



Learn more about:

Measuring Greenhouse Gases Around the World



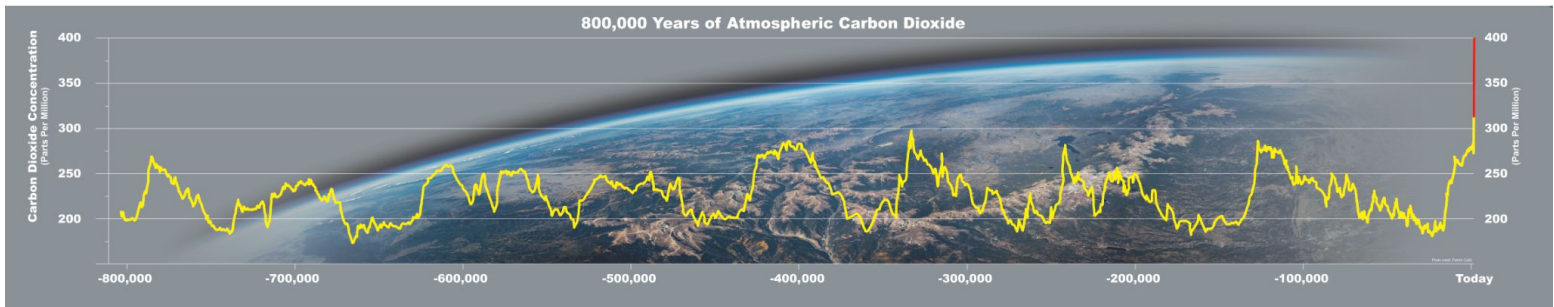
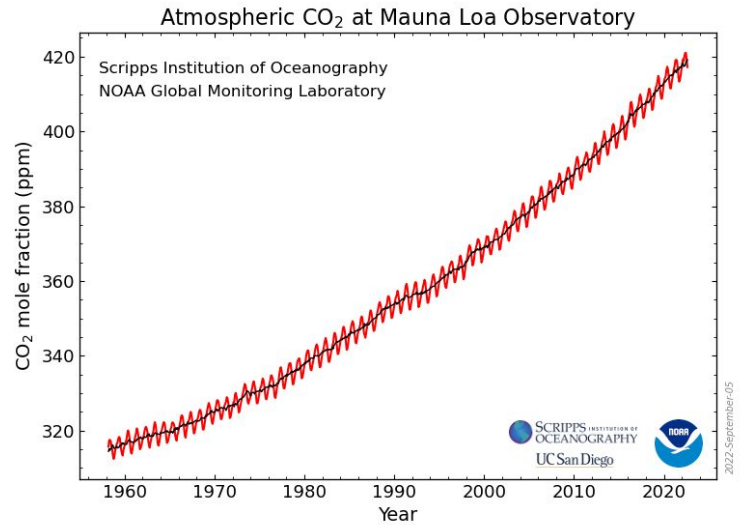
Charles Keeling, a scientist at the Scripps Institution of Oceanography, started measuring carbon dioxide (CO₂) in Mauna Loa, Hawaii in 1958.

NOAA's **Global Monitoring Laboratory** has joined this data collection, measuring greenhouse gases all over the world.

Since Dr Keeling began measuring CO₂, the concentration of greenhouse gases in the atmosphere has significantly risen. The CO₂ record from the Mauna Loa Observatory is called the **Keeling Curve**.

The graph on the right shows CO₂ measured at Mauna Loa from 1958-2021.

The graph below shows CO₂ going back 800,000 years. The yellow is data from Antarctic ice cores. The red is data from Mauna Loa starting in 1958.



NOAA measures greenhouse gases at it's four observatories:



South Pole



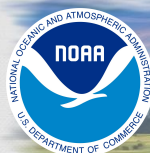
American Samoa



Mauna Loa, HI



Utqiagvik, AK



NOAA Boulder

come be BOLD with us

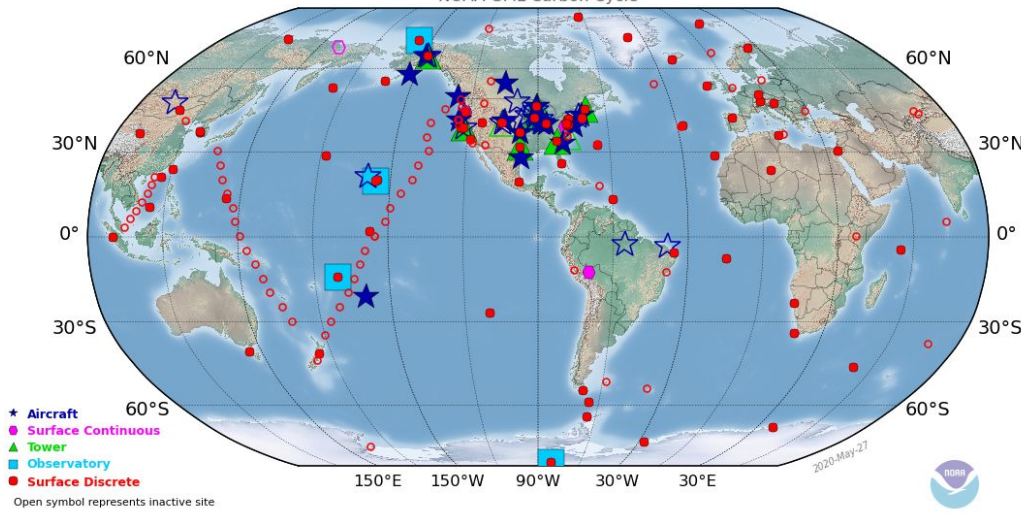


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Cooperative Measurement Programs
NOAA GML Carbon Cycle



Technicians and volunteers measure greenhouse gases at over 50 locations around the world for NOAA's Global Monitoring Laboratory.

NOAA GML Carbon Cycle operates several measurement programs. Semi-continuous measurements are made at 4 baseline observatories, a few surface sites and from tall towers. Discrete surface and aircraft samples are measured in Boulder, CO. Presently, atmospheric carbon dioxide, methane, carbon monoxide, hydrogen, nitrous oxide, sulfur hexafluoride, the stable isotopes of carbon dioxide and methane, and halocarbon and volatile organic compounds are measured. Contact: Dr. Arlyn Andrews, NOAA ESRL Carbon Cycle, Boulder, Colorado, (303) 497-6773, arlyn.andrews@noaa.gov, <http://www.esrl.noaa.gov/gmd/ccgg/>



Step 1: Volunteers collect air in flasks using a Portable Sampling Unit.

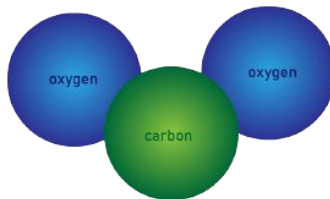


Step 2: Samples are sent to the Global Monitoring Laboratory in Boulder, Colorado.

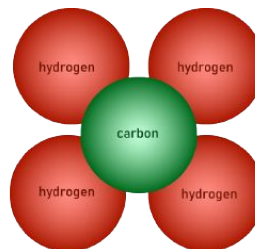


Step 3: Air Samples in flasks are analyzed at Global Monitoring Laboratory and at the University of Colorado.

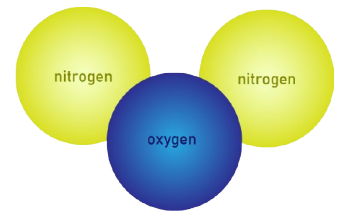
Greenhouse gases absorb infrared radiation and remain in the atmosphere for a long time. These are the most significant greenhouse gases:



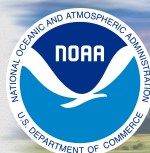
carbon dioxide



methane



nitrous oxide



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