The 2018 Butte County "Camp Fire" and Its Effects on Air Quality in California

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Background

Wildfire occurrences have continued to increase over the past decade. this increasing trend along with earlier fire seasons and a later end to those seasons could see more longer-lasting and destructive wildfires. They produce emissions such as carbon dioxide, particulate matter, and carbon monoxide along with other VOC's.

Methods

- Before importing them into R, we downloaded data sets on air contaminants such as PM 2.5, Ozone and Carbon Monoxide from the United States Environmental Protection Agency Website (EPA)
- Analyzed national data sets to provide a baseline before examining the more specialized data sets.
- Data from the California Air Resources Board about the Camp Fire in 2018 was examined to determine the different air pollutants.

Discussion

- Pollutants' harmful effects on human health
  - Zinc, Lead, Manganese
- Carbon monoxide reacts in the atmosphere and produces carbon dioxide and ozone.
- Particulate matter aids in chemical reactions that produce more ozone.
- AQI (air quality index) over 301 AQI

Results

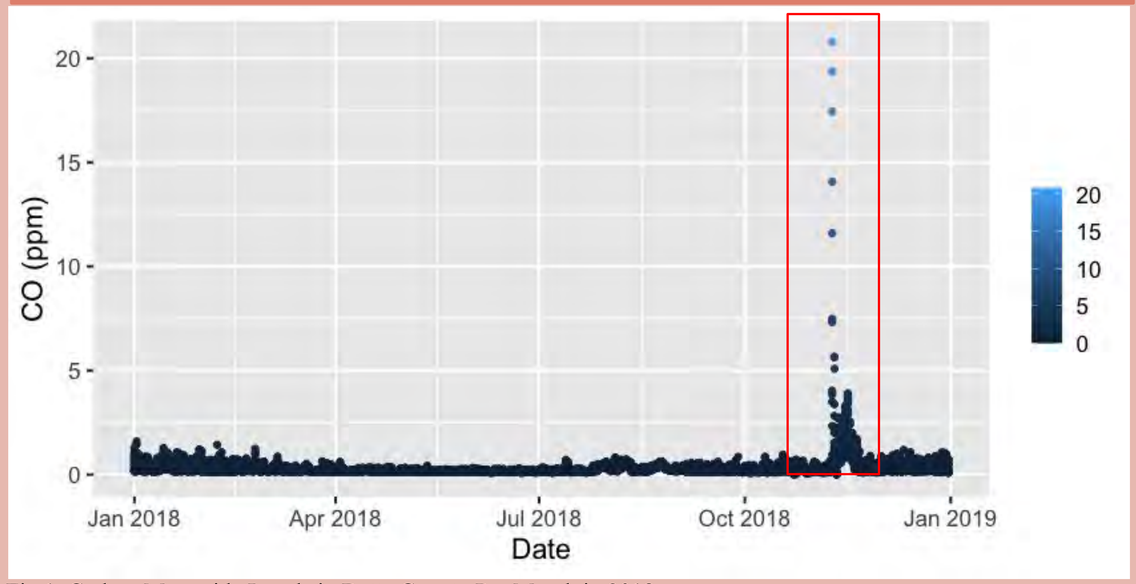

Fig 1. Carbon Monoxide Levels in Butte County Per Month in 2018

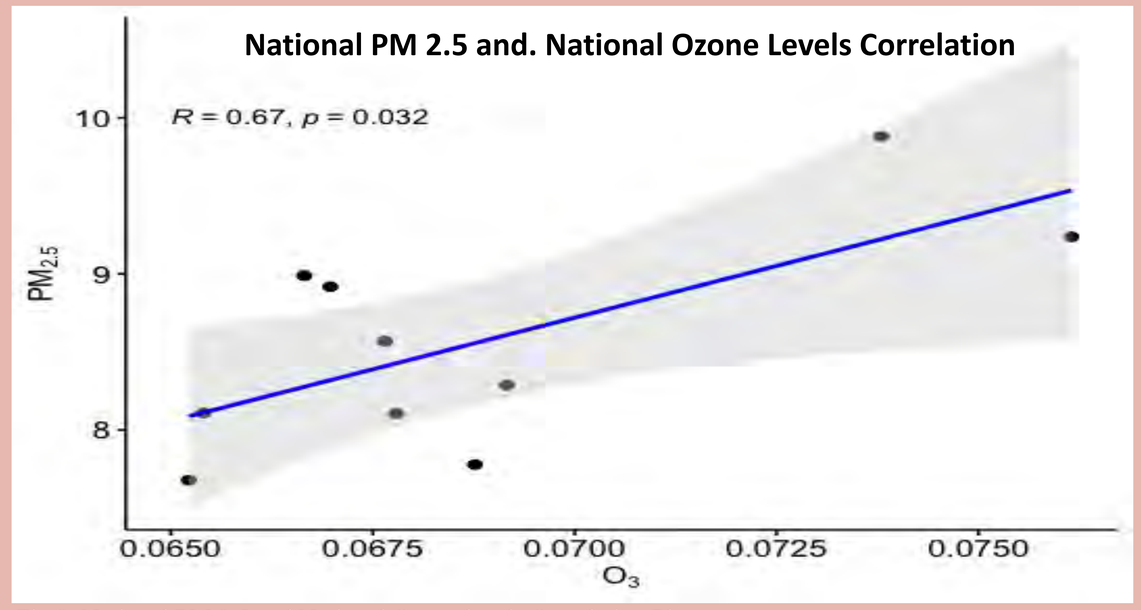

Fig 2. National PM 2.5 and National Ozone levels Correlation Plot

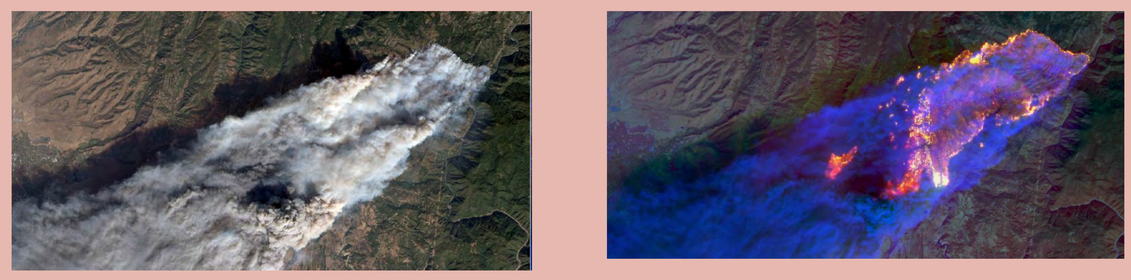

Fig 3. - Landsat 8's shortwave and thermal infrared data showing active hotspots below the smoke cover (Matt Montanaro and Aaron Gerace)

Conclusions

Data from the California Camp Fire reveals an unfortunate story that is happening all the time. Wildfires fuel climate change, leading to global warming, which then contributes to more fires. Furthermore, there are many health effects that impact us directly. It is important to understand the effects to create a plan of action to prevent wildfires and the negative effect they have on air quality.

Future Work

- It would be interesting to look into construction materials that would emit less of the harmful contaminants when burned. Along with these, the building codes of the communities that live around wildfire areas
- It would also be interesting to further research the health effects that wildfires have on humans in the long-term.

References

(1) Environmental Protection Agency. (n.d.-a). AirData website file download page. EPA. https://aqs.epa.gov/aqsweb/airdata/download_files.html#Raw
(2) Environmental Protection Agency. (n.d.-b). Ozone Trends. EPA. https://www.epa.gov/air-trends/ozone-trends
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(4) NASA. (2022, April 12). The synoptic view of California's Camp Fire: A scorching reality of today's fires. NASA. https://landsat.gsfc.nasa.gov/article/the-synoptic-view-of-californias-camp-fire-a-scorching-reality-of-todays-fires/
(5) Camp Fire spreads foul air in California. (n.d.). NASA. NASA. https://www.earthobservatory.nasa.gov/images/144261/camp-fire-spreads-foul-air-in-california. Accessed 23 June 2023

Acknowledgements

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This project was completed during a one week visit to CU Boulder as part of the Pathways to STEM program. The Pathways to STEM program is funded by the National Science Foundation IUSE DUE #2311797.

Alternate Text

Sidney Esparza, Shao-Wei Larios, Hanah Amor, & Angelica Arechiga

Cal Poly Pomona

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(3) Environmental Protection Agency. (n.d.-c). PM 2.5 National Trends. EPA. https://www.epa.gov/air-trends/particulate-matter-pm25-trends

(4) NASA. (2022, April 12). The synoptic view of California's Camp Fire: A scorching reality of today's fires. NASA. https://landsat.gsfc.nasa.gov/article/the-synoptic-view-of-californias-campfire-a-scorching-reality-of-todays-fires/

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