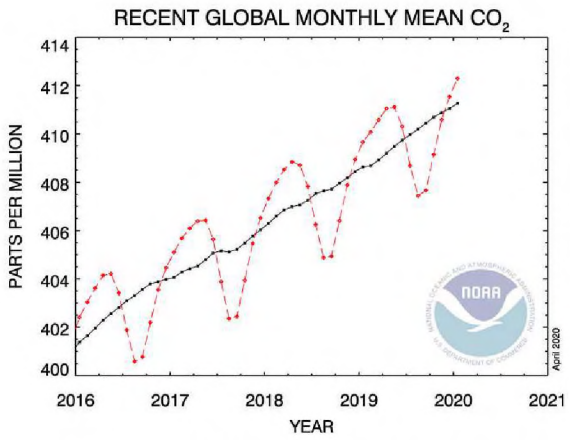
Trends in Atmospheric Carbon Dioxide

Mauna Loa, Hawaii | Global | CO_2 Animation | CO_2 Emissions

Recent trend | Full Record | Growth Rate | Data

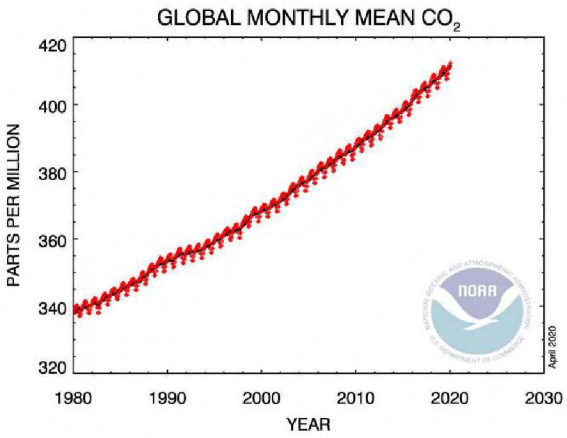
Global Monthly Mean CO_2

January 2020: 412.30 ppm
January 2019: 409.67 ppm
Last updated: April 6, 2020



Recent global monthly means

PDF Version



Global monthly means since 1980

PDF Version

The graphs show monthly mean carbon dioxide globally averaged over marine surface sites. The Global Monitoring Division of NOAA/Earth System Research Laboratory has measured carbon dioxide and other greenhouse gases for several decades at a globally distributed network of air sampling sites *[Conway, 1994]*. The last four complete years plus the current year are shown on the first graph. All years since 1980 are shown on the second graph. The last year of data are still preliminary, pending recalibrations of reference gases and other quality control checks.

Data are reported as a dry air mole fraction defined as the number of molecules of carbon dioxide divided by the number of all molecules in air, including CO_2 itself, after water vapor has been removed. The mole fraction is expressed as parts per million (ppm). Example: 0.000400 is expressed as 400 ppm.

The dashed red line with diamond symbols represents the monthly mean values, centered on the middle of each month. The **black line** with the square symbols represents the same, after correction for the average seasonal cycle. The black line is determined as a moving average of SEVEN adjacent seasonal cycles centered on the month to be corrected, except for the first and last THREE and one-half years of the record, where the seasonal cycle has been averaged over the first and last SEVEN years, respectively.

A global average is constructed by first fitting a smoothed curve as a function of time to each site, and then the smoothed value for each site is plotted as a function of latitude for 48 equal time steps per year. A global average is calculated from the latitude plot at each time step *[Masarie, 1995]*. Go here for more details on how global means are calculated.

Click for a comparison with recent trends in carbon dioxide at Mauna Loa, Hawaii, which has the longest continuous record of direct atmospheric CO_2 measurements.