Geophysical Research Abstracts
Vol. 19, EGU2017-11384-2, 2017
EGU General Assembly 2017

Fugitive methane emission pinpointing and source attribution using ethane measurements in a portable cavity ring-down analyzer

Derek Fleck, John Hoffnagle, John Yiu, Johnston Chong, and Sze Tan
Picarro Inc, Santa Clara, CA , USA (dfleck@picarro.com)

Methane source pinpointing and attribution is ever more important because of the vast network of natural gas distribution which has led to a very large emission sources. Ethane can be used as a tracer to distinguish gas sources between biogenic and natural gas. Having this measurement sensitive enough can even distinguish between gas distributors, or maturity through gas wetness. Here we present data obtained using a portable cavity ring-down spectrometer weighing less than 11 kg and consuming less than 35W that simultaneously measures methane and ethane with a raw 1-σ precision of 50ppb and 4.5ppb, respectively at 2 Hz. These precisions allow for a C_2:C_1 ratio 1-σ measurement of $<$0.1% above 10ppm in a single measurement. Utilizing a second onboard laser allows for a high precision methane only mode used for surveying and pinpointing. This mode measures at a rate faster than 4Hz with a 1-σ precision of $<$3ppb. Because methane seepages are highly variable due to air turbulence and mixing right above the ground, correlations in the variations in C_2H_6 and CH_4 are used to derive a source C_2:C_1. Additional hardware is needed for steady state concentration measurements to reliably measure the C_2:C_1 ratio instantaneously. Source discrimination data of local leaks and methane sources using this analysis method are presented. Additionally, two-dimensional plume snapshots are constructed using an integrated onboard GPS to visualize horizontal plane gas propagation.