NOAA's Utah Winter Air Quality Study: 2017

Understanding the Causes of Utah's Severe Particulate Matter Pollution in the Salt Lake Region During Winter

Air Quality Challenges in the Salt Lake City region

- The over 2 million residents along Utah's Wasatch Front (80% of Utah's population) experience some of the most severe particulate matter (PM) air quality issues in the Nation.
- PM concentrations in Salt Lake City exceed the National Ambient Air Quality Standards (NAAQS) an average of 18 days per year, all during wintertime. The EPA declared three regions in northern Utah as non-attainment areas in 2009.
- Understanding the causes of Salt Lake's winter PM pollution is needed for Utah's efforts to develop a State Implementation Plan (SIP) to address the NAAQS exceedances in this region.

NOAA's Measurements to Understand Winter Particulate Matter Pollution in Utah

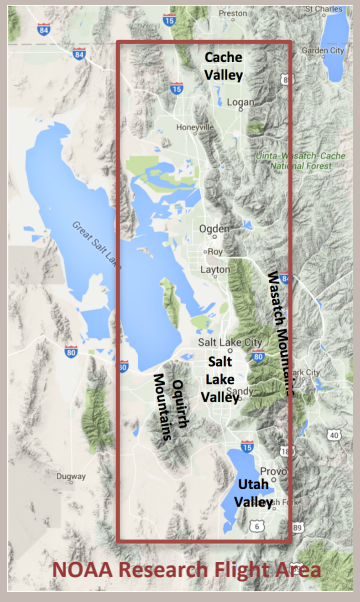
Well known factors for the region:

- The winter meteorology leads to strong multi-day inversions that trap urban emissions in the Salt Lake, Cache, and Utah valleys.
- The entrapment is exacerbated by the confining terrain (mountains to the east and west), which limits horizontal mixing.
- Episodes of high PM are more likely during periods with snow cover, but snow is not required to induce PM exceedance events.

NOAA's Utah Winter Air Quality Study will use a small instrumented research airplane to access the critical altitude region in which particulate matter formation is most important. Little is known about the chemistry aloft. The focus will be to investigate the interplay between winter inversions, emissions, and atmospheric chemistry.

Key questions addressed:

- Which emissions (urban, agricultural…) are the most important for forming PM, especially the ammonium nitrate PM that is prevalent during exceedances?
- How does geographic location (mountain vs urban valley) and time of day affect the formation of PM and its composition?
- How does the formation of PM near the surface differ from formation aloft?
- What is the role of snow cover? And of chloride sources from the Great Salt Lake?



- Time frame: January-February 2017
- Measurement platform: NOAA Twin Otter research aircraft
- Chemistry measurements onboard: ozone, nitrogen oxides, ammonia, aerosol mass, CO, CO_2, methane
- Flights: Regular vertical profiling over the altitude range (~500 m) characteristic of the inversion events, and horizontal flights throughout the valleys
- Partners: Academia, Utah Dept. of Environmental Quality

Expected Payoffs

- Improved scientific understanding of the emissions, chemistry, and meteorology that lead to Utah's winter particulate matter problem
- Actionable information that will help identify which emissions are most important, thereby supporting the State of Utah's efforts to develop a State Implementation Plan for meeting the NAAQS for particulate matter
- Wider applicability to other western U.S. mountain valleys: California, the desert Southwest, and Pacific Northwest

CSD12 Contact: Mackenzie Solomon, NOAA Office of Legislative and Intergovernmental Affairs, 202-482-2497, mackenzie.solomon@noaa.gov