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Local to Hemispheric Atmospheric Impacts of U.S. Oil and Natural Gas Development

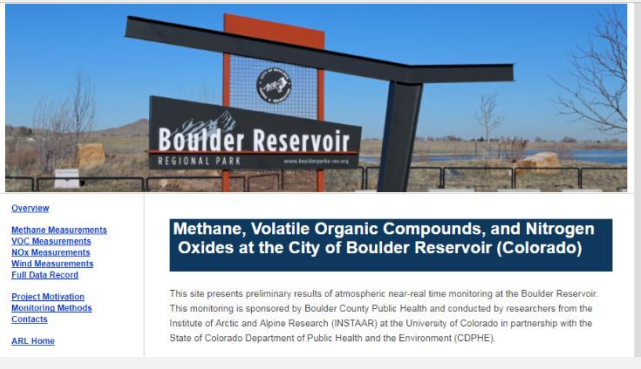
Detlev Helmig

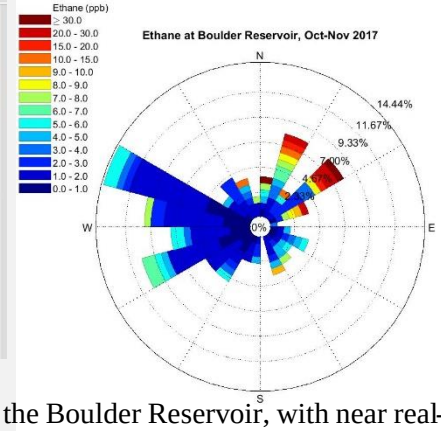
University of Colorado - Institute of Arctic and Alpine Research (INSTAAR)

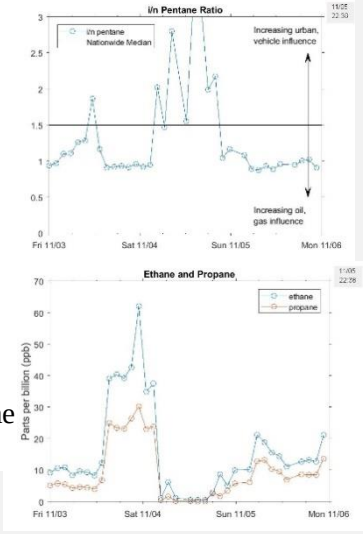
Abstract:

The development of hydraulic fracturing drilling techniques ('fracking') for oil and natural gas (O&NG) extraction has triggered a steep rise in drilling activity and O&NG production in the U.S. Atmospheric emissions of methane and volatile organic compounds (VOC) associated with these activities have become a concern for local and regional air quality and climate forcing on regional, continental and global scales.

Monitoring during the summer 2014 Front Range Air Pollution and Photochemistry Experiment (FRAPPÉ) showed atmospheric VOC increases along a transect from Boulder to the east, reflecting higher emissions from the more dense O&NG operations in eastern parts of Boulder County and Weld County. Since late winter 2017 we have been conducting continuous atmospheric monitoring at the Boulder Reservoir for tracking O&NG related emission changes, with results being provided to the public in near real time via a public web portal. These observations demonstrate frequent occurrences of conditions with highly elevated O&NG-associated atmospheric alkanes, mostly transported from north to southeast sectors. Larger scale emission changes are reflected in global observations from the NOAA-INSTAAR global VOC monitoring program. This monitoring has shown a remarkable reversal of Northern Hemisphere long-term trends of O&NG related VOC. Global atmospheric concentrations of O&NG tracers peaked around 1970-1980, followed by downward trends for the next four decades. These declining trends halted during 2005-2010, and reversed to increasing concentrations thereafter, indicative of the hemispheric impact of North American O&NG emissions.







Ongoing monitoring program of O&NG emissions at the Boulder Reservoir, with near real-time data reporting at the public website http://instaar.colorado.edu/arl/boulder_reservoir.html#monitoring. Data examples from early November 2017 show highly elevated ethane and propane, with a strong O&NG signature.

Date: Monday, January 22, 2018; **Time:** Refreshments 3:15pm, Seminar 3:30pm

NCAR Foothills Laboratory - 3450 Mitchell Lane, Boulder, CO 80301

FL2-1001, Small Auditorium

Live webcast: http://ucarconnect.ucar.edu/live

For more information, please contact Bonnie Slagel: bonnie@ucar.edu or 303-497-8318