Characterization and Quantification of Benzene Emissions from a New Multiwell Pad in a Colorado Front Range Residential Community

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Recent population growth in the Colorado Front Range has brought oil and natural gas operations and people in closer proximity. Of particular concern to public health is benzene, a carcinogen linked to leukemia and classified as a hazardous air pollutant by the United States Environmental Protection Agency (EPA). A naturally occurring component of oil and gas, benzene can be released from equipment and during processes at oil and natural gas-producing well pads. In an effort to minimize cost and maximize productivity and efficiency, oil and natural gas operators have developed multi-well pads, production sites with 20 or more wells. If located in a residential area, these types of larger facilities with more equipment and more potential benzene sources may pose a higher health risk to nearby residents than traditional, smaller well pads.

Here we present results from five weeks of continuous, calibrated *in situ* measurements at a residence downwind of a new 22-well oil and natural gas-producing multiwell pad in Greeley, Colorado. Using ratios between hydrocarbon species measured at the residence and meteorological data collected on-site, emission sources are identified. Results of inverse modeling using the steady-state plume dispersion model AERMOD to quantify benzene emissions rates from the well pad are presented.

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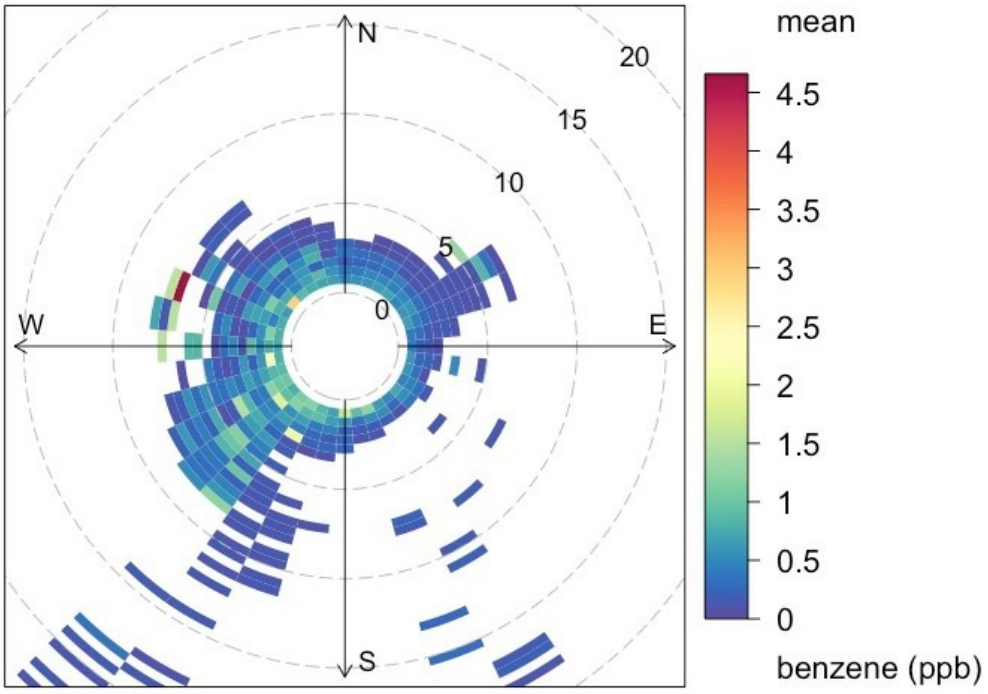

Figure 1. Mean observed ambient benzene mixing ratios binned by wind direction for the five-week field campaign. The largest enhancements in benzene tend to originate from the southwest, where the multi-well pad is located.