Abstract: Josette E. Marrero

Formaldehyde (HCHO) is one of the most abundant oxygenated volatile organic compounds (VOCs) in the atmosphere, playing a role in multiple atmospheric processes, such as ozone (O3) production in polluted environments. Due to its short lifetime of only a few hours in daytime, HCHO also serves as tracer of recent photochemical activity. While photochemical oxidation of non-methane hydrocarbons is the dominant source, HCHO can also be emitted directly from fuel combustion, vegetation, and biomass burning. The Compact Formaldehyde FluorescencE Experiment (COFFEE) instrument was built for integration onto the Alpha Jet Atmospheric eXperiment (AJAX) payload, based out of NASA[1]s Ames Research Center (Moffett Field, CA). Using Non-Resonant Laser Induced Fluorescence (NR-LIF), trace concentrations of HCHO can be detected with a sensitivity of 200 parts per trillion.

Since its first research flight in December 2015, COFFEE has successfully flown on more than 20 science missions throughout California and Nevada. Presented here are results from these flights, including boundary layer measurements and vertical profiles throughout the tropospheric column. California[1]s San Joaquin Valley is a primary focus, as this region is known for its elevated levels of HCHO as well as O3. Measurements collected in wildfire plumes, urban centers, agricultural lands, and on and off shore comparisons will be presented. In addition, the correlation of HCHO to other trace gases also measured by AJAX, including O3, methane, carbon dioxide, and water vapor will also be shown. Lastly, the implications of these HCHO measurements on calibration and validation of remote sensing data collected by NASA[1]s OMI (Aura) and OMPS (SuomiNPP) satellites will be addressed.