

Project ICE CREAM: Isotopic Composition Emphasizes CO₂ Respiration and Emissions in Atmospheric Mixing

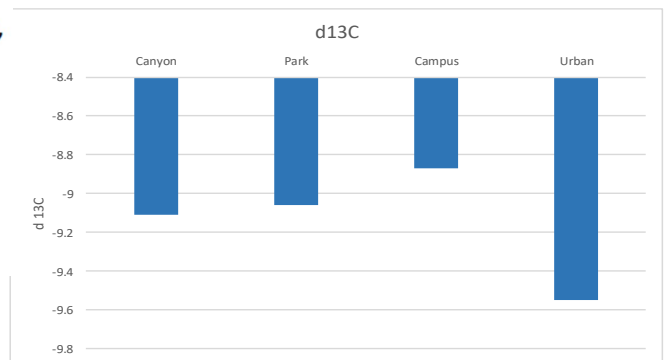
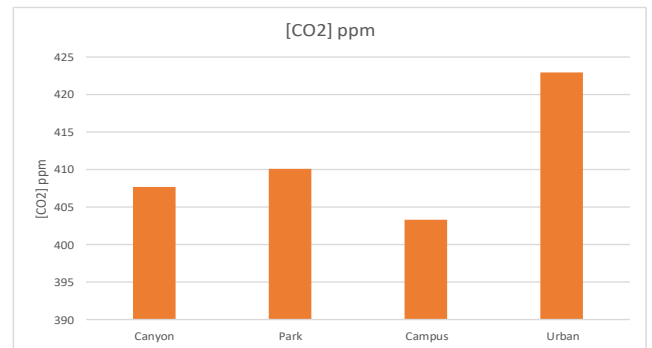
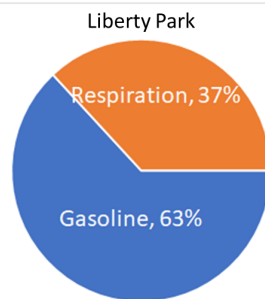
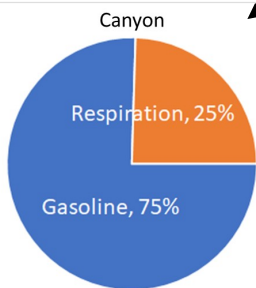
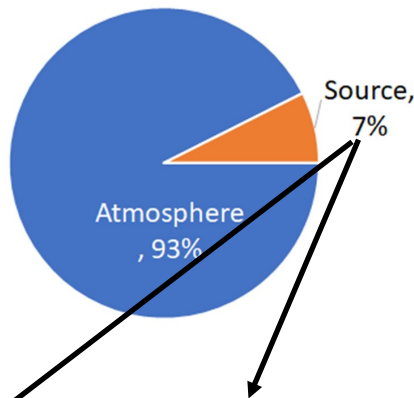
Zhongyin Cai, Becky Forgrave, Emily Joyce

Research Questions:

1. Does atmospheric CO₂ sources and amounts vary on an urban to rural gradient?
2. What is the CO₂ isotopic composition in the air we breathe indoors vs outdoors?

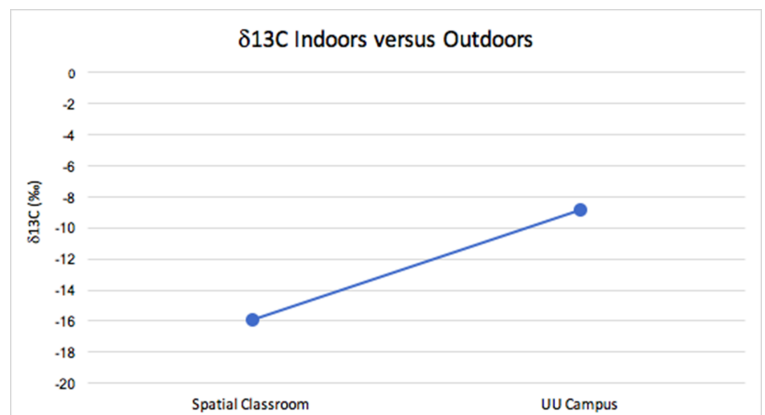
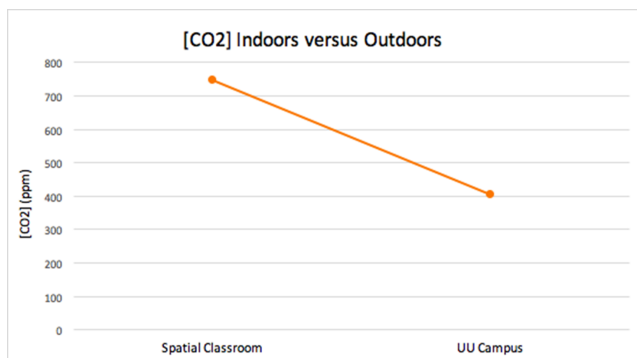
Sampling Sites

1. Red Butte Canyon
2. University
3. University—soil
4. University — classroom
5. Liberty Park
6. Trolley Square



Mixing Models

- Carbon source value from Keeling Plot
- Oxygen source values solved for each site
- $C_m = C_A + C_B$
- $\delta_m * C_m = \delta_A * C_A + \delta_B * C_B$
- $\delta_m = (\delta_A C_A - \delta_B C_A) * (1/C_m) + \delta_B$



Conclusions:

1. The most urban site (Trolley Square) had the highest CO₂ concentration and most depleted $\delta^{13}C$, indicating the strong influence of gasoline combustion from vehicles. This is supported by our mixing model.
2. The strongest respiration signal was measured for the sample collected indoors.