Quantifying Indoor Pollution Following the Marshall Fire

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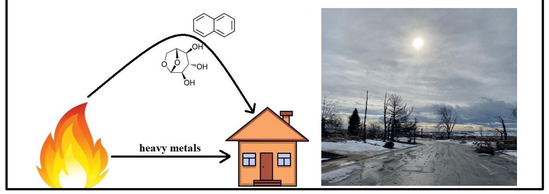
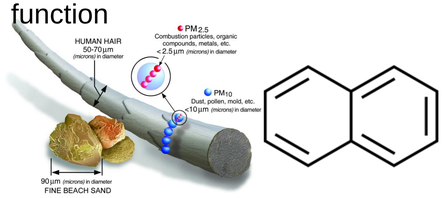
The Marshall Fire (12/30/2021)

- The Marshall is the most expensive wildfire in CO history, causing an estimated $3,000,000,000 of damage
- ***Homeowners reported a lack of guidance for when it was safe to return home, and what pollutants remain indoors following the fire***



Pollutants of Interest

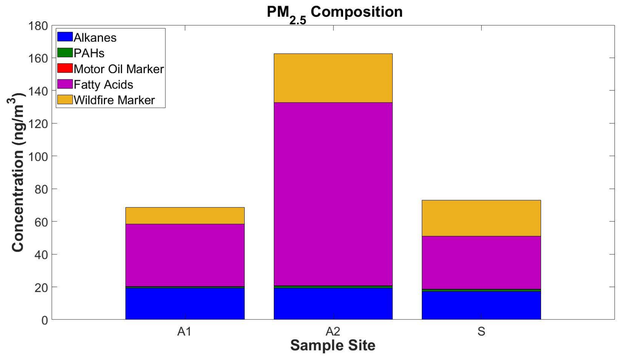
- $PM_{2.5}$ consists of small particles less than 2.5 μm in diameter. Exposure to $PM_{2.5}$ can result in health impacts such as reduced heart and lung function



- Polycyclic Aromatic Hydrocarbons (PAHs) are a group of ringed compounds that have detrimental effects on human health. The EPA considers 16 PAHs high priority due to their toxic effects. Priority PAHs with a greater number of rings are generally considered to be more toxic

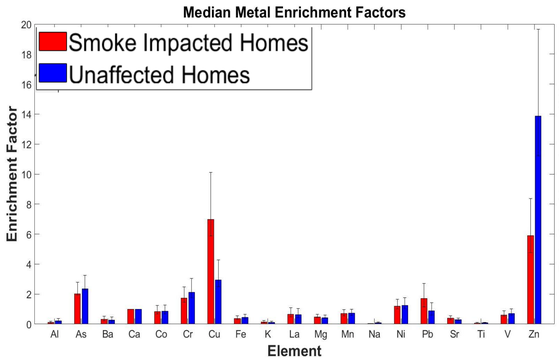
Post-Wildfire (1/7-2/4) Airborne $PM_{2.5}$

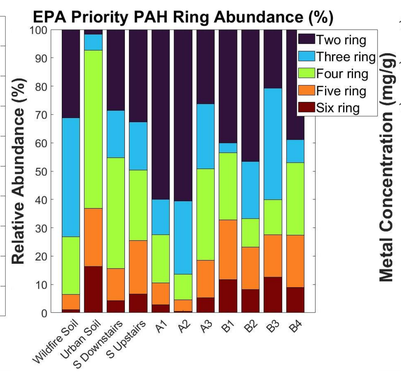
- $PM_{2.5}$ concentrations were low in sampled homes following the Marshall Fire
  - Likely a result of reduced vehicle traffic in fire-impacted neighborhoods
- Toxic components of $PM_{2.5}$ (PAHs) were found in negligible concentrations
- Concentrations of species emitted by plant and wood burning were elevated within sampled $PM_{2.5}$

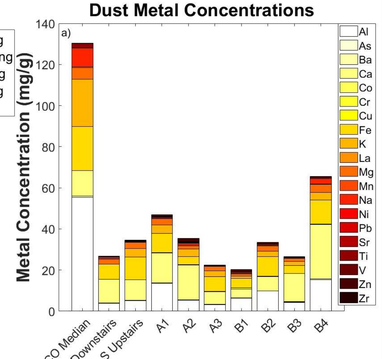


Post-Wildfire Dust

- ***Concentrations of toxic EPA priority PAHs were elevated in fire-impacted dust samples***
- Concentrations of metals were lower in indoor dust samples than in soils across Colorado
- Heavy metals displayed increased enrichment in dust samples. Metal enrichment is likely due to human activities including vehicle break wear, combustion, and vehicle emissions
  - Enrichment Factor: How much greater a pollutant concentration is compared to normal levels

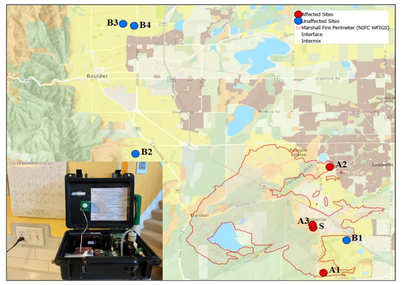






Methods

- ***We analyzed the after-effects of the Marshall Fire on common pollutants using tools such as:***
- Collecting indoor $PM_{2.5}$ samples
- Neighborhood scale $PM_{2.5}$ monitoring
- Dust (Ash & Soil) analysis



Implications & Future Work

- Upon returning home, ***homeowners affected by wildfires should prioritize dust & ash removal***
- $PM_{2.5}$ from wildfires likely does not represent a long-term hazard to impacted homeowners
- Future work: Determine what percentage of pollutants in different samples are caused by the Marshall Fire using techniques such as Positive Matrix Factorization (PMF)

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