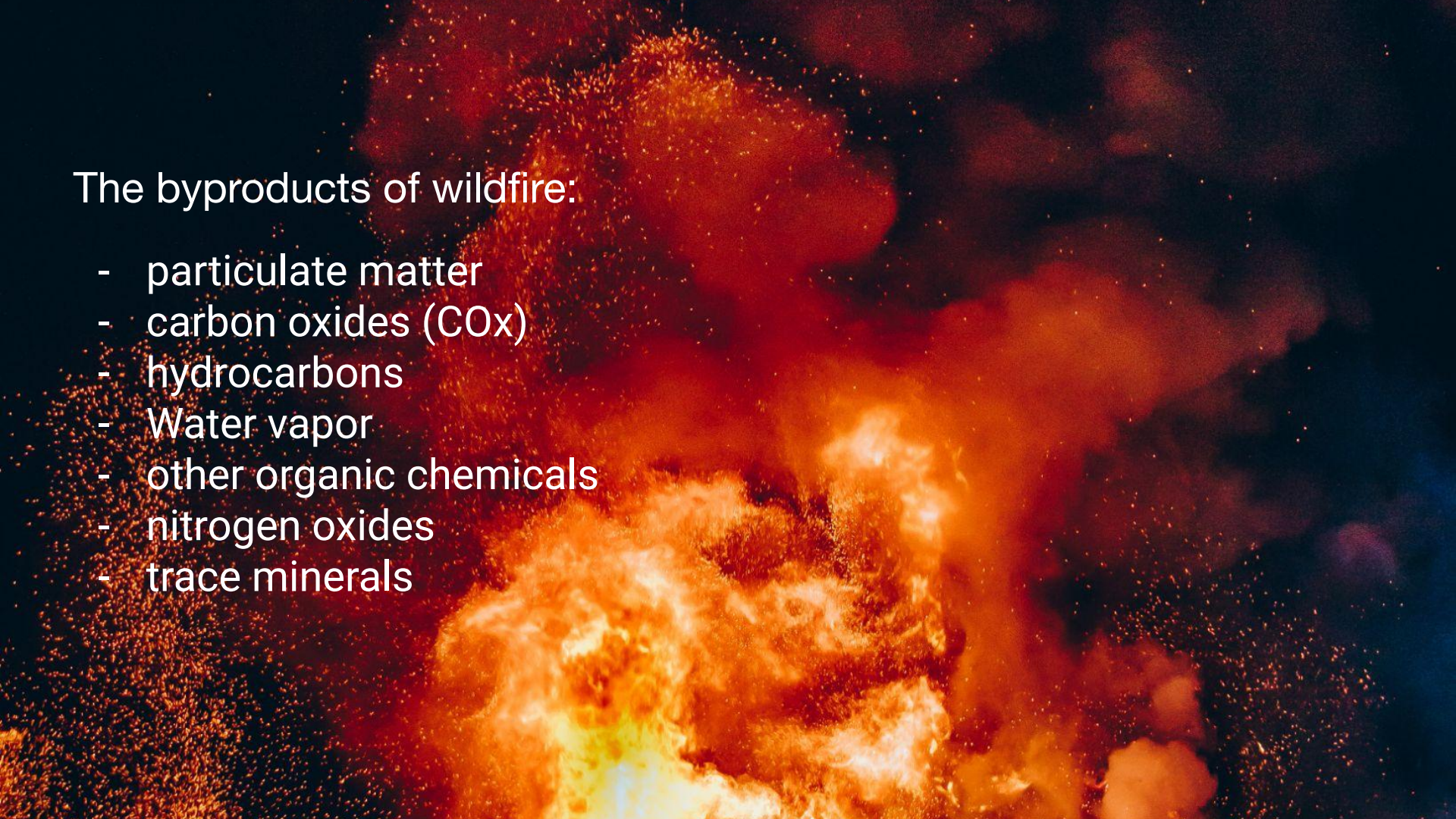
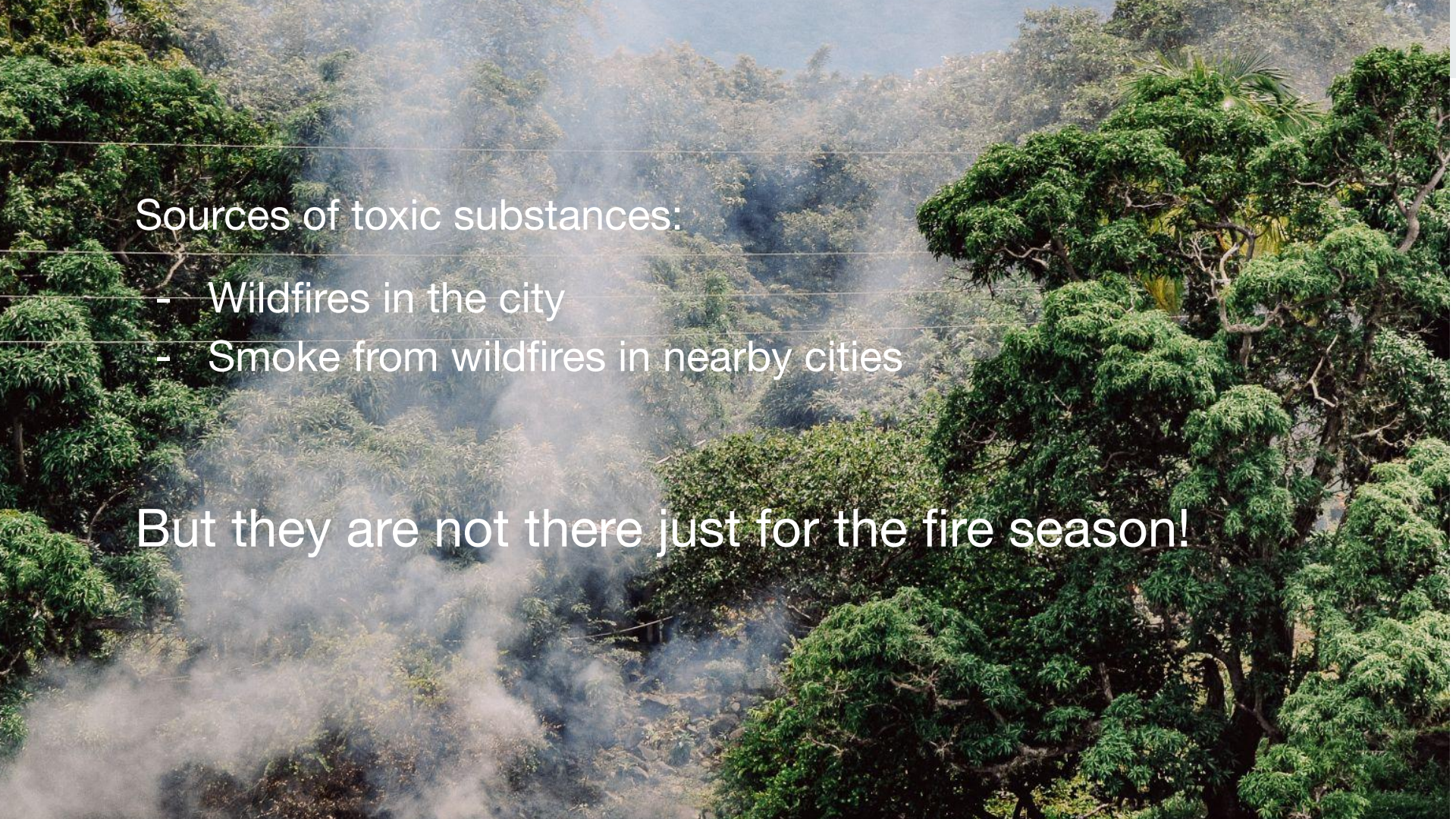


The byproducts of wildfire:

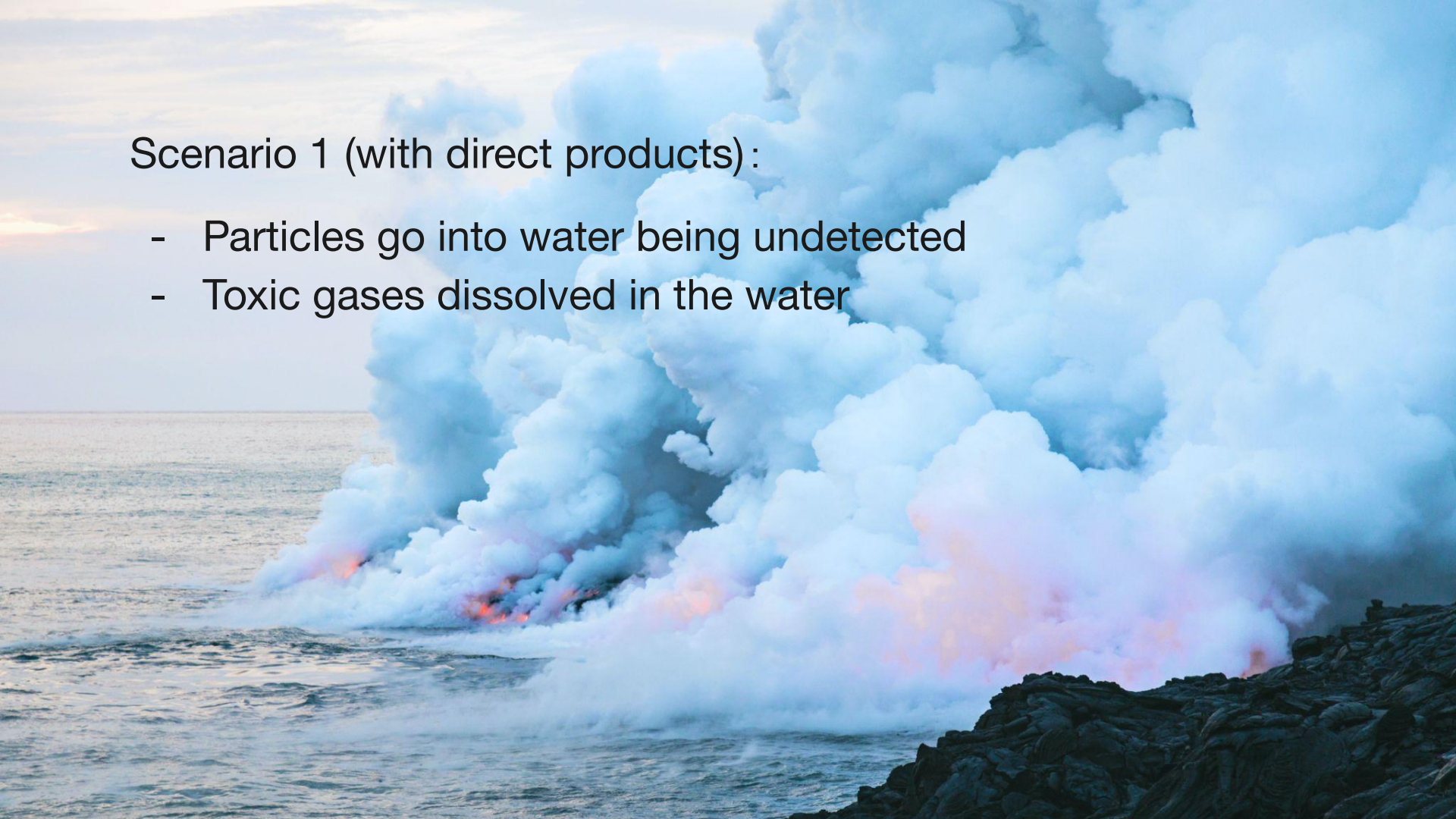
- particulate matter
- carbon oxides (COx)
- hydrocarbons
- Water vapor
- other organic chemicals
- nitrogen oxides
- trace minerals



Sources of toxic substances:

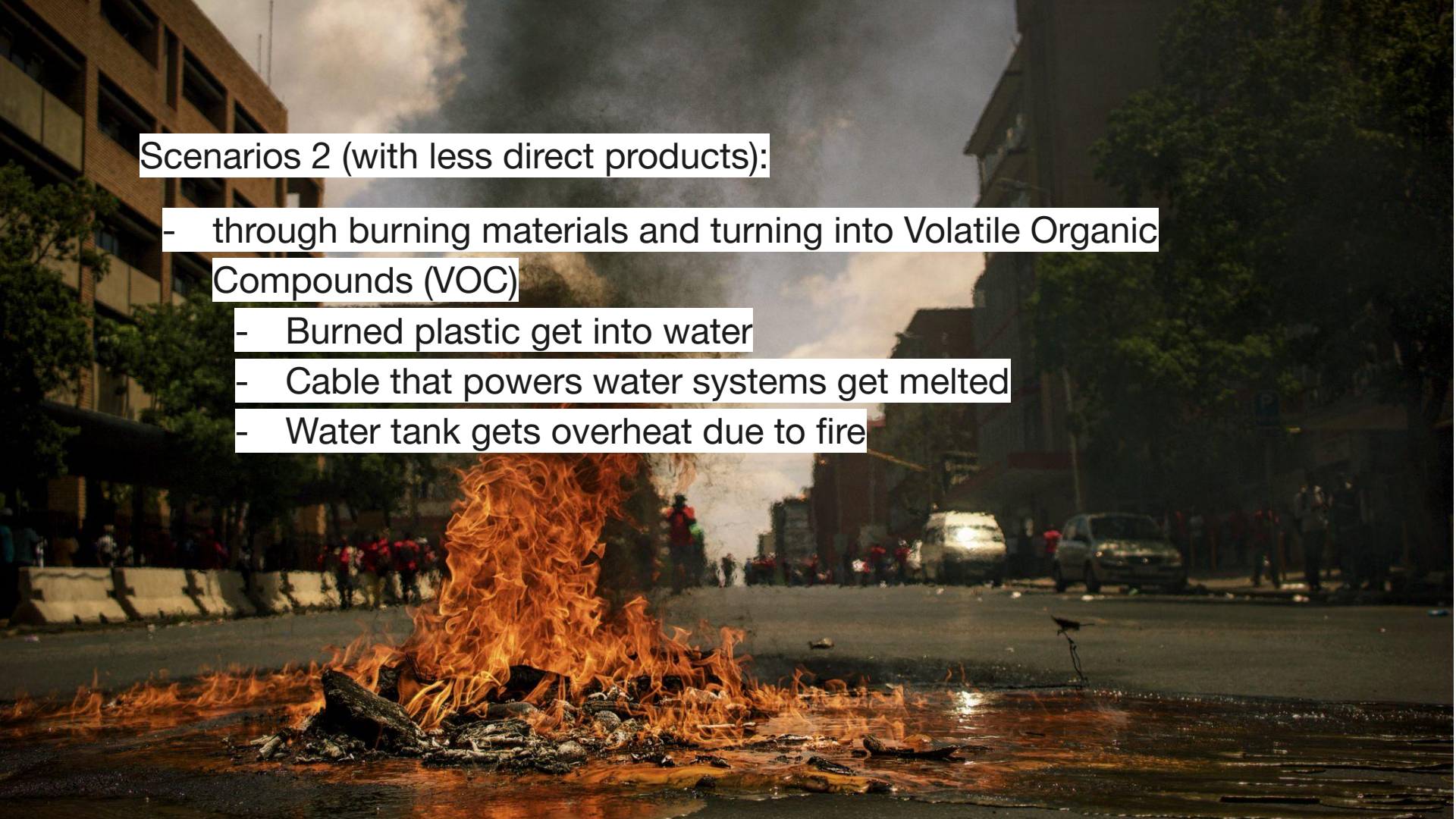
- Wildfires in the city
- Smoke from wildfires in nearby cities

But they are not there just for the fire season!



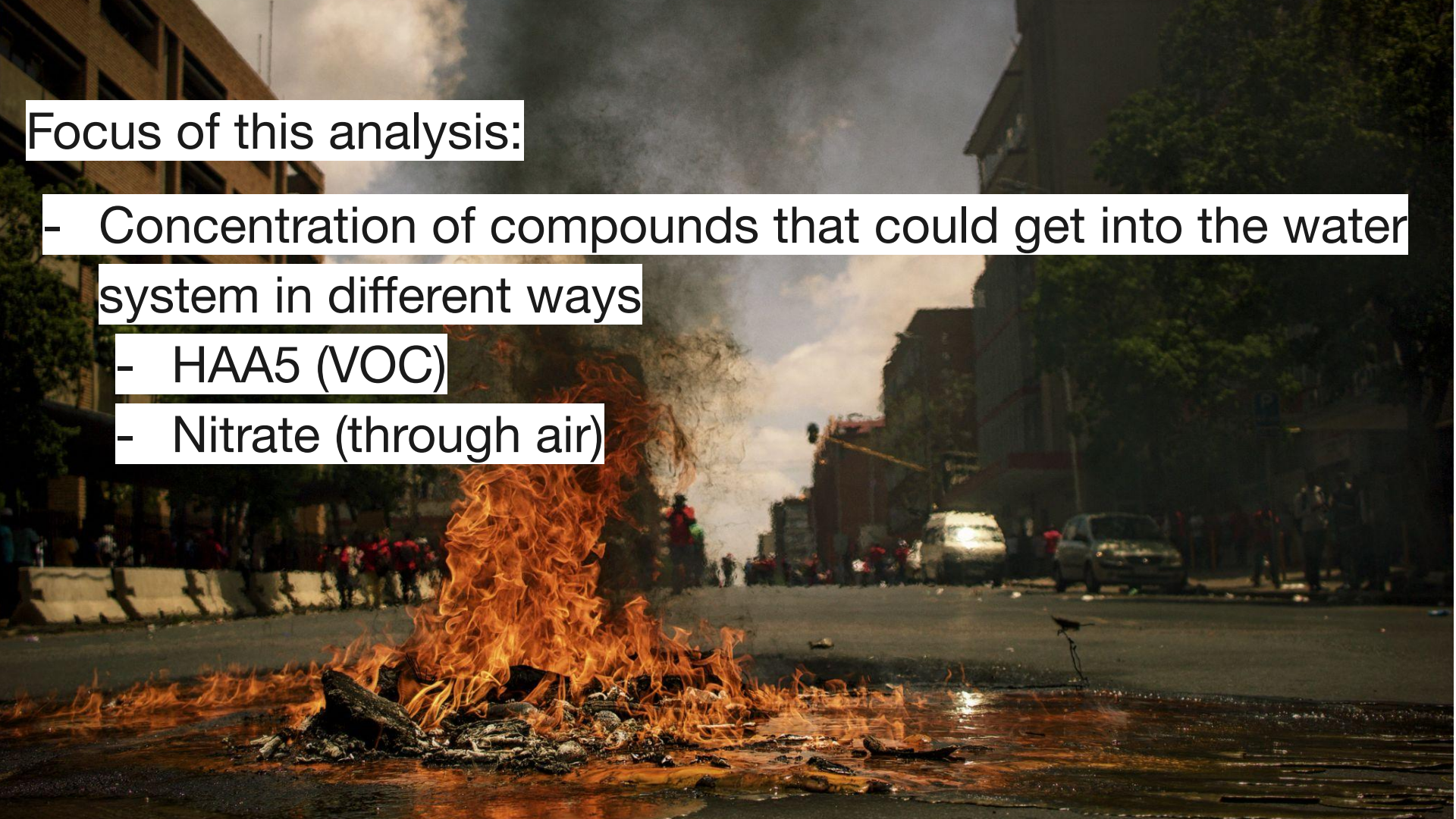
Scenario 1 (with direct products):

- Particles go into water being undetected
- Toxic gases dissolved in the water



Scenarios 2 (with less direct products):

- through burning materials and turning into Volatile Organic Compounds (VOC)
  - Burned plastic get into water
  - Cable that powers water systems get melted
  - Water tank gets overheat due to fire



Focus of this analysis:

- Concentration of compounds that could get into the water system in different ways
  - HAA5 (VOC)
  - Nitrate (through air)

Correlation between Concentrations of Compounds in the water system and

- GIS_Acres (year average)
  - 0.41
- Count of Fires in the year
  - 0.55
- AQI_Gas (year average)
  - 0.74

- Avg_distance (miles) (year average)
  - -0.84
- Count of Fires in the year
  - 0.67
- AQI_Gas (year average)
  - 0.38

	Weighted HAA Count (mcg/L)
Year	0.372843
avg_distance (miles)	-0.219202
GIS_Acres	0.412659
Count	0.550811
Estimator	0.564357
Mean_Water_Discharge	-0.279302
AQI_Particle	-0.098744
AQI_Gas	0.741473
Weighted HAA Count (mcg/L)	1.000000

	Weighted Nitrate Means (mcg/L)
Year	0.338557
avg_distance (miles)	-0.844739
GIS_Acres	-0.079851
Count	0.669609
Estimator	0.672903
Mean_Water_Discharge	-0.264754
AQI_Particle	-0.167777
AQI_Gas	0.379603
Weighted Nitrate Means (mcg/L)	1.000000

Hypotheses from the Analysis with Correlation

- The count of fires over the year has relatively high correlation
- Area might play a greater role in having more VOC in the water
- Average distance might play a greater role in carrying toxic gases

Determining New Estimator

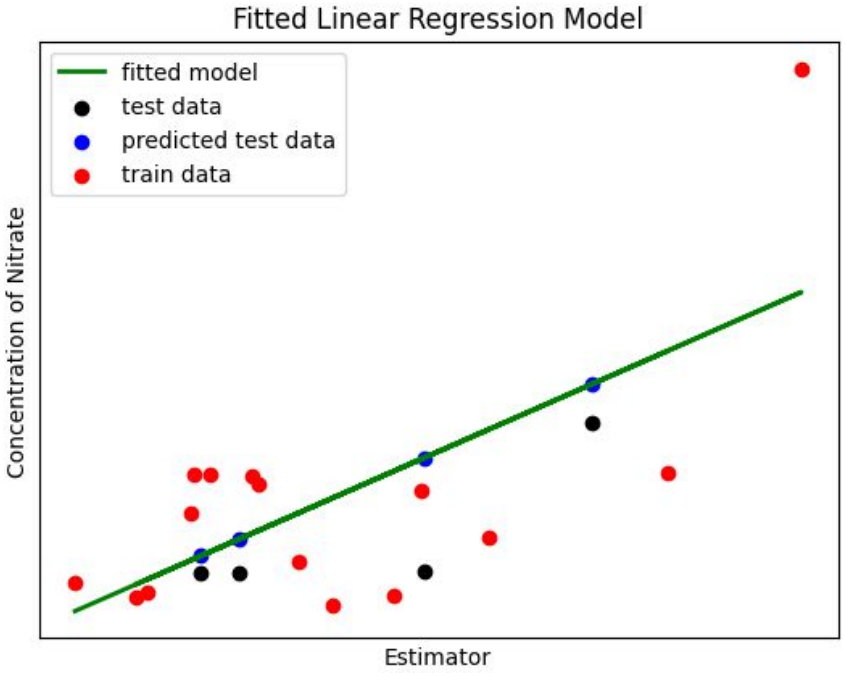
Let A = Average Distance in Miles

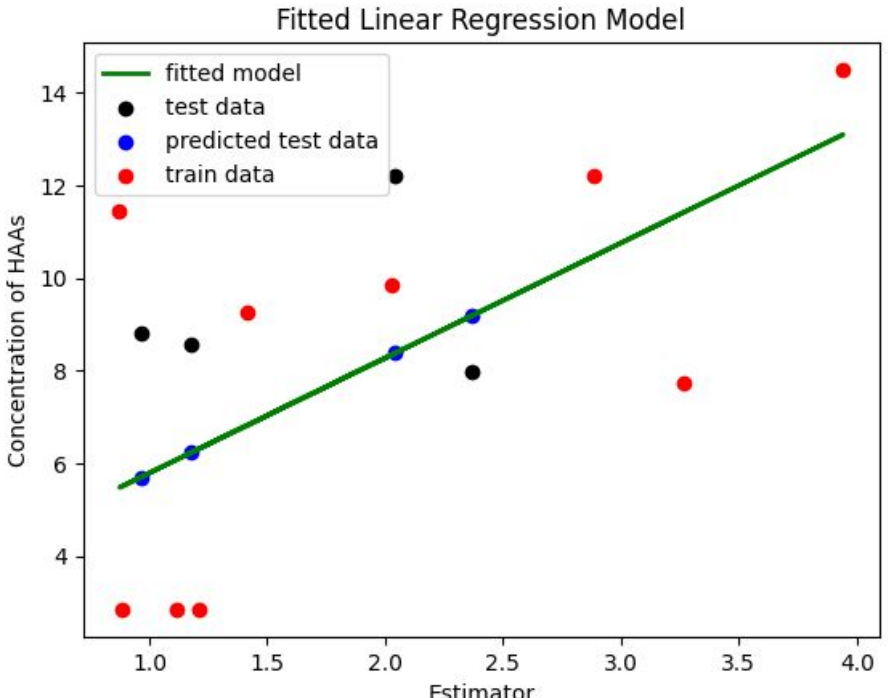
Let B = Average Acres Burned

Let C = Count of Fires

Estimator = pd.Series(B*C**2/np.sqrt(A)/1e7)

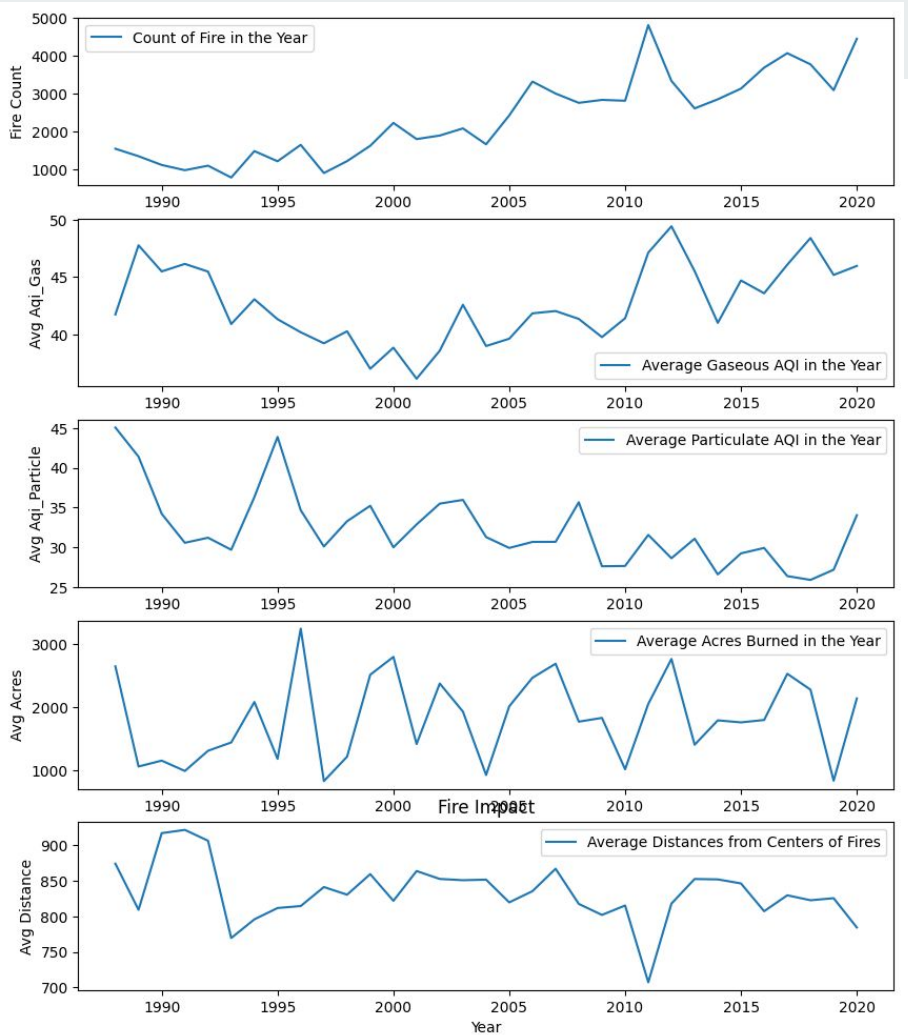
Fitted Models





Conclusion

- Growing trend in the yearly count of fires could make the concentration of toxic compounds in water system higher
- Long-term exposure to toxic chemicals could lead to higher risk of cancers
- Purification should be placed more in water system after fire seasons



Possible Issues with the Analysis

- AQI data was collected from sites in nearby city
- The data about concentrations has only quarterly or yearly data, and are limited (since late 1990s)
- Hard to determine how long do the compounds stay in water
- Estimator for new models needs further tuning and to distinguish from each other