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Climate Change Biology

An Analysis of Summer 2021 West Coast Wildfire Smoke Migration and its Ramifications on Climate Change, Public Health, and Infrastructure

Effects of Excessive Forest Fires on Climate

Wildfires emit 8 billion tons of CO₂ in atmosphere annually

Carbon Release

Release large amounts of carbon and CO₂ into atmosphere

Carcinogen Release

Melt water pipes, releasing carcinogens into water supply

Wildfires cause 5-10% of global CO₂ emissions

Ozone Precursors

Release volatile and semi-volatile organic material and nitrous oxides

Organism Mortality

Weakens or kills plants and animals that contribute to ecosystem

Soot Release

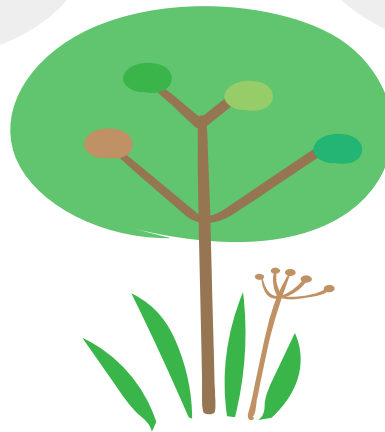
Release soot into atmosphere causing water body acidification

Economic Impact

Total costs of wildfires in 2017 & 2018: >\$40 B
15-50% Increase in US fire reducing budget
(US Forest Service)

Public Health

Residual smoke can reduce air quality and cause respiratory illness along with vision issues



Methods and Experimental Design

1

Images

Obtain aerial images of US from July 21-26 from NASA Worldview

2

Threshold

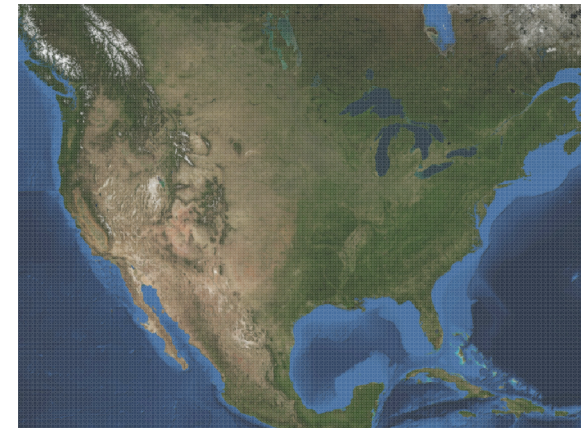
Set threshold to visualize fire smoke in red and develop smoke migration time lapse

3

Analyze

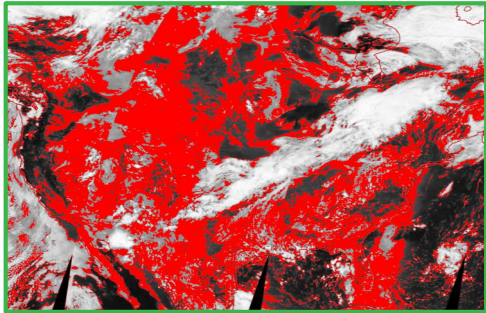
Track the eastward distance that the smoke from west coast fires traveled each day

Sampling Site

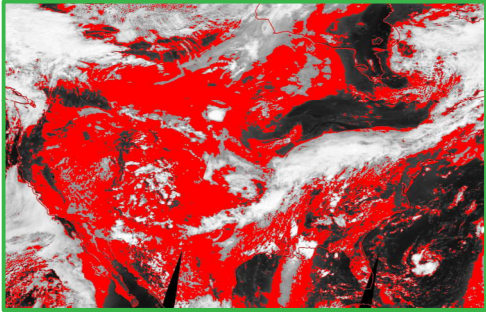


Thresholded Aerial Images of US (Smoke in Red)

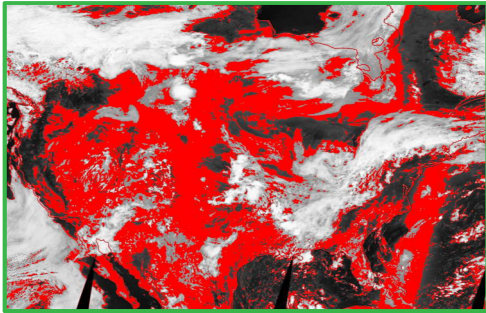
1



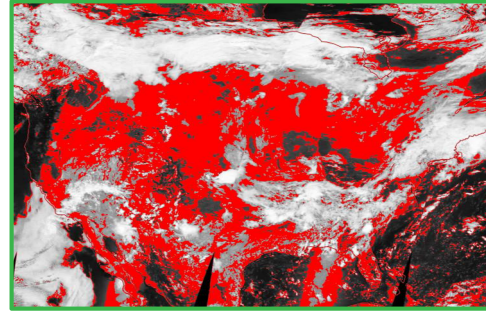
2



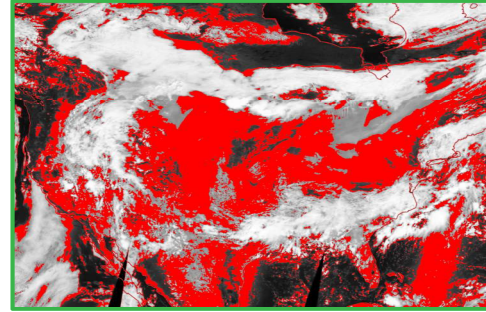
3



4



5



6

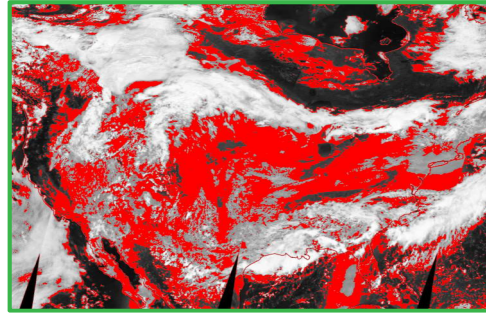
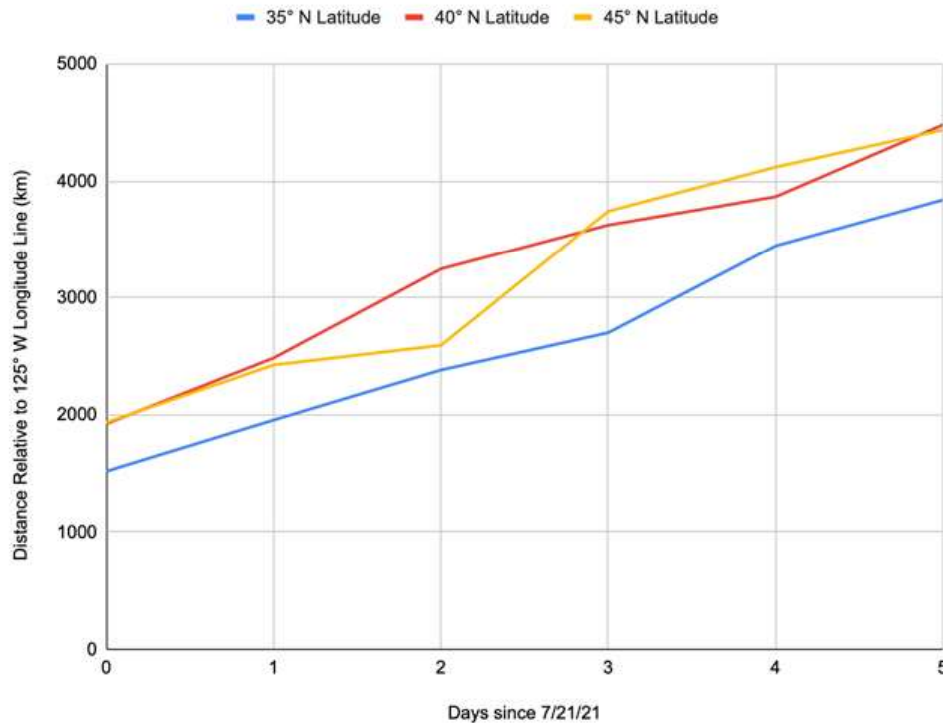


Figure Numbers 1-6
Represent the Dates
July 21-26, 2021 In
Order

Results: Smoke Migration Quantified

Horizontal Distance Traveled East by West Coast Wildfire Smoke



Results reveal wildfire smoke can migrate coast to coast in the US

1

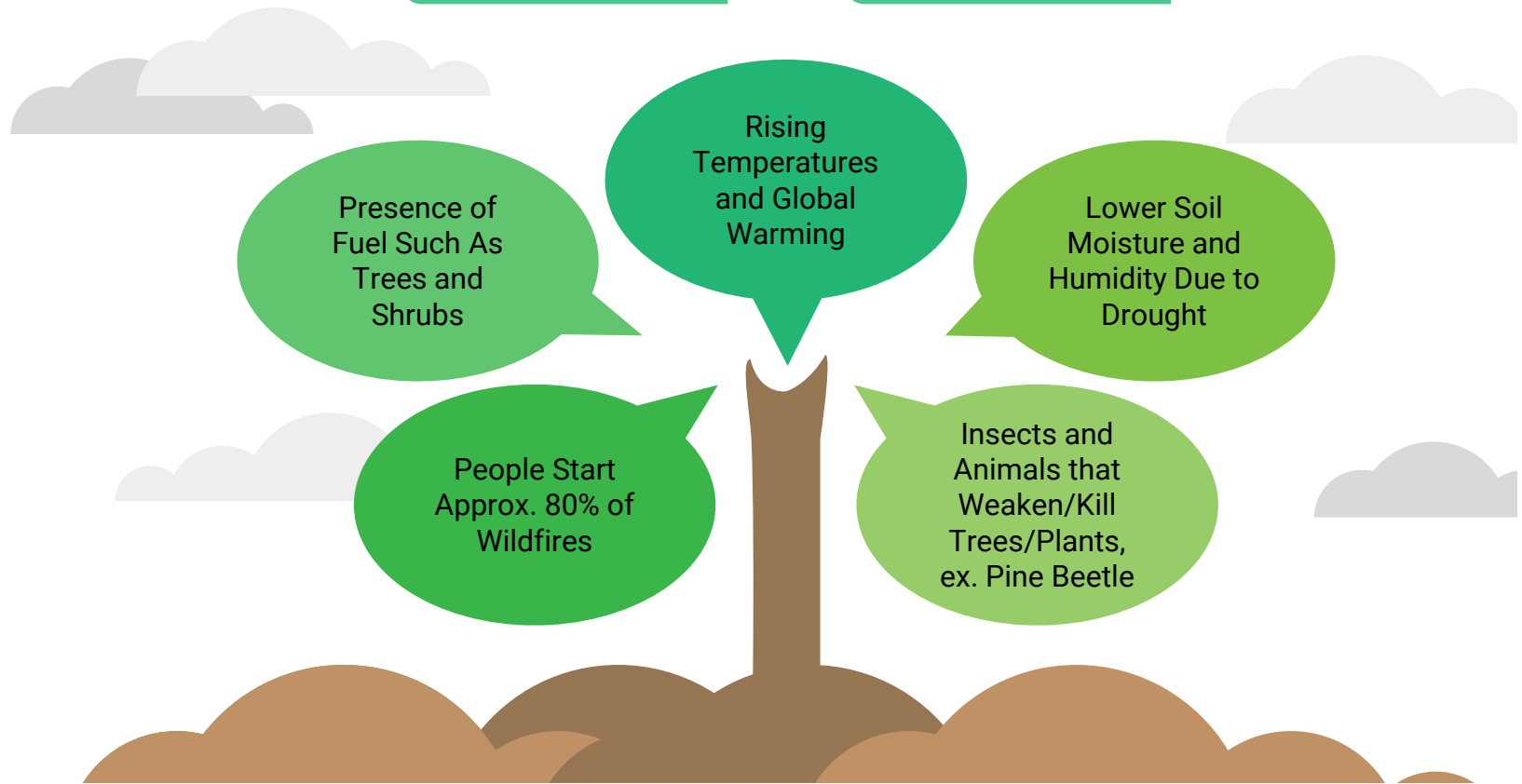
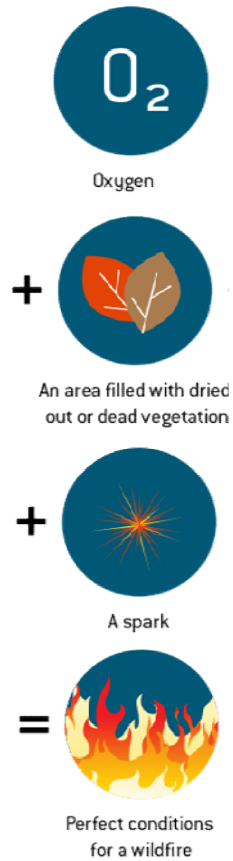
On average, wildfire smoke traveled 2500 km horizontally across the 35, 40, and 45 degree latitude line, making its way from the west coast to the east coast

2

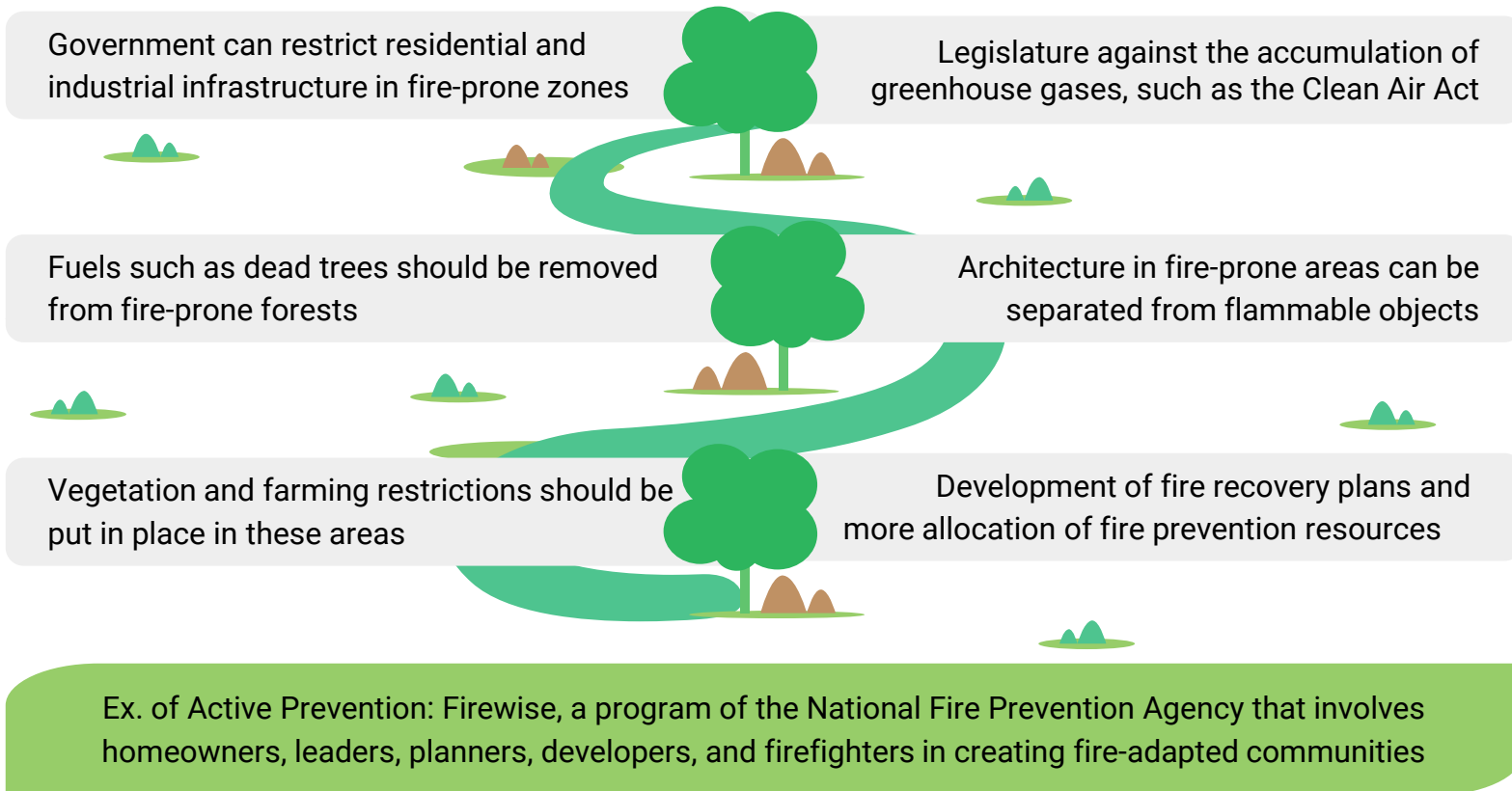
The effects of wildfires on air quality, public health, and climate change, are not limited to the site of the fire, and have residual effects thousands of miles away

3

What Causes or Accelerates Forest Fires?



Possible Preventative Measures or Damage Control



References

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[Wildfire Best Practices Guide.ashx?la=en](https://www.nfpa.org/-/media/Files/Public-Education/By-topic/Wildland/Wildfire-Best-Practices-Guide.ashx?la=en). National Fire Protection Association, *Community Wildfire Safety Through Regulation*.

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