



Title:

Quantification and mapping of methane emissions using eddy covariance in a synthetic natural gas injection experiment

Abstract:

Unprecedented expansion of unconventional energy resource development has caused concerns about fugitive gas emissions, the patterns of which are not well understood. This study was conducted in north-eastern British Columbia, which is a region of active petroleum resource development, and there is evidence of gas migration at gas wells. A controlled gas injection experiment was conducted at the Hudson's Hope Field Research Station (HHFRS) near Hudson's Hope, where synthetic natural gas was injected 26 m below the ground (below the water table) over a period of 66 days. The eddy covariance (EC) technique was used to monitor methane emissions into the atmosphere resulting from the controlled release, with the aim to quantify and potentially locate the emissions using flux footprint analysis. The EC fluxes were down-scaled to quantify the emissions. An inversion approach was tested in an attempt to locate the leak and the results were compared with the original information about the location of the leak, as observed using chamber measurements and a groundwater sampling well. A point source controlled-release experiment was also conducted by releasing 93% v/v methane into the atmosphere to evaluate the flux footprint models being used in this study.

Bio:

Chitra completed her B.Tech. in Engineering Physics at the National Institute of Technology Calicut, India. She went on to do her M.Sc. in Atmospheric Science at the University of British Columbia, under the supervision of Dr. Andy Black, and defended her M.Sc. thesis in November 2020. She enjoys utilizing mathematical techniques to work on tackling imminent environment problems.