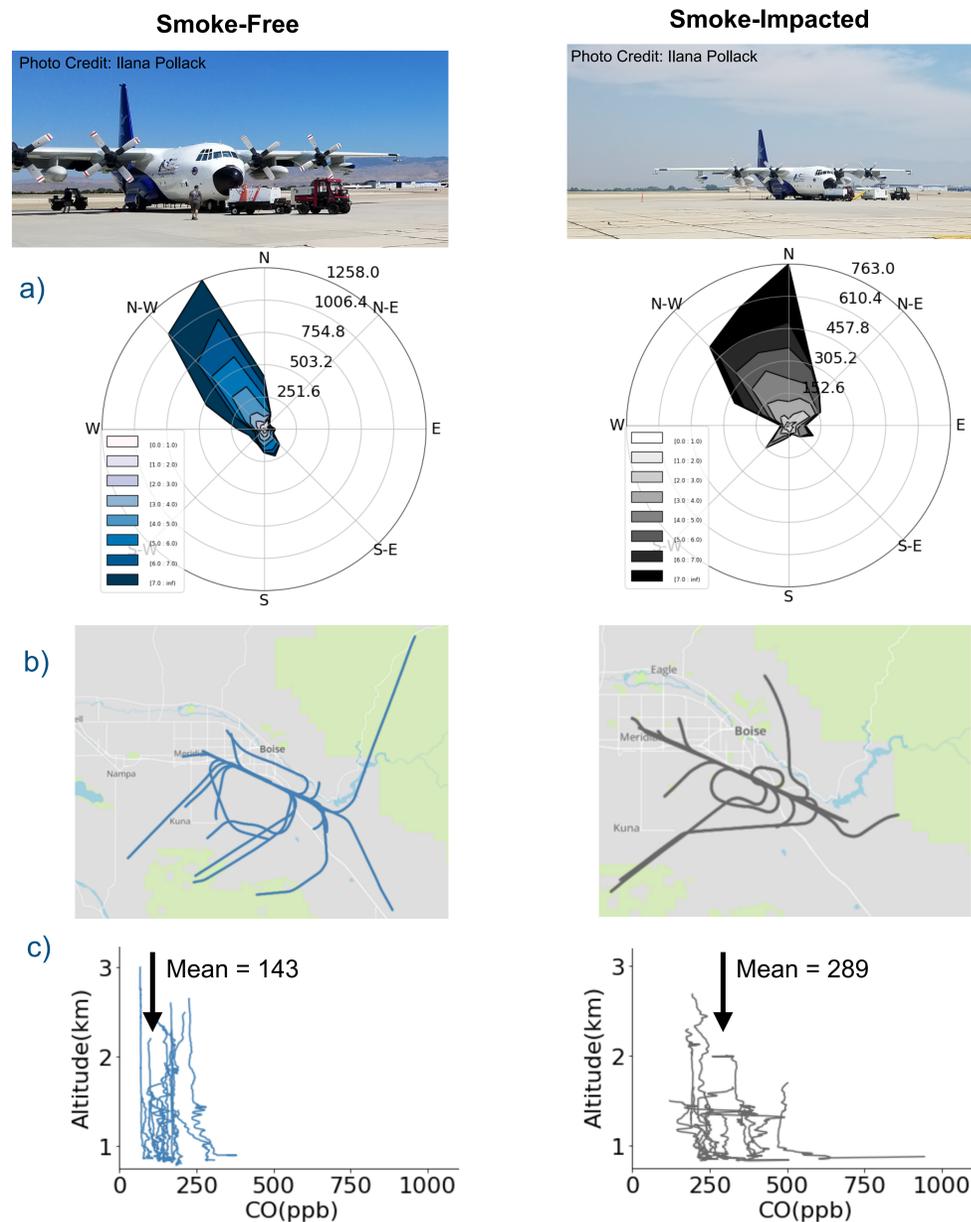


## 1 Abstract

-Wildfire smoke is an important source of air pollution for the western U.S., and this problem is likely to be exacerbated by climate change.  
 -The Western Wildfire Experiment for Cloud Chemistry, Aerosol Absorption and Nitrogen (WE-CAN) project deployed the NCAR/NSF C-130 research aircraft in summer 2018 (22 July – 31 August) to sample wildfire smoke using Boise, ID as a base.  
 -We report on measurements of gas-phase species collected in aircraft ascents and descents through the Boise, ID boundary layer.  
 -The smoke was transported from both local fires in Idaho as well as fire complexes in Oregon and California.  
 -When compared to ground-based data obtained from the Colorado Front Range in summer 2015, we found that a similar subset of gas-phase species increased when both areas were smoke-impacted.  
 -During smoke-impacted periods, the average abundance of several Hazardous Air Pollutants (HAPs), was comparable in magnitude to the annual averages in many major U.S. urban areas.

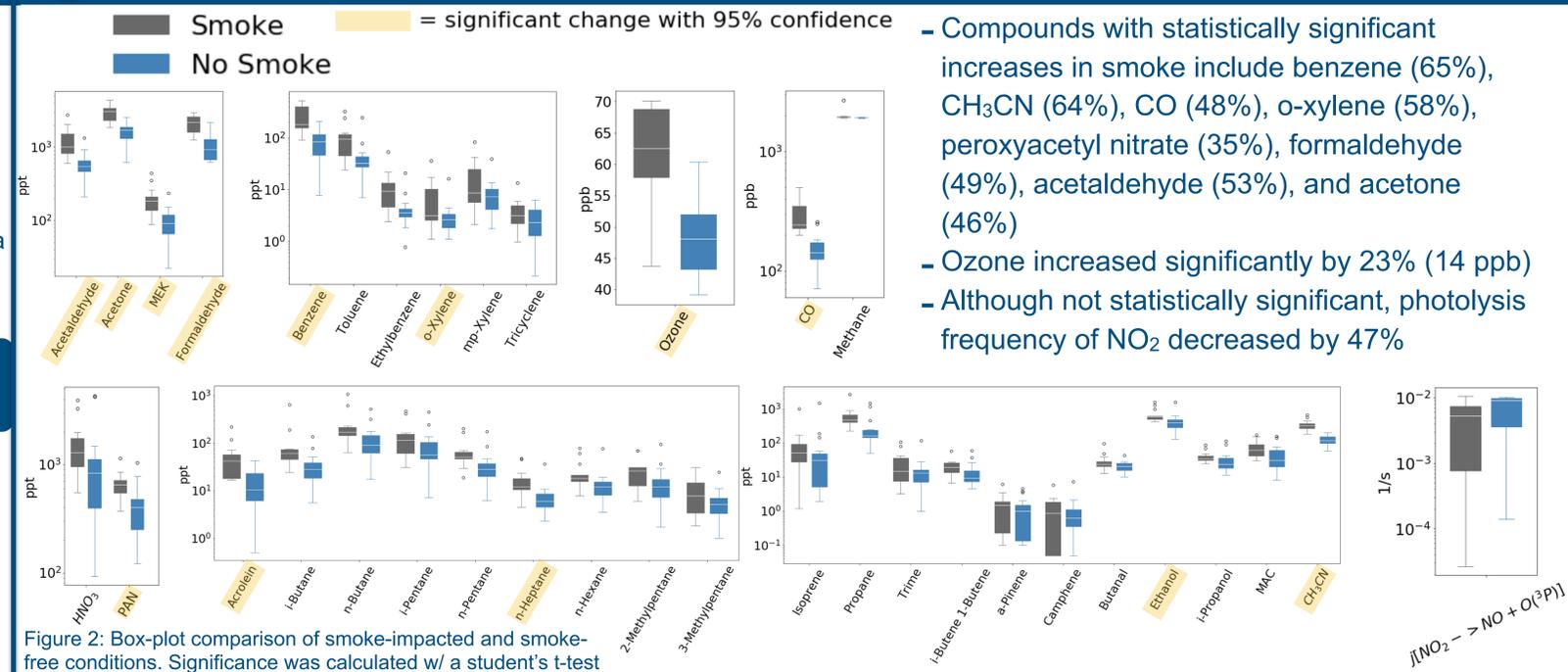
## 2 Smoke Identification



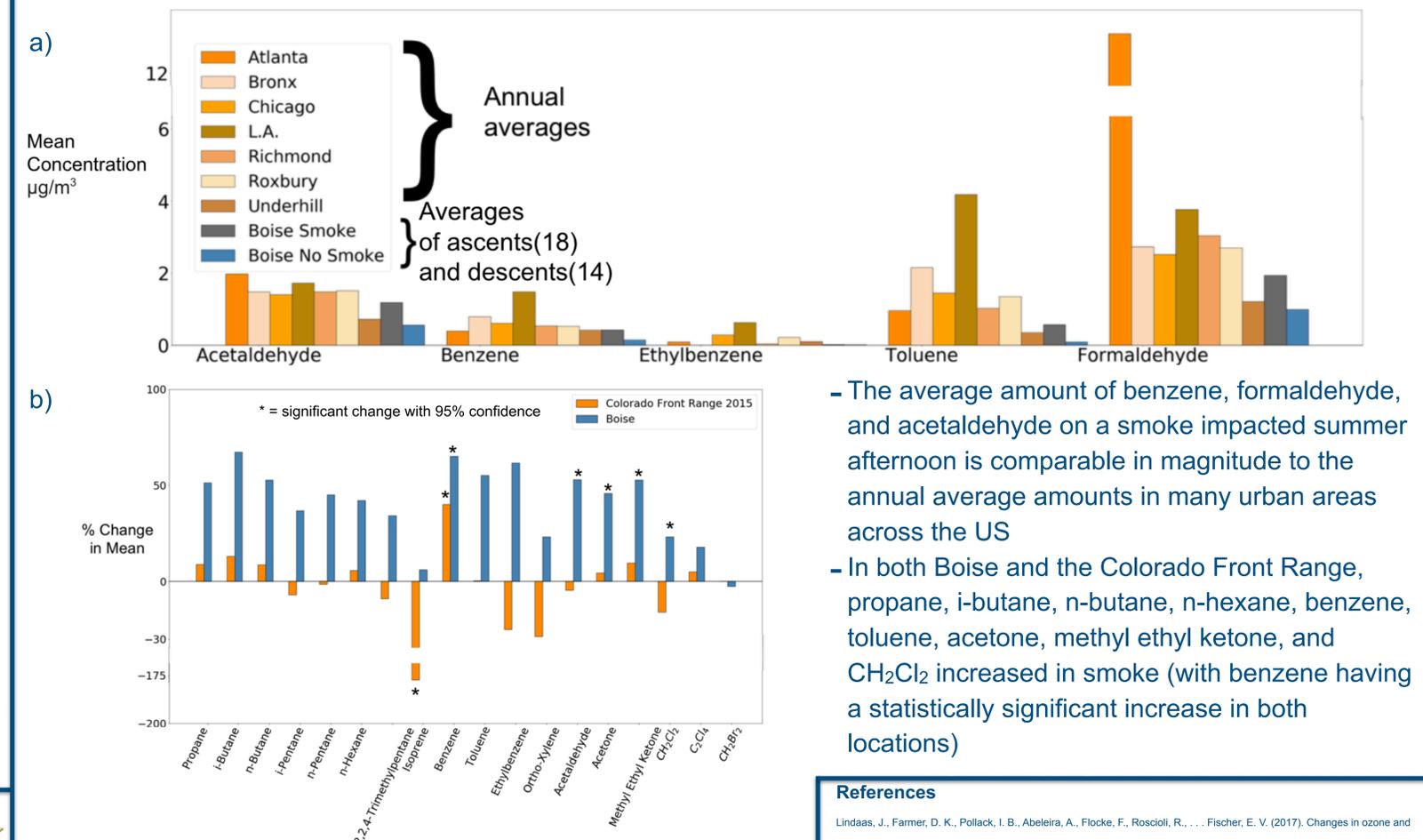
-Identified the boundary layer using potential temperature and water vapor  
 -Boundary layer altitudes range from .9 km to 2.7 km  
 -Ascents and descents with mean HCN > 300 pptv and CH<sub>3</sub>CN > 200 pptv are  
 -For smoke-impacted and smoke-free days, there were northwesterly  
 -18 ascents/descents classified as smoke-free and  
 -Note: "Smoke-impacted" means there is smoke at the ground

Figure 1: a) Wind roses showing wind speed and direction for all ascents and descents, b) Map of ascents and descents for all flights, and c) CO v. altitude for all ascents and descents

## 3 Many Gas-Phase Species Increased in the Presence of Smoke.



## 4 Comparisons Between Boise and Other Cities



- The average amount of benzene, formaldehyde, and acetaldehyde on a smoke impacted summer afternoon is comparable in magnitude to the annual average amounts in many urban areas across the US  
 - In both Boise and the Colorado Front Range, propane, i-butane, n-butane, n-hexane, benzene, toluene, acetone, methyl ethyl ketone, and CH<sub>2</sub>Cl<sub>2</sub> increased in smoke (with benzene having a statistically significant increase in both locations)

### References

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Figure 3: a) Comparison of annual average of HAPs from major cities to ascent and decent averages from Boise and b) comparison of the % change in mean of chemical species from smoke-free to smoke-impacted conditions of Boise and the Colorado Front Range

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