2.042 Using mobile laboratory and aircraft measurements to characterize feedlot emissions and their contribution to atmospheric methane over the Denver-Julesburg Basin.

Early Career Scientist

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Abstract:

Atmospheric emissions from animal husbandry are important to air quality and climate, but are hard to characterize and quantify as they vary substantially based on management practices, livestock type, and diurnal and seasonal cycles. Using a new mobile laboratory, ammonia, methane, nitrous oxide, and carbon dioxide emissions were measured from several concentrated animal feeding operations (CAFOs) in northeastern Colorado. Four CAFOs were chosen for repeated diurnal and seasonal measurements. A diurnal trend in the enhancement ratio of ammonia to the other compounds is clearly observed and is consistent across seasons and CAFOs. These findings are used to develop a source signature for feeding operations in the area.

In addition to 250+ CAFOs, the Denver-Julesburg basin (DJB) is a heavily developed oil and natural gas region with over 25,000 wells and numerous compressors and processing plants. Due to the co-location of these varied methane point sources, top-down measurements are often unable to attribute emissions to a specific source or sector. In this work, the CAFO emission signature determined from targeted mobile laboratory measurements is combined with aircraft measurements of ammonia, methane, and ethane during the spring 2015 Shale Oil and Natural Gas Nexus (SONGNEX) field campaign to attribute atmospheric methane over the DJB to either agriculture or fossil fuel sectors.