

## A Winter Ozone Monitoring Network in Utah's Uintah Basin

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While Utah's Uintah Basin typically experiences criteria pollutant concentrations below the Environmental Protection Agency's National Ambient Air Quality Standards (NAAQS), specific meteorological conditions during some winters allow ozone to build up over a broad area of the Basin. Conditions conducive to ozone formation include extensive snow cover, strong temperature inversions, and light winds. The Uintah Basin supports a vibrant oil and natural gas extraction industry, and it is likely that  $\text{NO}_x$  and hydrocarbons emitted during oil and gas extraction, along with emissions from other sources, contribute to ozone production during inversion episodes.

For three years Utah State University (USU) has operated a network of 10-20 stations that monitor ozone, meteorology, and ozone precursors around the Uintah Basin. 10 more air quality stations are operated by other groups, resulting in a dense monitoring network that allows for a detailed understanding of causes of wintertime ozone pollution in the Basin. For example, volatile organic compound (VOC) concentrations in the Basin are strongly correlated with proximity to oil and gas wells ( $R^2 = 0.92$ ), and VOC speciation is dependent on the type of wells (oil or gas) in the area. In contrast, ozone is most strongly correlated with elevation ( $R^2 = 0.60$ ), though proximity to oil and gas production is also important (combined  $R^2$  value of 0.78 with elevation and proximity to wells as independent variables). Spatial relationships of ozone and precursors with compressors, gas plants, coal-fired power plants, population, traffic, meteorological phenomena, and other parameters have also been investigated. This monitoring network has allowed for detailed observation of the buildup and distribution of ozone and precursors under inversion conditions and dispersion of ozone plumes as storms flush polluted air from the Basin. Data from this network are being incorporated into regulatory and research-grade meteorological and air quality models, including models under development at USU.

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