

Comparison of Co-Located Air Samples at Mauna Loa Observatory and CO₂ Observations at Mt. Fuji

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NIES CGER and NOAA ESRL started a comparison of co-located air samples from Mauna Loa Observatory (MLO: 19.54°N, 155.58°W, 3397 m.a.s.l.) in May, 2010. To complement low-frequency measurement comparisons such as the cylinder-based World Meteorological Organization (WMO) round-robin and flask-based projects [e.g. “sausage”], it was recommended at the WMO Expert Meeting in 2009 that more laboratories participate in more high-frequency real-air measurement comparisons. ESRL and CGER cooperatively developed and installed a sampling system on an existing intake line at MLO where both laboratories’ flasks are filled from the same air stream at almost the same time. The CGER sampling part is the same as those used at other NIES sampling sites, and it was embedded in the ESRL sampling system. Samples are collected every week and analyzed data are updated every month. Although periodic re-calibration of working standard gases has not been done at CGER, due to the earthquakes in March 2011, so far most data agree relatively well for CO₂, CH₄ and δ¹⁸O-CO₂. Continued comparison is required to determine analytical tendencies at each laboratory (e.g. when standard gases are changed) and to quantify offsets because different standard scales are used for H₂ and isotopic ratios. Frequent long-term comparisons of atmospheric measurements provide useful information to improve and maintain high quality observations and analysis.

CGER also has started CO₂ observation on Mt. Fuji (35.21°N, 138.43°E, 3776 m.a.s.l.) with a battery-powered automatic system. CO₂ at Mt. Fuji compared to MLO flask data shows both similarities and differences. Mt. Fuji CO₂ observations can capture both global and regional CO₂ signals over Japan.

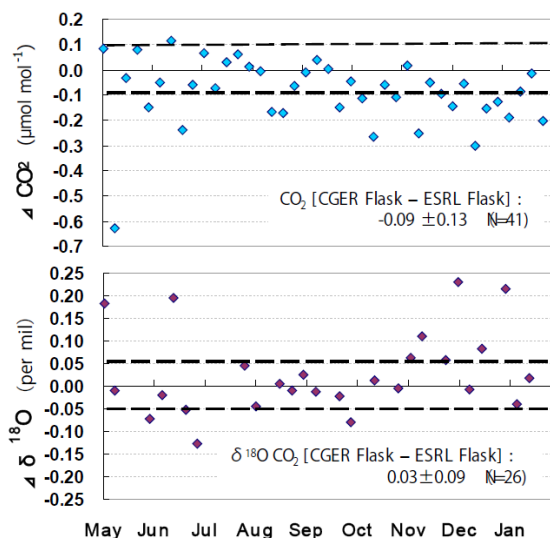


Figure 1. Difference between NIES and ESRL measurements of CO₂ and δ¹⁸O-CO₂ in co-located samples collected at MLO (sampled at 10 (HAST)). CGER data are provisional. Dotted lines show WMO targets for network compatibility.

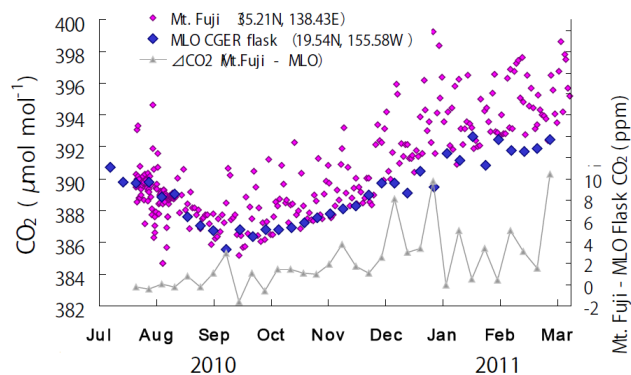


Figure 2. Mt. Fuji CO₂ (measured 1/day at 23 (JST)) compared to MLO CGER flask CO₂ data.