



The Cooperative Global Air Sampling Network Newsletter

Greetings to our cooperating partners and network affiliates. Thank you for your continued support of our greenhouse gas monitoring program!

The accompanying figure shows measurements of carbon dioxide (CO₂) from air samples collected at your site. "Rejected" indicates samples with clear problems during sampling or analysis. Some measurements are determined to be "non-background" using a statistical filtering technique; this step helps ensure the measurements can be compared with results from atmospheric transport

models, which are unable to capture variability from local processes. Measurements from your site are also compared with a smoothed representation of CO₂ for the background surface atmosphere at about the same latitude as your sampling site (**zonal average**). Average sampling interval and percent good pairs are summarized for 2013 to 2015 in the lower right-hand corner of the plot. Most sites have a target sampling interval of every 7 days. We strive for greater than 90% good pairs at all sites (a good pair has ≤ 0.5 ppm CO₂ difference between the flasks collected in series).

CCGG Sampling Procedure Updates

We have a few new items to share with you about our greenhouse gas sampling program.

Air Sampling Training Video - coming soon:

We are making a video showing the entire air sampling procedure. Most of the filming is finished, and we are in the initial editing stage. We hope to make it available in several formats for ease of use. New 'quick' instructions and diagrams are also being added to the PSUs as replacement units are sent to network sites.

Procedure and Sample Sheet Changes:

We will send more detailed information via email soon, but here is a brief overview of some potential changes coming your way (at a few sites, some of these are already being done):

- Record the PSU ID number, the flow rate and battery voltage at the start of the flush, and the final sample pressure collected in the flasks. New sample sheets are being distributed with spaces to enter this information.
- We will be discontinuing the use of consecutively numbered flask pairs that are still being used at many sites. When this happens, it will be very important that the flasks are always arranged in the order shown in the photo at right (the **low number flask** attached to the 'pump' tubing and the **high number flask** attached to the 'return' tubing). The flask IDs should be entered on the sample sheet in this same order (the sample sheets have been changed to indicate this as well).
- Updated sample collection procedures will be available on the website soon.

Reminders:

- Please return broken flasks and parts to us.
- Always use the oldest flasks first from your flask supply.
- Return samples as quickly as possible. It is our procedure to send new flasks out when we get sampled boxes in.
- Make sure sample sheets are completely and legibly filled out.

Please email us with questions or concerns!

cggflask@noaa.gov

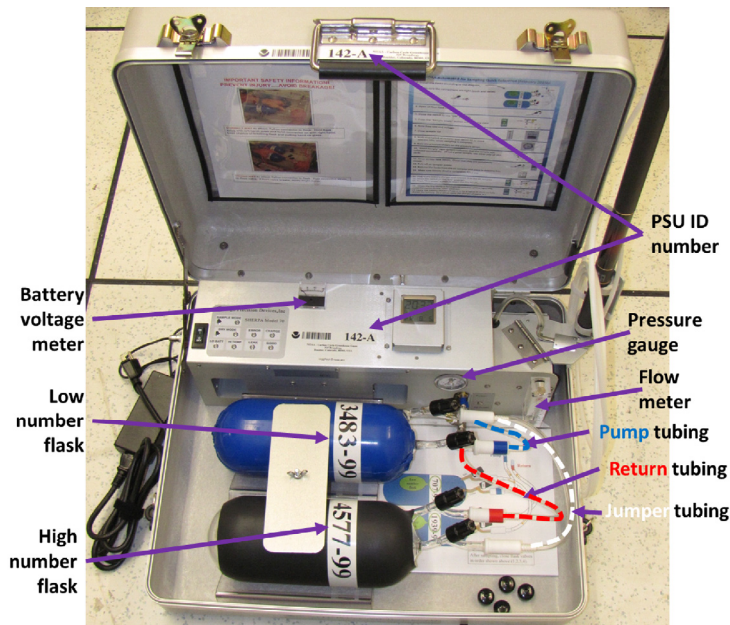


Photo above: Automated portable sampling unit (PSU) parts diagram.

Contact Information:

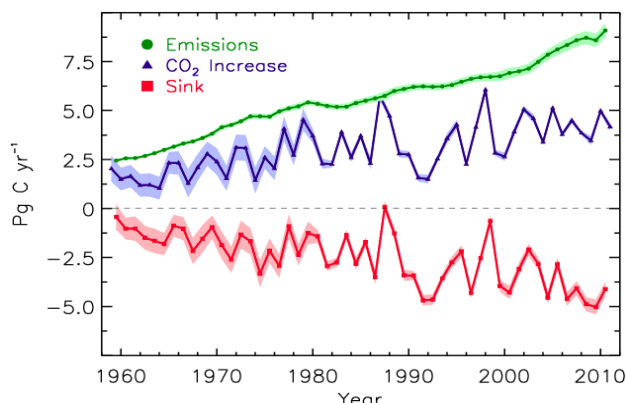
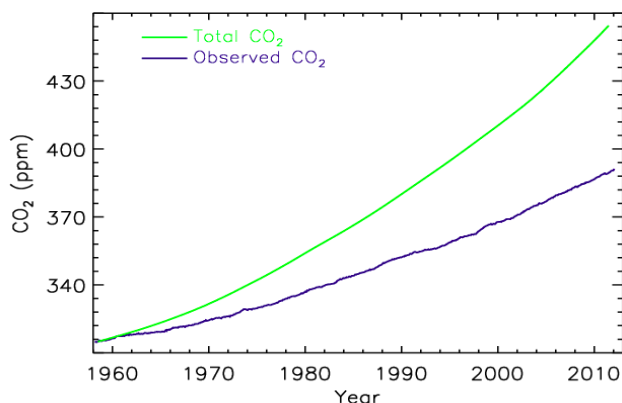
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Scientific Applications



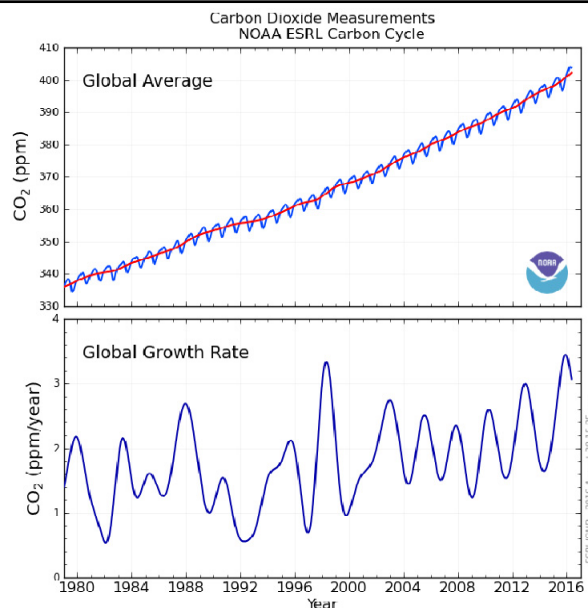
Since the industrial revolution, approximately 375 Pg of carbon (1 Pg = 1 billion metric tons) have been emitted by humans to the atmosphere as CO₂. Atmospheric measurements show that about half of this CO₂ remains in the atmosphere and that, so far, sink processes have steadily increased. Accurate measurements of atmospheric CO₂ by NOAA provide the basis for understanding the fate of CO₂ emitted to the atmosphere. The figure (left) shows globally averaged CO₂ since 1958 measured by NOAA and the Scripps Institution of Oceanography (blue) and an estimate of how CO₂ would have increased if all fossil fuel emissions remained in the atmosphere (green). The figure (right) shows annual emissions in Pg C from fossil fuel

combustion and other industrial processes (green), the annual atmospheric increase (blue), and the amount of carbon sequestered by sinks each year (red). These sinks constitute the small net difference between large fluxes (~100 Pg C per year) into and out of the atmosphere from the terrestrial biosphere and oceans. This small net difference varies with climate oscillations such as El Niño and La Niña. The ocean sink is less susceptible to human interference than the terrestrial biosphere. Net uptake of CO₂ by the ocean makes it more acidic with potentially large impacts on the ocean food chain. (Figures and text are based on Ballantyne et al., 2012, Nature Vol. 488, p: 70-72 and Levin, 2012, Nature Vol. 488 p: 35-36.)

NOAA/GMD Website Highlights

A few tidbits from the NOAA/GMD website:

- GMD/CCGG operates over 100 sites around the world. This includes surface flasks taken once per week, tall towers where we can measure up to 450 m into the atmosphere, aircraft profiles that allow us to measure even higher into the atmosphere, and observatories that make continuous measurements.
- Every year 15,000-20,000 flasks of air are shipped to CCGG for measurement of CO₂, CH₄, H₂, CO, N₂O, and SF₆ and to the Institute of Arctic and Alpine Research for isotopes of CO₂ and CH₄.
- CO₂ amounts have increased about 36% in the last 150 years, about half of that in the last three decades.
- Website movies and figures feature changing abundances and trends of CO₂ and CH₄ (example: figure to the right).
- Procedures, past newsletters, measurement techniques, and other useful information are also found on the website.



Top panel: Global average atmospheric CO₂ mole fractions (blue line) determined using measurements from the Cooperative Global Network. The red line represents the long-term trend.
Bottom panel: Global average growth rate for CO₂.

Interested in learning more? Check out these Web links:

- GMD home page: www.esrl.noaa.gov/gmd/
- CCGG home page: www.esrl.noaa.gov/gmd/ccgg/
- Cooperative Network: www.esrl.noaa.gov/gmd/ccgg/flask.php
- Interactive Data Visualization: www.esrl.noaa.gov/gmd/dv/iadv/