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Title:

Four Years of Airborne Measurements of  
Wildfire Emissions in California, with a Focus on the  
Evolution of Emissions during the Soberanes Megafire

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Abstract: Biomass burning is an important source of trace gases and particles which can influence air quality on local, regional, and global scales. With wildfire events increasing due to changes in land use, increasing population, and climate change, characterizing wildfire emissions and their evolution is vital.

In this work we report in situ airborne measurements of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), water vapor (H<sub>2</sub>O), ozone (O<sub>3</sub>), and formaldehyde (HCHO) from nine wildfire events in California between 2013 and 2016, which were sampled as part of the Alpha Jet Atmospheric eXperiment (AJAX) based at NASA Ames Research Center.

One of those fires, the Soberanes Megafire, began on 22 July 2016 and burned for three months. During that time, five flights were executed to sample emissions near and downwind of the Soberanes wildfire. In situ data are used to determine enhancement ratios (ERs), or excess mixing ratio relative to CO<sub>2</sub>, as well as assess O<sub>3</sub> production from the fire. Changes in the emissions as a function of fire evolution are explored. Air quality impacts downwind of the fire are addressed using ground-based monitoring site data, satellite smoke products, and the Community Multiscale Air Quality (CMAQ) photochemical grid model.