NOAA Earth System Research Laboratory
Global Monitoring Division
Issue 8: Spring 2013

The Cooperative Global Air Sampling Network Newsletter

Greetings to our cooperating partners and network affiliates. Thank you for another great year of greenhouse gas monitoring!

The attached figure shows globally averaged atmospheric carbon dioxide (CO_2) determined using measurements from the cooperative network (blue line) and the long-term trend (red line) from 1981 to 2012 (top panel). The bottom panel shows the annual increase for CO_2 over the same time period. CO_2 increased by an average of 1.70 ppm yr^{-1} from 1981-2012, with a minimum of 0.67 ppm yr^{-1} and a maximum of 2.84 ppm yr^{-1}. Since 2000, CO_2 has increased by 1.96 ppm yr^{-1}. The variability in the annual increase is caused by changes in the imbalance between photosynthetic uptake and respiration by plants.

The NOAA Annual Greenhouse Gas Index

Climate change, mainly caused by emissions from burning fossil fuels, is a serious threat to our environment and society. Measuring trends and changes in long-lived greenhouse gases (GHGs) in the atmosphere is vital to help us track these and other emissions. The NOAA Annual Greenhouse Gas Index (AGGI) was created in 2004 to show the warming influence supplied by long-lived GHGs and how that influence is changing each year. This index was designed to improve the link between scientists and society by providing a normalized standard that can be easily understood and followed.

Air samples collected approximately weekly at sites like yours around the world are returned to NOAA GMD for measurement of the main GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), CFC-12, CFC-11 and several others. These weekly measurements are smoothed to calculate global averages (Figure 1). The CO_2 growth rate averaged about 1.68 ppm per year from 1979-2011. The CH_4 growth rate declined from 1983 until 1999, was roughly constant from 1999 to 2006, and has since increased. N_2O continues to increase at a relatively uniform growth rate. In response to the Montreal Protocol, the abundances of CFCs began decreasing between the mid-1990s and the mid-2000s.

Figure 2 shows the AGGI normalized to 1990 levels. CO_2, CH_4, N_2O, CFC-12 and CFC-11 account for ~96% of the direct radiative forcing by long-lived GHG increases since prior to the industrial revolution (1750). **The 2011 AGGI is 1.30, translating to a 30% increase in radiative forcing since 1990.**

For more information on the AGGI please visit:
http://www.esrl.noaa.gov/gmd/aggi/

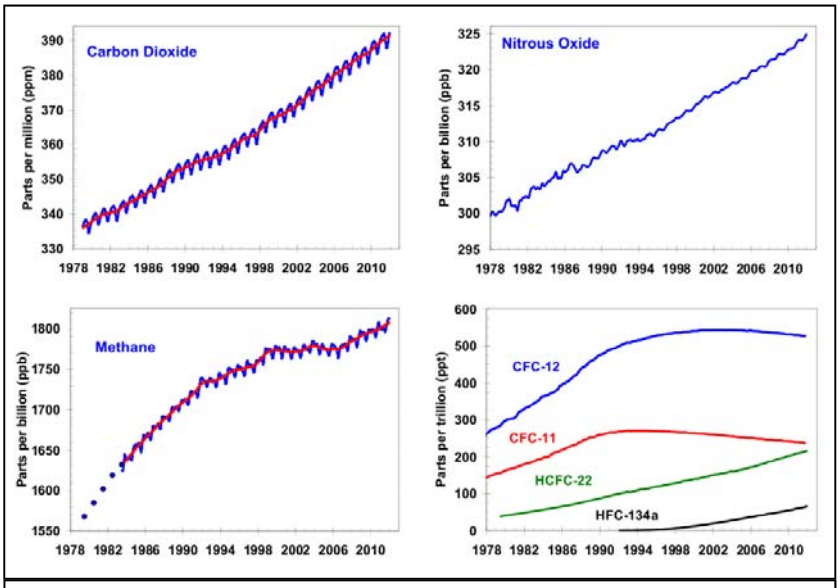
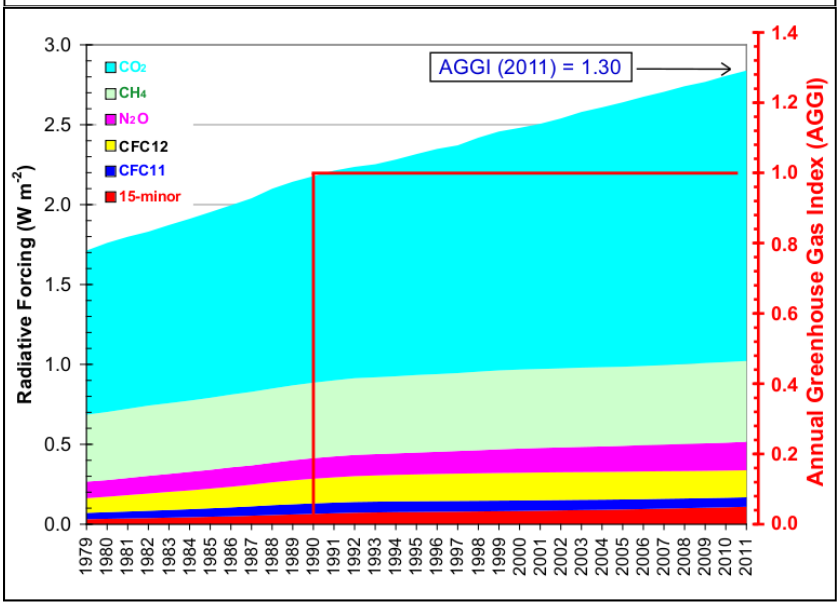


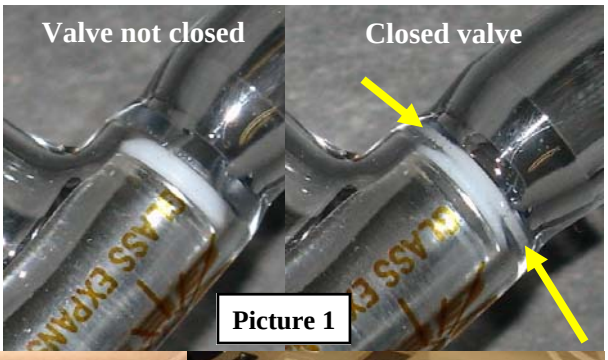
Figure 1 (above): Global average abundances of the major, well-mixed, long-lived greenhouse gases.
Figure 2 (below): Radiative forcing for the major gases and a set of 15 minor long-lived halogenated gases.



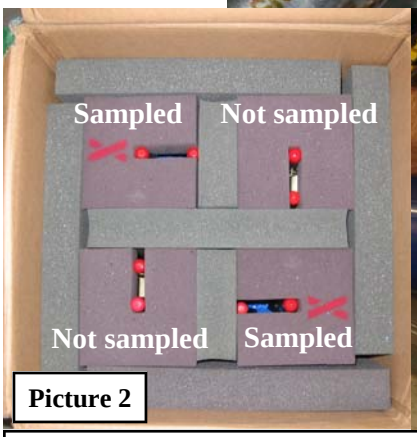
Review of Sample Collection Information

Below are some useful sampling reminders:

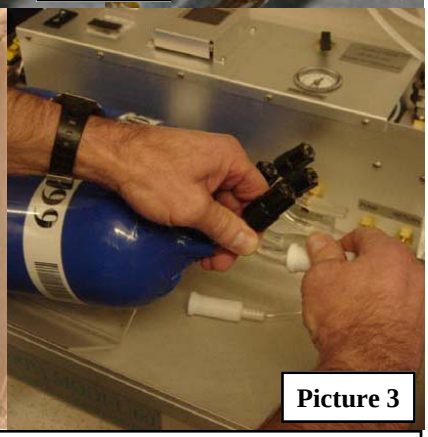
- Use flasks in the order they were received - oldest ones first.
- Return broken flasks and parts - we can usually repair the flasks and we can always reuse parts.
- Sample at your target frequency - most sites are every 7 days (logistics or wind conditions might not always make this possible).
- Send samples back as promptly as you can (again, some sites might not be able to do this).
- Close the flask valves completely after sampling (Picture 1).
  Tighten valves until the front O-ring is sealed.
  Do not over tighten as this may break the flask.
- Place flasks in the box with all of the valves pointing towards the center of the box (Picture 2) - this reduces flask breakages.
- Use the foam inserts to mark when flasks have been sampled (Picture 2).
  no marking = not sampled, red X = sampled
- Use proper technique for attaching connectors. Hold the stopcock with one hand and use your other hand to attach Teflon connector (Picture 3)
- Flasks do not need to be sampled in consecutively mated pairs (Ex: 121-99 paired with 4219-99).
- Visit our website for sampling instructions: http://www.esrl.noaa.gov/gmd/ccgg/psu/index.html



Picture 1



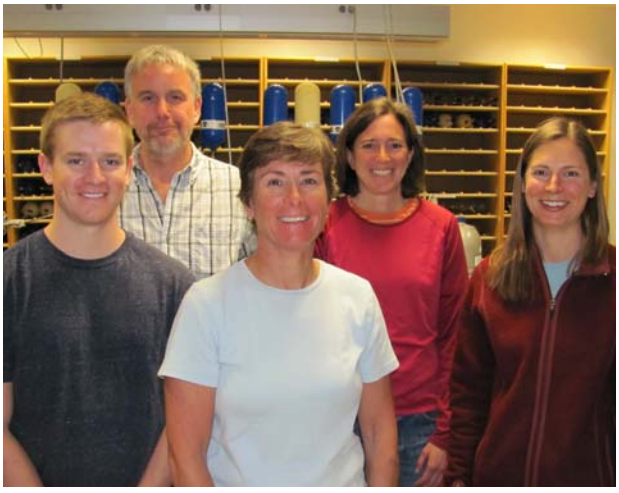
Picture 2


Picture 3

Picture 1 (top): Flask valve not closed (left) and flask valve closed (right).
Picture 2 (above left): Proper flask orientation in shipping box and example of foam inserts.
Picture 3 (above right): Proper handling when attaching PSU connectors.

Carbon Cycle Group Information

We've had some changes to our group over the past year. As most of you know, Tom Conway retired after over 30 years at NOAA. He will be missed by many in the greenhouse gas monitoring community! Don Neff, who has been with CCGG for ~18 years, is now helping fill in some of Tom's responsibilities in the network. We also hired Eric Moglia in October to help in the prep lab and measurement lab after Kelly Sours moved abroad. And lastly, Molly got married in June and changed her last name to Crotwell.



Team photo (left to right):
Eric Moglia, Don Neff, Pat Lang, Sonja Wolter, Molly Crotwell.

Contact Information:
E-mail: ccggflask@noaa.gov
Molly Crotwell: 303-497-4728
Eric Moglia: 303-497-3988
Don Neff: 303-497-4271
Sonja Wolter: 303-497-4801
Fax: 303-497-6290
Shipping Address:
Attn: Prep Lab, Rm GD305
NOAA/GMD-1
325 Broadway
Boulder, CO 80305

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.html
Interactive Data Visualization: www.esrl.noaa.gov/gmd/ccgg/iadv