Utilizing Public Transit for Urban Atmospheric Monitoring in Denver, CO

L.E. Mitchell[1], I. Vimont[2,3], S.E. Michel[4], and B.H. Vaughn[4]

[1]University of Utah, Salt Lake City, UT 84112; 541-207-7204, E-mail: logan.mitchell@utah.edu
[2]National Research Council Post-Doc, Boulder, CO 80305; 303-497-6044, E-mail: isaac.vimont@noaa.gov
[3]NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO 80305
[4]Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder, CO 80309

Global awareness of the magnitude of emissions reduction needed to keep climate warming under 1.5°C is increasing. A recent IPCC report found that global CO_2 emissions must decline by 45% by 2030, reaching net zero around 2050 in order to meet that objective. At the same time, many cities have elevated levels of air pollution that lead to adverse health impacts in millions of people annually. To address both of these challenges, cities and states in recent years have been developing plans to reduce emissions of both greenhouse gases and air pollutants. In light of these commitments, new cost-effective measurement strategies that are able to track the spatial and temporal variability of atmospheric species within complex urban environments are needed.

Denver, CO is an excellent candidate for increased air quality monitoring and evaluation. Denver is consistently out of attainment for ozone (O_3) air quality standards and if the standards are tightened, the challenges facing Denver's pollution mitigation will increase. In order to better understand the nature of O_3 in Denver, higher spatial resolution measurements are needed than are currently employed around the greater Denver urban region. One promising new approach to urban atmospheric monitoring is deploying measurement systems on public transit vehicles. In Salt Lake City, UT (SLC) a monitoring system was deployed in December 2014 on a light rail public transit car measuring greenhouse gases and air pollutants (Mitchell et al., 2018). Analysis of the data from that project is ongoing, yet it has already yielded important policy-relevant insight about emissions from transportation and energy systems across the city.

To further utilize public transit-based monitoring we are exploring the possibility of a similar deployment on the RTD light-rail system in Denver, CO. Denver and SLC have similar air quality issues and also both have GHG reduction targets (50% reduction by 2030 in SLC; 30% reduction by 2025 in Denver). In this presentation we will discuss some of the results from the TRAX (Transit Express) project in SLC and also discuss how a similar project could be deployed in Denver.

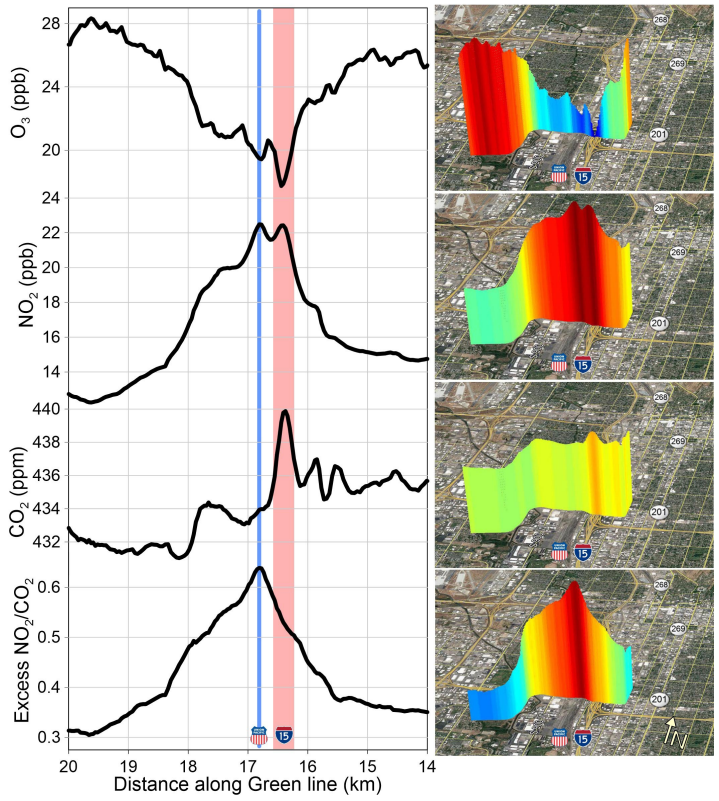

Figure 1. Relationships between species illustrating sources of NO_2 and CO_2 along a subsection of the TRAX line.