A21M-2170 Insights into the source attribution and chemical pathways of reactive nitrogen based on isotopic and trace gas analysis in summertime Salt Lake City

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08:30 - 12:00

Hall EFG (Poster Hall) (NOLA CC)

Abstract

Elevated summertime ozone (O_3) and O_3 exceedances over 70 ppbv, the national air quality standard (NAAQS), in the afternoons have been a critical issue in Salt Lake City (SLC). These episodes have been mainly driven by a combination of deep boundary layer development, local and regional O_3 transportation, and critically, the presence of its precursors from local emissions and transport. Reactive nitrogen (RN) compounds, as important O_3 precursors, play a key role in modulating atmospheric oxidative capacity and secondary aerosols formation.

As part of the Utah Summer Ozone Study (USOS) , we performed concentration and isotopic composition measurements of RN species from July 15 to August 8, 2024, at two urban sampling sites in SLC: one on the roof of the College of Mines and Earth Sciences at the University of Utah representing suburban background air, and the other at the Tech Center of the Utah Division of Air Quality near emission sources. In particular, we monitored real-time nitrogen oxides (NO_x) and O_3 concentrations and analyzed isotopic compositions ($^{15}N/^{14}N$, $^{18}O/^{16}O$, $^{17}O/^{16}O$) of nitrous acid (HONO), NO_x, nitric acid (HNO_3), and particulate nitrate ($p\text{-}NO_3^-$) after collecting these samples with a resolution of hours. Preliminary $\delta^{15}N$-HONO values were similar across sites (urban: –20.28‰ to –1.73‰; suburban: –19.68‰ to 5.17‰), suggesting similar sources. By contrast, $\delta^{18}O$-HONO in the suburban site (18.25 to 105.06‰) was generally higher than urban site (-3.24 to 89.84‰), indicating more secondary production contribution in suburban areas.