

2.025 The CU Mobile Solar Occultation Flux Instrument: Column Measurements to Quantify Emissions from Biomass Burning.

Early Career Scientist

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Abstract:

Gases from both anthropogenic and biogenic sources have the potential to have a profound impact human health and climate. Emissions from biomass burning include HCN, HCHO, NH₃, and C₂H₆. We describe the University of Colorado mobile Solar Occultation Flux (CU mobile SOF) instrument to quantify sources of emissions in the UV-Visible and Infrared wavelengths. The SOF method is complementary to in-situ observations in being able to obtain trace gas fluxes and trace gas production rates from a source when driving around or upwind and downwind of that target source. The Volkamer group has developed a digital mobile solar tracker (Baidar et al., 2016, AMT) that can be simultaneously coupled to a Fourier Transform Infrared Spectrometer (FTIR) and a UV-Visible Spectrometer (UV-Vis) to measure trace gases along the direct solar beam.

The mobile lab was successfully deployed during FRAPPE (Front Range Air Pollution and Photochemistry Experiment) in Colorado in 2014, and the CU mobile SOF instrument was successfully used to map and quantify emission fluxes from urban areas (e.g. NO₂), oil and natural gas operations (C₂H₆) and feedlots (NH₃). The total column measurements were conducted at high spatial (5-19 m) and temporal (2 sec) resolution. We measured significant variability in the gas columns.

During the summer of 2016 the CU mobile SOF will be deployed on an aircraft. Due to the often elevated fire plumes in biomass burning events, and the size and long-range distances that these plumes travel in the atmosphere, instrumentation that are capable of operating on aircraft are a necessary component to field experiments that study fires. We present results from select research drives from FRAPPE and pending progress will report first results from the airborne deployment of the mobile SOF.