

A Multi-Year Record of Airborne Continuous CO₂ in the U.S. Southern Great Plains

S. Biraud¹, C. Sweeney² and M.S. Torn¹

¹Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720; 510-486-6084, E-mail: SCBiraud@lbl.gov

²Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO 80309

We report on three years of airborne measurements of continuous atmospheric CO₂ concentrations over the Atmospheric Radiation Measurement Program (ARM) Climate Research Facility (ACRF) in the U.S. Southern Great Plains. These continuous measurements are collected weekly from a small aircraft (Cessna 206) on a series of horizontal legs ranging from 17,500 feet down to 1,500 feet above sea level. The continuous CO₂ observations are measured using a CO₂ analyzer built by Atmospheric Observing System Inc., based in Boulder, Colorado. The analyzer has non-imaging optics and negligible sensitivity to motion of platform. The NDIR Analyzer is the core element of the system. Accuracy, including bias, is approximately 0.1 ppm of CO₂ Dry Mole Fraction at 1 Hz. Each flight lasts between 2.5 and 3 hours, yielding about 10,000 CO₂ measurements per flight. Since November 2007, more than 150 continuous CO₂ vertical profiles have been collected, along with NOAA ESRL 12-flask (carbon cycle gases and isotopes) packages for validation. Comparison between the continuous and flask CO₂ measurements indicates a difference of no larger than 0.2 ppm.

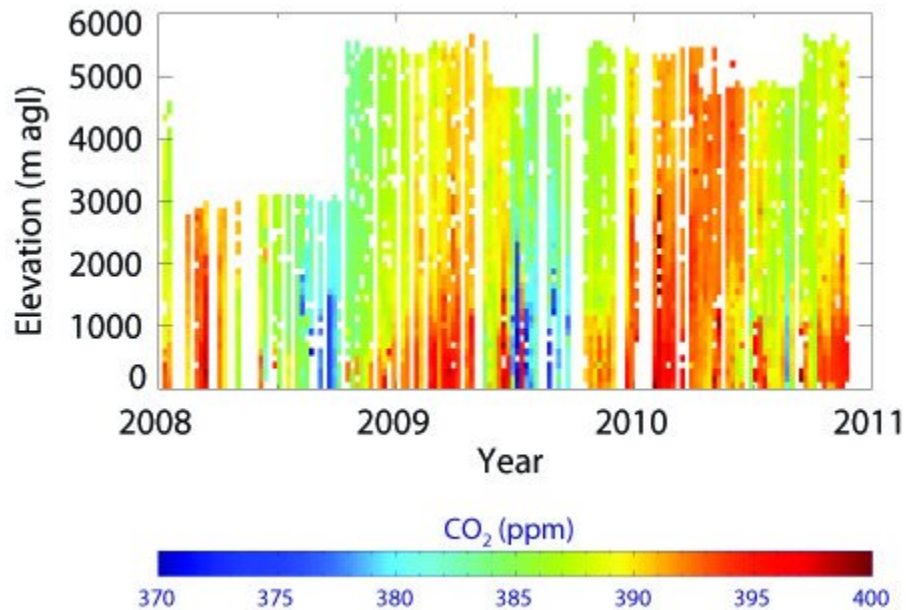


Figure 1. Weekly average continuous CO₂ concentrations collected from 2008 through 2010 over the ACRF in the U.S. Southern Great Plains.