Source Distribution of Elevated Ozone in the Northern Colorado Front Range

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The Northern Front Range region of Colorado has struggled with poor air quality in recent years, primarily in summer months, and since 2007 has been a non-attainment area for 8-hr ozone exceeding the Environmental Protection Agency National Ambient Air Quality Standard (NAAQS). A recent study by Gilman et al. (1) suggested that emissions from the oil and gas development area in Weld County constitute a major source of ozone precursors along the Front Range. Spatial Volatile Organic Compound (VOC) measurements and comparison with historic VOC data records further exemplify the rise and dominance of oil and gas VOC emissions in the Colorado Front Range (2). Here we use ozone data from the NOAA Boulder Atmospheric Observatory site in Erie, CO, and the Boulder County/Colorado Department of Public Health & Environment South Boulder monitoring site for an analysis of ozone climatology, transport, and source regions. While the winter data show a slight tendency of higher ozone being transported from the Rocky Mountains to the west, the summer data show a preponderance of high ozone events originating from the north to southeast sectors, in the direction of the oil and gas producing Wattenberg Field in the Denver-Julesburg Basin. This correlation suggests a significant contribution of emissions from the oil and gas operations to the summer ozone NAAQS exceedences in the Colorado Front Range.

(1) Gilman, J.; Lerner, B.; Kuster, W.; de Gouw J. Source Signature of Volatile Organic Compounds from Oil and Natural Gas Operations in Northeastern Colorado, *Environ. Sci. Technol*. **2013**, 47, (3), 1297-1305.

(2) Thompson C., Hueber J., and Helmig D. Regional impact of fugitive emissions from oil and gas operations on atmospheric non-methane hydrocarbons in Northeastern Colorado. *Submitted for publication.*

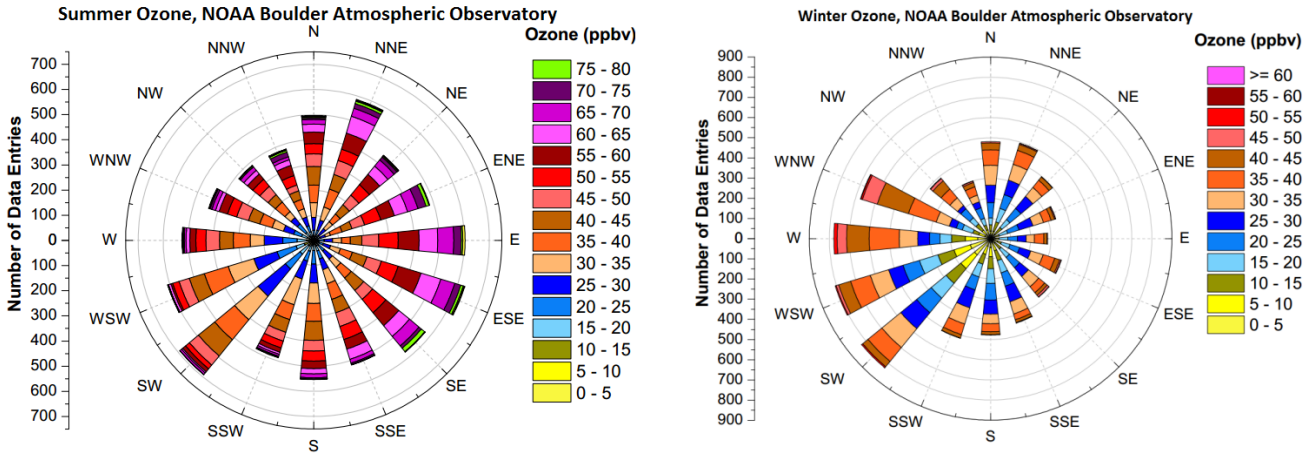

Figure 1. Ozone as a function of wind direction at NOAA's Boulder Atmospheric Observatory during the winter months (left: Dec 1 – Feb 28) compared to the summer (right: Jun 1 – Aug 30).