

Flask Versus *In Situ* Results at Tall Tower Sites

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Seven sites in the NOAA ESRL GMD Tall Tower network are equipped with both *in situ* systems for measuring CO and CO₂ and Programmable Flask Packages (PFP). Typically, daily flask pairs are sampled from the highest *in situ* level at the tower, and capture a snapshot of the planetary boundary layer during the most well-mixed time of the day. The daily samples are analyzed for fifty or more species of atmospheric trace gases and are used as an independent measure of comparison for CO and CO₂. Paired samples provide a measure of repeatability for PFP measurements that includes sampling precision, analysis precision and atmospheric variability. PFP and *in situ* CO and CO₂ data from tower sites are included in the automated web-based Inter-Comparison Project, which is updated daily. Recent comparisons of flask versus *in situ* data have identified leaks in sample tubing and compressor packages, prompting investigation and timely repair. The flask measurements can also provide insight into pollution plumes and other local influences surrounding the tower. Variations between flask and *in situ* agreement differ from site to site, and seasonally. Analysis of the flask versus *in situ* statistics, as well as time series comparisons for each tower will be presented. Constraints in measurements, sampling time, and other problematic factors will also be explored. A brief overview of special projects and future instrument development will be presented.

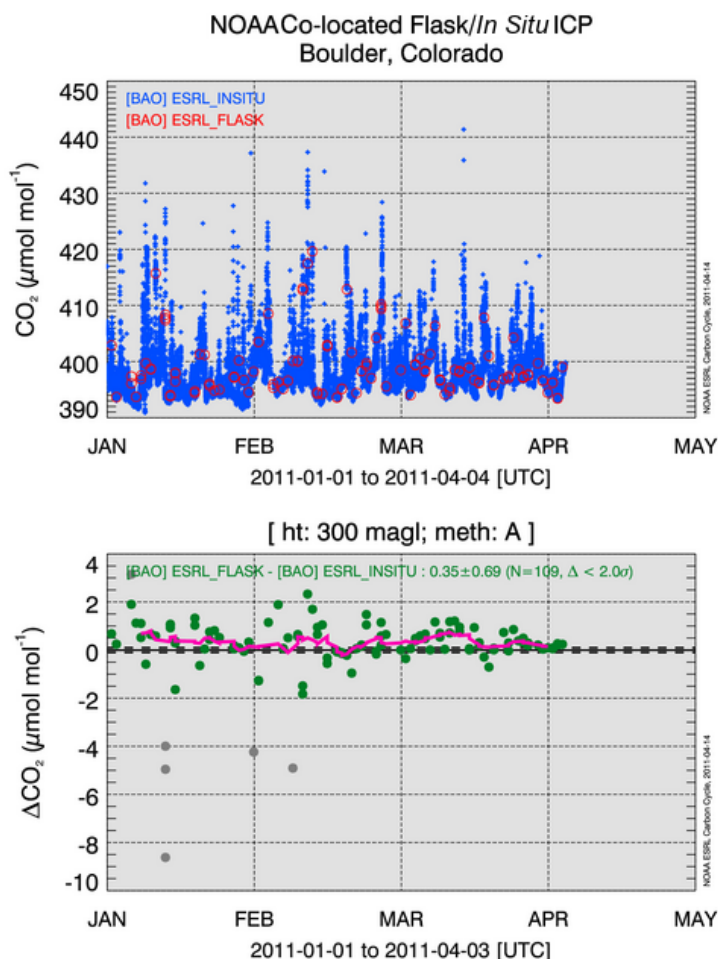


Figure 1. Current 2011 flask (red) and *in situ* (blue) measurements from the Boulder Atmospheric Observatory (BAO) tower in Erie, CO. On the second graph, the running mean of the flask minus *in situ* CO₂ differences is indicated in red, while differences for individual samples are shown in green.