3.054 Quantification and Intercomparison of Methane Emissions from Production Sites in Dry Vs Wet Oil and Natural Gas Fields in the Western and Midcontinental United States.

Early Career Scientist

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Abstract:

Over the past decade, natural gas production has skyrocketed in the United States, largely as a result of unconventional methods such as hydraulic fracturing. Studies have shown that national emissions of methane have also increased significantly over the last decade with important climate implications given that methane has a global warming potential of approximately 86 times greater than CO2 over a 20-year period. In this study, methane fluxes were measured at a large number of production sites in four major U.S. oil and gas basins using the Environmental Protection Agency's (EPA) Other Test Method (OTM) 33a. With this method, measured methane concentrations are combined with Gaussian plume dispersion parameters and concurrent meteorological conditions to obtain a flux estimate. The basins measured in this study range from producing extremely dry to extremely wet natural gas. Dry natural gas contains very little to no condensate, so natural gas extracted from drier basins requires less processing equipment and it has been postulated that fugitive emissions from dry fields will be lower. Measurements were taken in Wyoming's Upper Green River Basin, Colorado's Denver-Julesburg Basin, Utah's Uintah Basin, and a Midcontinent Basin. Mass-weighted averages (MWA) of methane emissions as a percent of production are computed for each basin. These results give a rough estimate of basin-wide emissions from well pads and the computed MWAs for each of the four basins range from 0.14 – 3.11 %, revealing the large variability basin-to-basin. The relationship of leakage rate to how wet or dry a basin is will be discussed along with other potential explanations for the variation in leakage rate.