

Trends in ozone and NO₂ in the Uintah Basin: Influence from oil and gas production and wildfires

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Ozone has been extensively studied in the Uintah Basin (UB) of eastern Utah, U.S., during the wintertime using ground-based measurements, vertical profiles (ozonesonde), and modeling. Changes in background ozone, local precursor emissions, population, and wildfire smoke combined with terrain-induced meteorology affect the ozone and nitrogen dioxide (NO₂) levels. Therefore, this analysis assesses a decadal trend in monthly mean ozone and NO₂ for 2010-2020 in the UB. Here we show that recent trends are associated with oil and gas activities and smoke from wildfires, as depicted in ground-based observations and tropospheric NO₂ columns. There is a statistically significant decreasing trend in the spring and winter seasons because of a more than 50% reduction in natural gas production. In the summer and fall months, an increasing trend is associated with an increase in smoke days in the Basin. Our findings suggest that emissions from oil and gas drilling activities play a significant role in shaping long-term trends in the Basin. Gas drilling was a dominant NO_x source in the central Basin before 2015, and oil drilling and production have increased in western UB, leading to an increase in the NO₂ column and ozone.