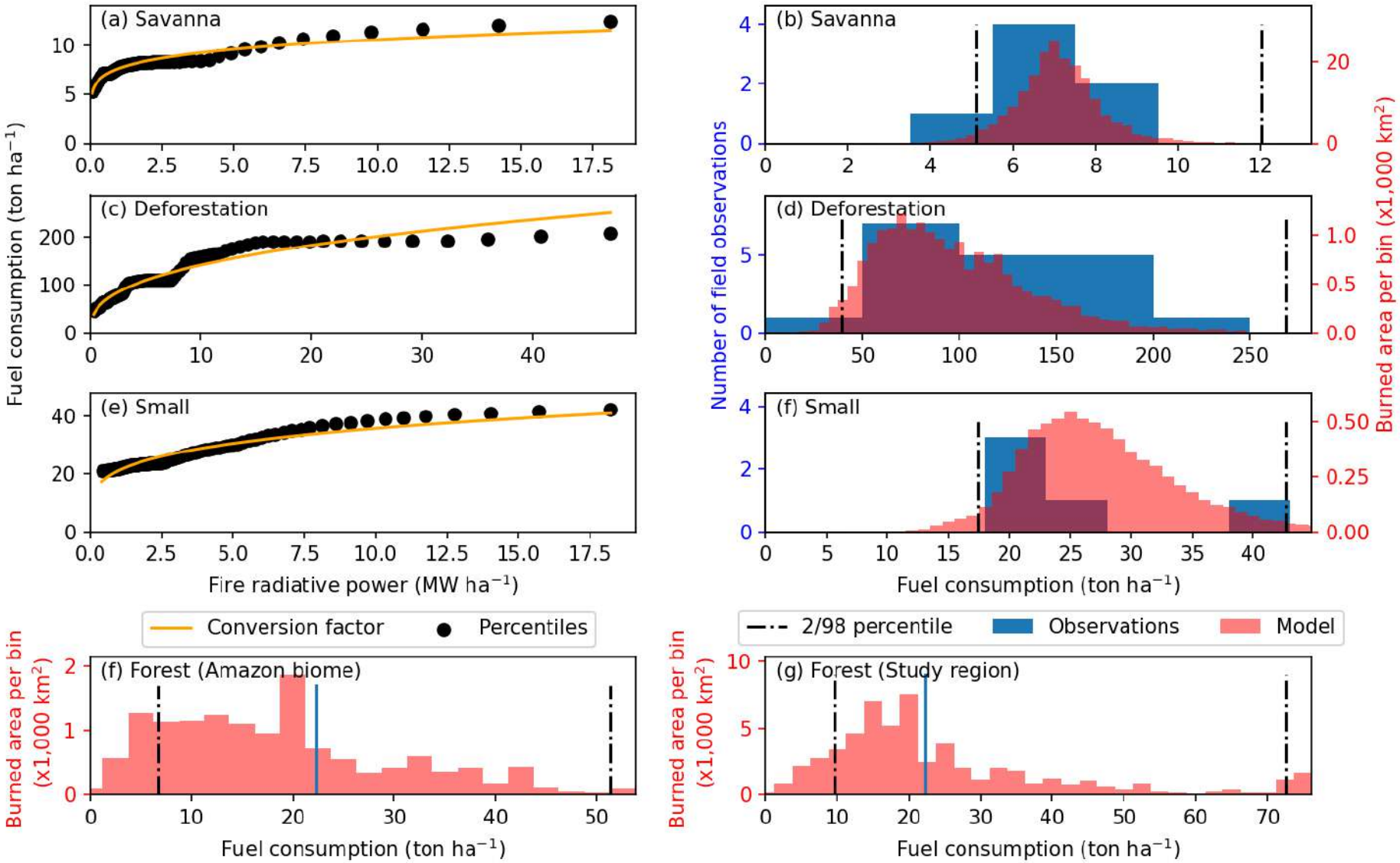


Burned area estimates





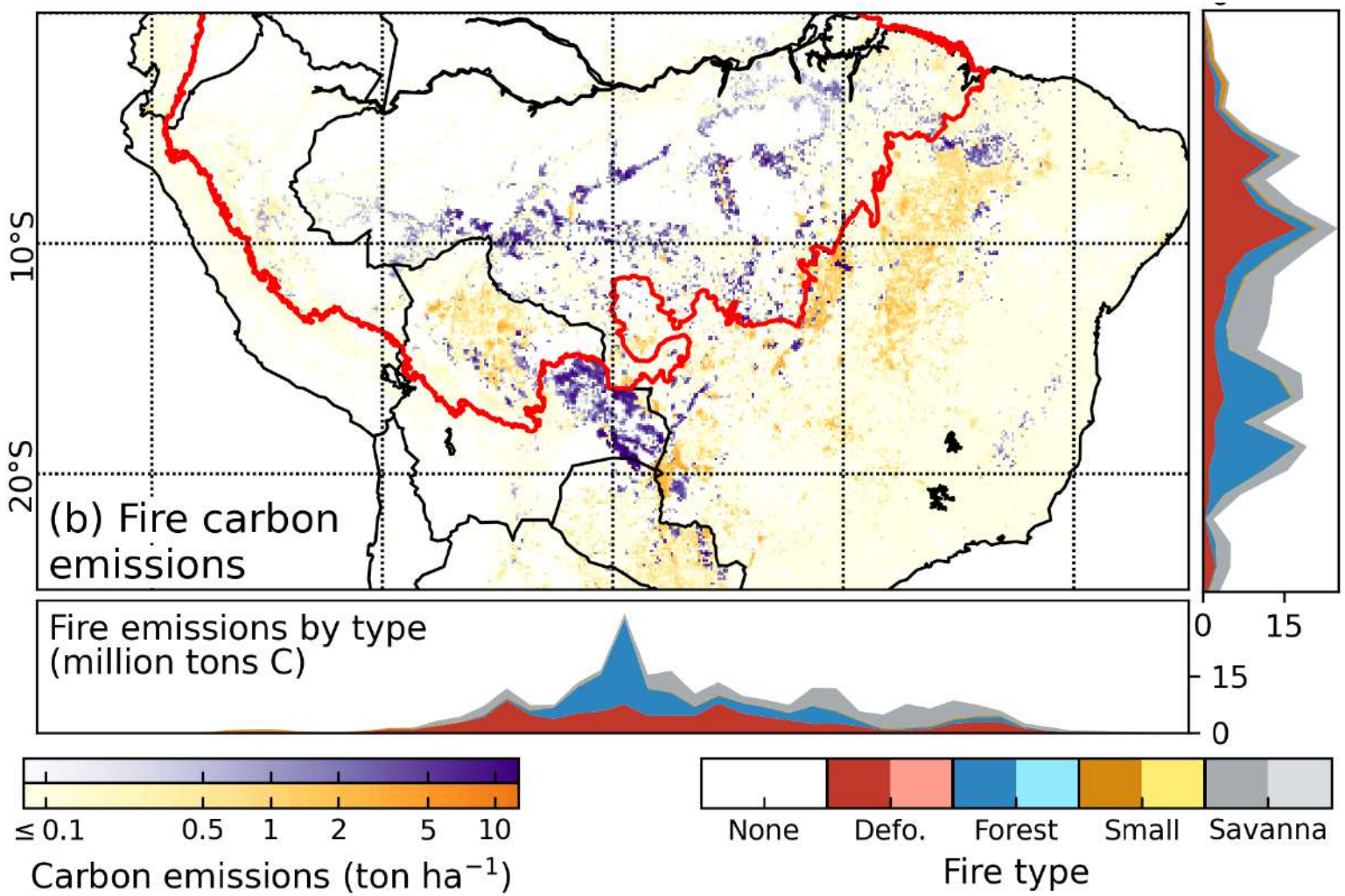
Carbon emissions estimates



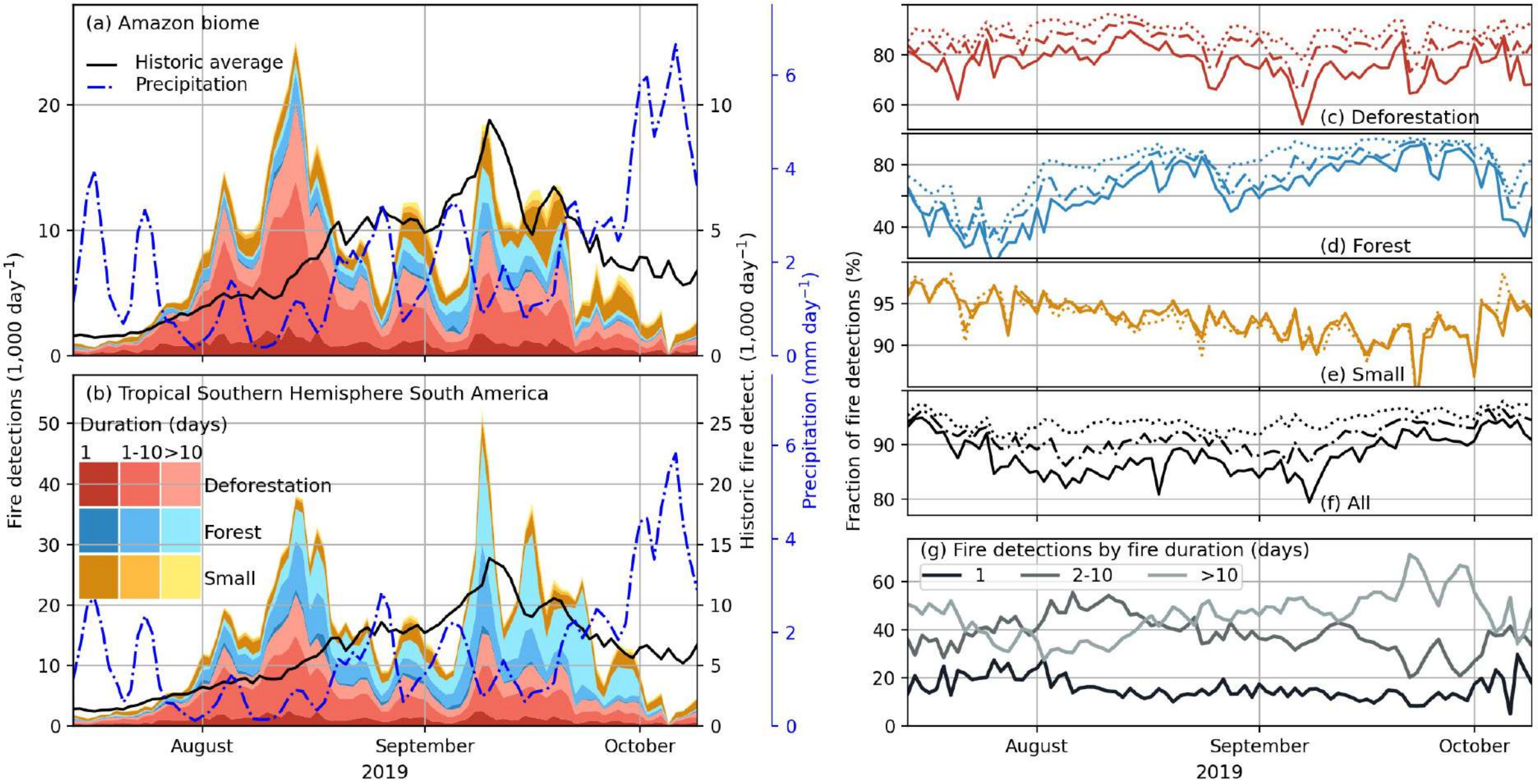
- Calibration against field observations

Fire & the carbon cycle

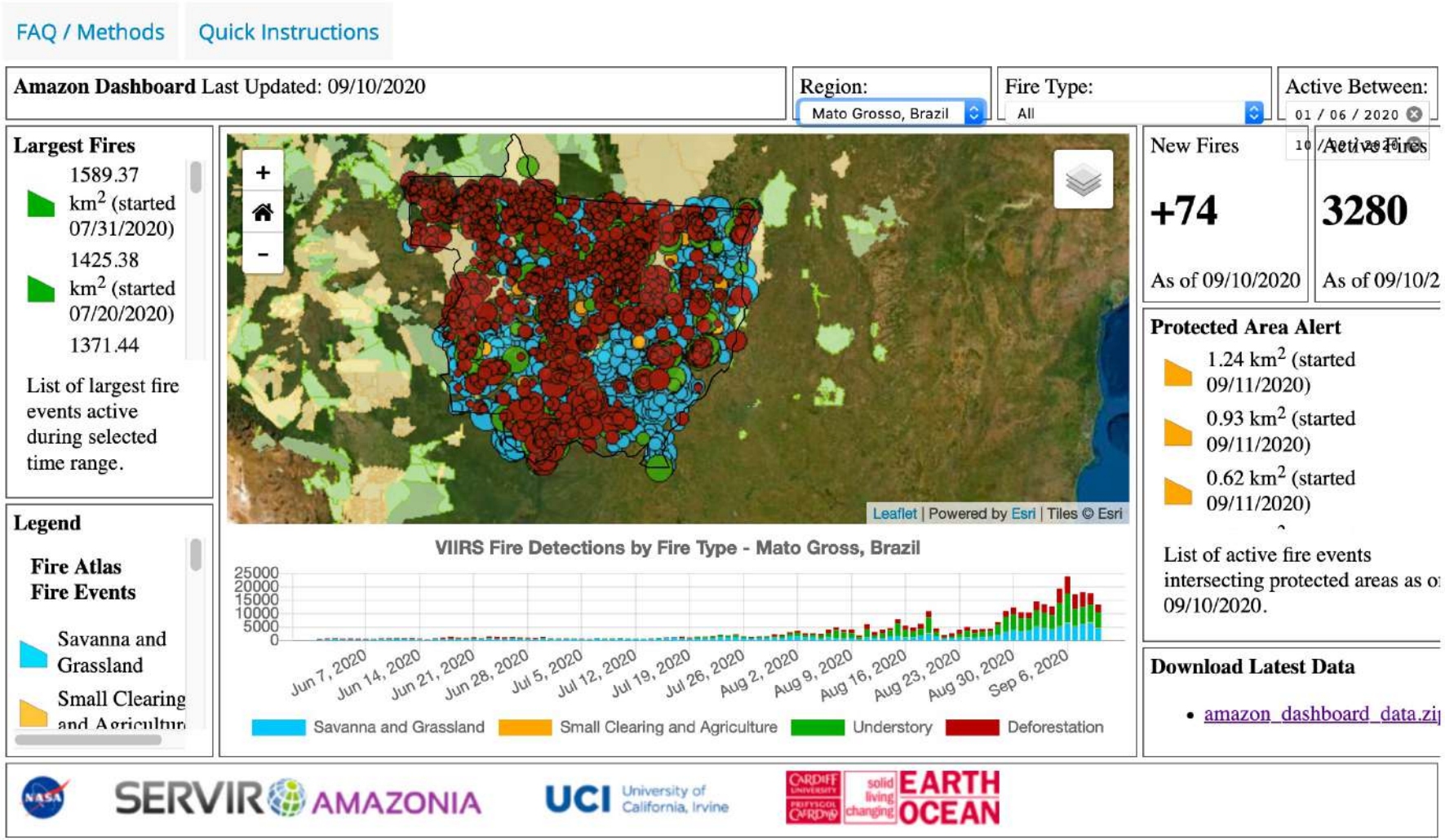
- We can now separate carbon fluxes with short- (yellow) and long-term (purple) impact on the carbon cycle.
- Across the larger study region, carbon emissions from forest fires (85 Tg) almost equalled those of deforestation fires (99 Tg).
- In Sense4fire, we develop the first object-based emissions inventory.

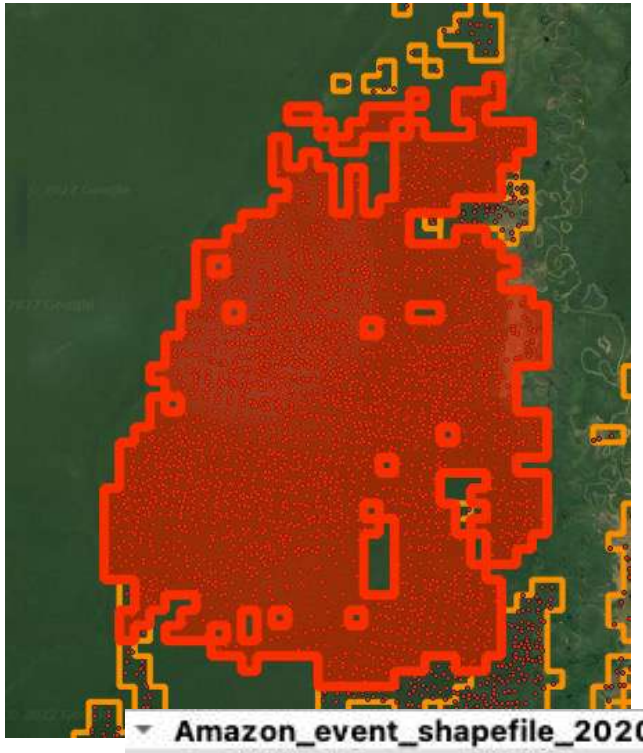


Good performance in near-real time



Providing situational awareness



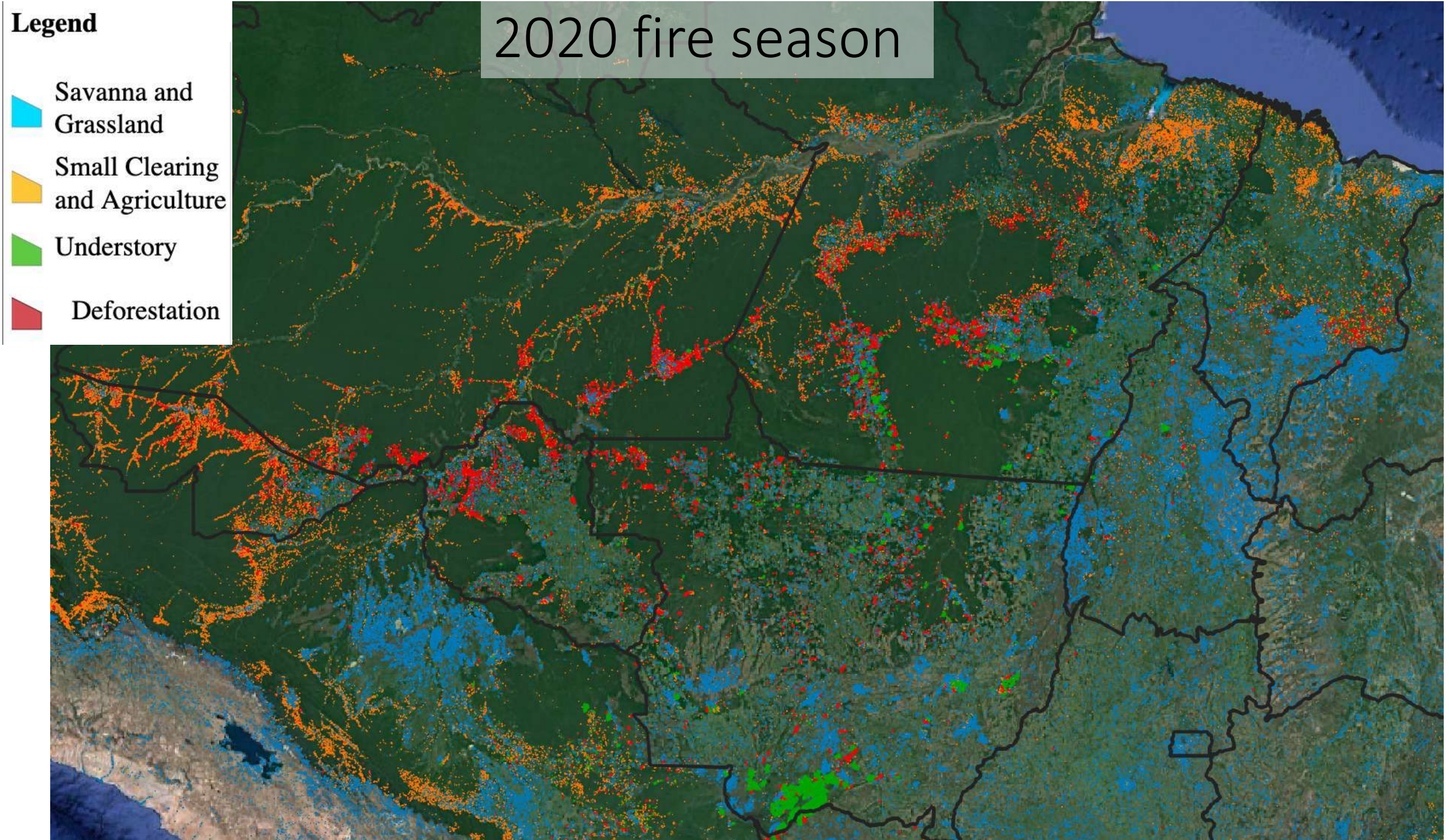


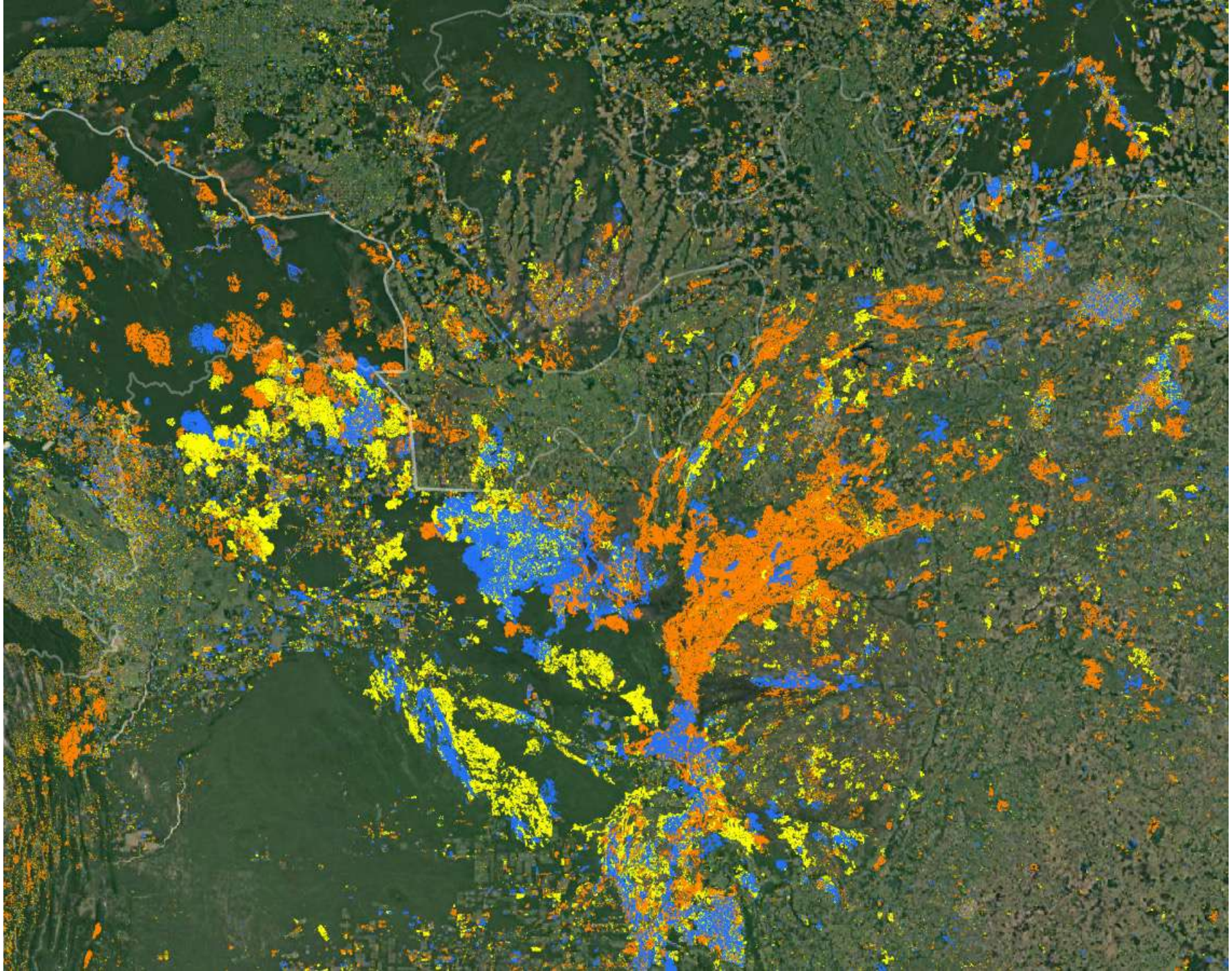
Amazon_event_shapefile_2020

cluster_ID	358735
(Derived)	
(Actions)	
cluster_ID	358735
fire_type	3
confidence	3
size	231.88
start_day	221
duration	44
emissions	594887.6
tree_cover	89.39
biomass	215.4
deforestat	0
frp	22.9
persistenc	1.82
progressio	0.12
daytime	0.49
detections	3089

- Amazon Dashboard and data at www.globalfiredata.org

2020 fire season




2021
2020
2019

Questions?

- Manuscript accepted ☺
- www.globalfiredata.org
- contact: andelan@cardiff.ac.uk and soon at BeZero Carbon!