

Environmental Hazards and Cancer



Yang Liu, Leticia Nogueira



HAQAST Meeting
January 27-28, 2025

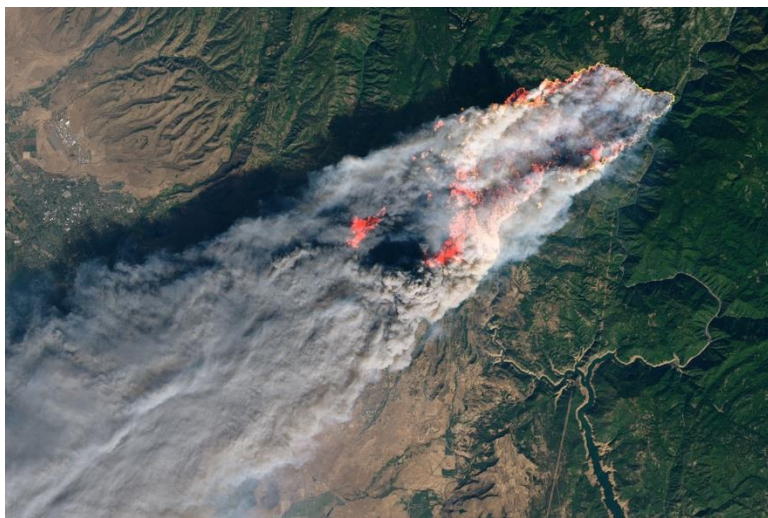
ROLLINS
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PUBLIC
HEALTH

NASA Headquarters - Washington DC

EMORY

Challenges in measuring exposure to environmental hazards

Camp Fire (2018)



https://en.wikipedia.org/wiki/Camp_Fire

Exposure to wildfire goes beyond inhaling wildfire smoke

Stress associated with potentially having to evacuate, threat to property and life, water and soil contamination



<https://pubmed.ncbi.nlm.nih.gov/33189165/>

Air quality monitors only measure smoke, only cover 25% of US counties, and are usually located in metropolitan areas while fires are more likely to happen wildland-urban interface



Clements, A., R. Duvall, D. Greene, AND T. Dye. The Enhanced Air Sensor Guidebook. U.S. Environmental Protection Agency, Washington, DC, 2022.

Satellite applications in assessing exposure to wildfire hazards and cancer survival



Wildfire exposure linked to higher risk for death after lung cancer surgery

Healio.com, 27 Jul 2023

Patients exposed to wildfires while recovering from lung cancer surgery had worse survival outcomes unexposed...



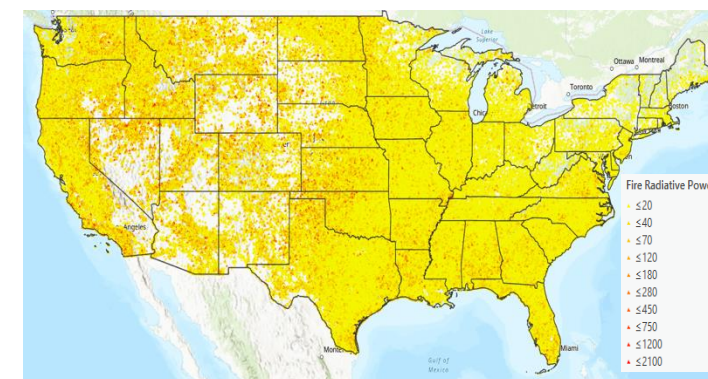
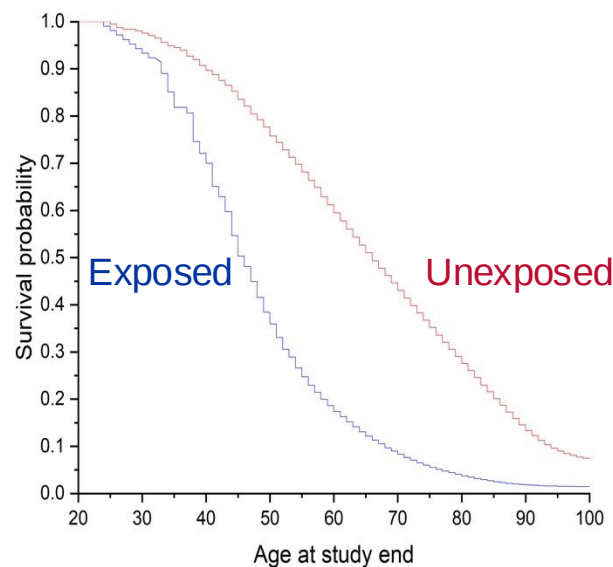
JAMA Oncology | Original Investigation

Association of Wildfire Exposure While Recovering From Lung Cancer Surgery With Overall Survival

Danlu Zhang, MPH; Yuzhi Xi, PhD; Daniel J. Boffa, MD; Yang Liu, PhD; Leticia M. Nogueira, PhD, MPH

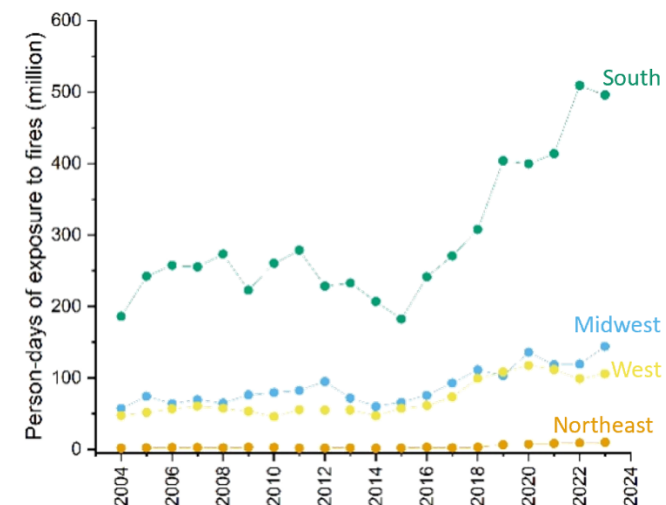
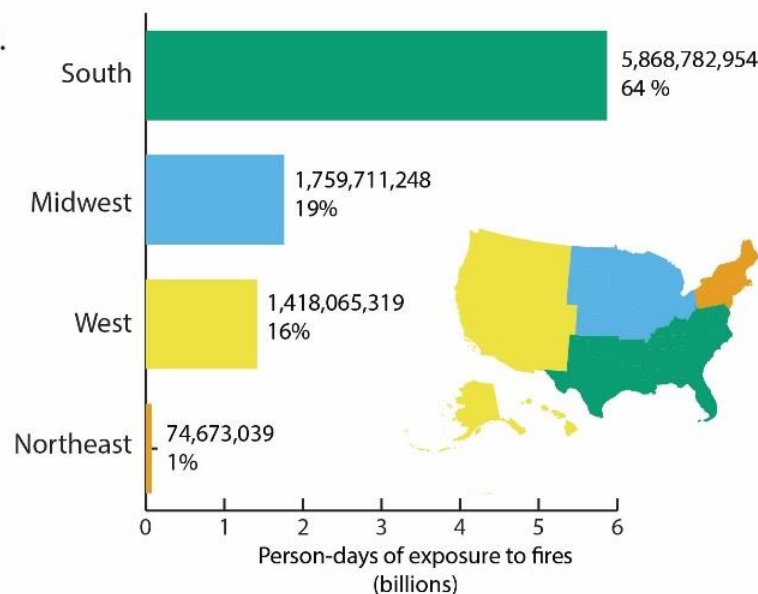
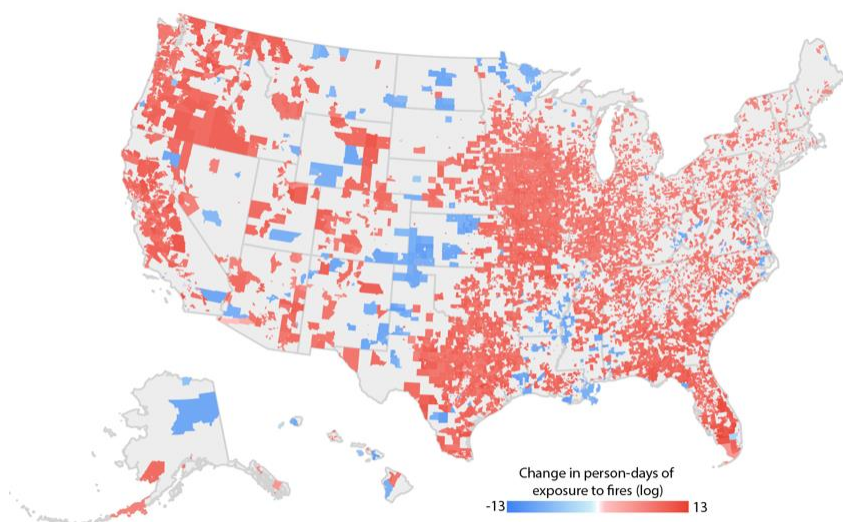


Cancer patients are a vulnerable population to wildfire hazards



Main Finding: wildfire exposure was associated with worse overall survival following non-small cell lung cancer surgical resection

Spatial distribution of fire exposure



Main findings:

1. Residents of the South Region of the US are most frequently exposed to fires
2. Most census tracts in the US experienced increases in person-days of exposure between 2004-2023, with the Southern region experiencing the most dramatic increase

Going forward – is it *satellitabile*? Power outages and air pollution

The Atlantic

Puerto Rico's Dire Health-Care Crisis



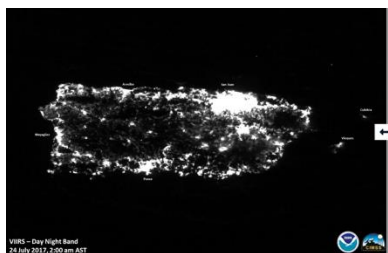
<https://www.theatlantic.com/politics/archive/2017/10/puerto-ricos-health-care-crisis-is-just-beginning/544210/>

Diesel-powered generators

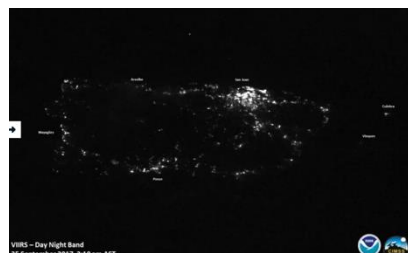


Used to be the only
CMS-approved
emergency power source
for healthcare facilities

Microgrids

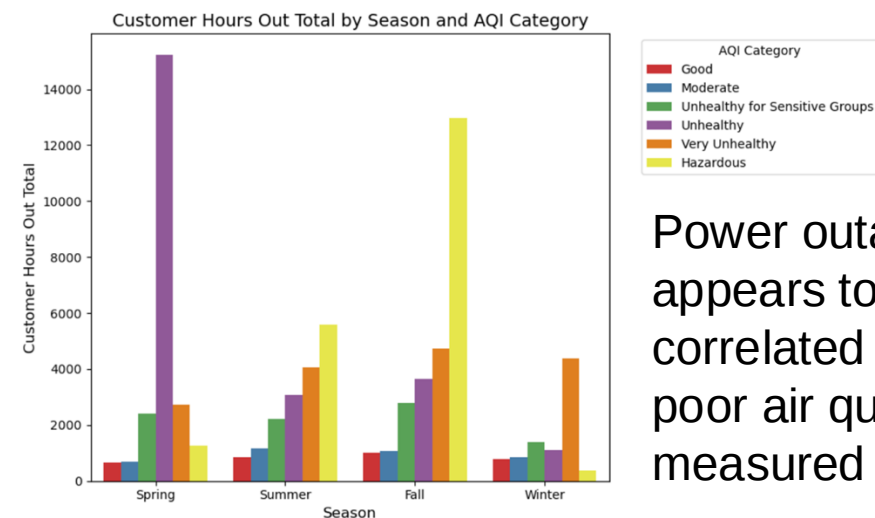


Before Hurricane Maria



After Hurricane Maria

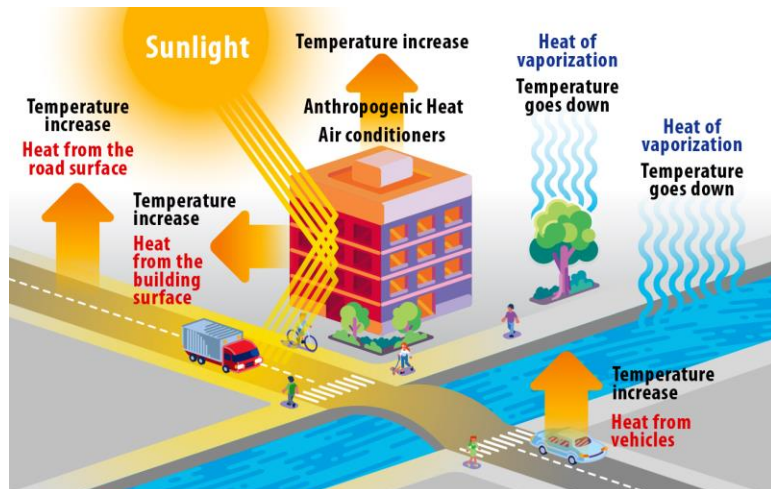
Power outages are
especially concerning
for healthcare
institutions



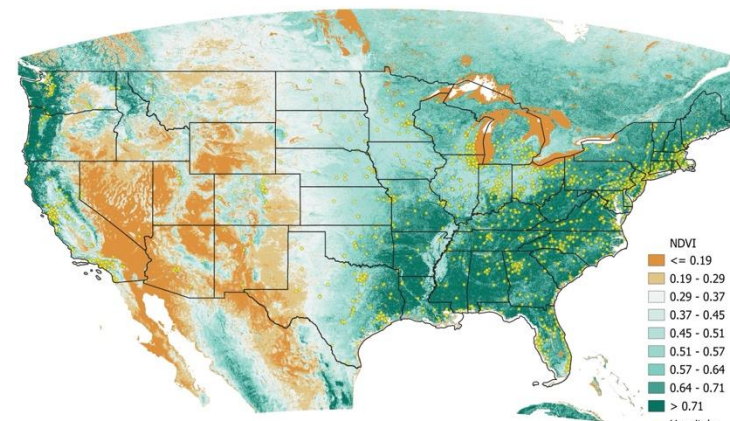
Power outage
appears to be
correlated with
poor air quality
measured by AQI

Going forward – is it *satellitabile*? Heat and vegetation

Exposure to extreme temperatures



Exposure to extreme outdoor heat can negatively affect treatment efficacy and survival



Using satellite-derived vegetation index, land surface temperature, and air temperature anomalies

Patients on active cancer treatment can be exposed to extreme temperatures

Some chemotherapy drugs make it harder to control body temperature

