On Road Study of Colorado Front Range Greenhouse Gases Distribution and Sources


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Abstract

The Global Monitoring Division and Chemical Sciences Division of the NOAA Earth System Research Laboratory have teamed up over the summer 2008 to experiment with a new measurement strategy to characterize greenhouse gases distribution and sources in the Colorado Front Range. Combining expertise in greenhouse gases measurements and in local to regional scales air quality study intensive campaigns, we have built the 'Hybrid Lab'. A continuous CO2 and CH4 cavity ring down spectroscopic analyzer (Picarro, Inc.), a CO gas-filter correlation instrument (Thermo Environmental, Inc.) and a continuous UV absorption ozone monitor (2B Technologies, Inc., model 202SC) have been installed securely onboard a 2006 Toyota Prius Hybrid vehicle with an inlet bringing in outside air from a few meters above the ground. To better characterize point and distributed sources, air samples were taken with a Portable Flask Package (PFP) for later multiple species analysis in the lab. A GPS unit hooked up to the ozone analyzer and another one installed on the PFP kept track of our location allowing us to map measured concentrations on the driving route using Google Earth. The Hybrid Lab went out for several drives in the vicinity of the NOAA Boulder Atmospheric Observatory (BAO) tall tower located in Erie, CO and covering areas from Boulder, Denver, Longmont, Fort Collins and Greeley. Enhancements in CO2, CO and destruction of ozone mainly reflect emissions from traffic. Methane enhancements however are clearly correlated with nearby point sources (landfill, feedlot, natural gas compressor ...) or with larger scale air masses advected from the NE Colorado, where oil and gas drilling operations are widespread. The multiple species analysis (hydrocarbons, CFCs, HFCs) of the air samples collected along the way bring insightful information about the methane sources at play. We will present results of the analysis and
interpretation of the Hybrid Lab Front Range Study and conclude with perspectives on how we will adapt the measurement strategy to study CO2 anthropogenic emissions in Denver Basin.

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