Climate Essentials: Critical Greenhouse Gas Concentration Trends

http://www.leapcad.com/Climate_Analysis/Critical_GHG_Concentration_Trends.xmcd

We will review the essential fundamental historic raw data of Climate Change-
Collections of Fundamental Climate Data and Mathcad Generated Plots:

Paleological Records - Temperature Proxies/Reconstructions
   Co-Plot of Temperature Anomaly and CO2 from the past 420,000 years from Vostok Ice Core Data
   Millenual Temperature Reconstructions (Last 1000 yrs from several souces)

CO2 Records
   The Keeling Curve: Mauna Loa Observation Hawaii Monthly CO2 Concentration Data (1958-2010)
   CO2 - Neftel Siple Ice Station - 1847 to 1953
   Vostok Ice Core Data: Barnola et al
   Temp and CO2 Hadcrut data: 1860 to 2010
   CDIAC - Carbon Dioxide Information Analysis Center - Global Anthropogenic CO2 Emissions

The Miskolczi - Principle

Relative and Specific Humidity vs. Height - The Saturated Greenhouse Effect
   A fundamental assumption of global warming models is that humidity is constant or increases.
   If Humidity has been decreasing with time, then Warming cannot be caused by increased CO$_2$.

In what follows, we will examine satellite data which shows that humidity has been decreasing.

See NOAA Earth System Research Laboratory Report: "Stratospheric Water Vapor is a Global Warming Wild Card"

Historical Isotopic Temperature Record from the Vostok Ice Core - 1999

Petit, “Climate and atmospheric history of the past 420,000 years from the Vostok ice core, Antarctica”, Nature 399: 429-436

CO2: Gas age CO2 (ppmv) File: co2vostokPetit.txt
Carbon Dioxide Information Analysis Center

Depth (m), Age of ice (yr BP), Deuterium content of the ice (D), Temperature Variation (deg C)

TempVostok := READPRN("vostok.1999.temp.txt")
CO2Vostok := READPRN("CO2vostokPetit.txt")

CO2VosS := ksmooth(CO2Vostok\(d\), CO2Vostok\(i\), 5000)
TSvost := ksmooth(YearsVost, TempVost, 10000)

CO2VosSnorm := \frac{CO2VosS - 260}{8}

Note: The 100,000 Year Cycle, which corresponds the Earth’s Orbital Variation
CO2 actually lags temperature by around 1000 years.

Vostok Ice Temperature (Blue) & CO2 (Black) over 400,000 Years
Max: 3.23C at 128,356 YBP.

Vostok Antartica CO2 Concentration

Vostok Antartica Temperature
The Keeling Curve: Mauna Loa Observation Hawaii Monthly CO2 Concentration Data

The carbon dioxide data, measured as the mole fraction in dry air, on Mauna Loa constitute the longest record of direct measurements of CO2 in the atmosphere. This data is the gold standard in climate research. They were started by C. David Keeling of the Scripps Institution of Oceanography in March of 1958 at a facility of the National Oceanic and Atmospheric Administration (Keeling, 1979). NOAA started its own CO2 measurements in May of 1974. The moving average is for 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. The estimated uncertainty in the Mauna Loa annual mean growth rate is 0.11 ppm/yr. This estimate is based on the standard deviation of the differences between monthly mean values.

Keeling had perfected the measurement techniques and observed strong diurnal behaviour with steady values of about 310 ppm in the afternoon at three locations (Big Sur near Monterey, the rain forests of Olympic Peninsula and high mountain forests in Arizona). By measuring the ratio of two isotopes of carbon, Keeling attributed the diurnal change to respiration from local plants and soils, with afternoon values representative of the “free atmosphere”. By 1960, Keeling and his group established the measurement record that was long enough to see not just the diurnal and seasonal variations, but also a year-on-year increase that roughly matched the amount of fossil fuels burned per year.

The Keeling Curve also shows a cyclic variation of about 5 ppmv in each year corresponding to the seasonal change in uptake of CO2 by the world's land vegetation. Most of this vegetation is in the Northern hemisphere, since this is where most of the land is located. The level decreases from northern spring (May) onwards as new plant growth takes carbon dioxide out of the atmosphere through photosynthesis and rises again in the northern fall as plants and leaves die off and decay to release the gas back into the atmosphere.

Read data from http://www.esrl.noaa.gov/gmd/ccgg/trends/co2_data_mlo.

Year Month decimal average interpolated trend #days
date ppm ppm (season corr)
MLCO2 := READPRN("NOA_Mauna_Loa_Monthly_CO2.TXT")

Date := MLCO2<sub>2</sub>  CO2<sub>ML</sub> := MLCO2<sub>4</sub>  TrendCO2 := MLCO2<sub>5</sub>
Mauna Loa CO2: Seasonal ppm + 3 ppm Seasonal Swing about Trend Line

Monthly Average CO2 (ppm)

Decimal Months/Years

Neftel Siple Ice Station - 1847 to 1953
Avg depth Gas concentration
(m) (yr AD) (ppmv)

Increase per year (%)\[\frac{(390 - 372) \times 100}{10 \times 372} = 0.48387\]

Ice Core, ML, and Beck CO2 Yearly ppm

See: "CO2: The Greatest Scientific Scandal of our Time", Zbigniew Jaworowski
This applies to all the CO2 Ice Core data shown in this worksheet

Depth (m), Ice Age (yrs), Gaz age (Yrs), CO2 (ppmv), mimimum, maximum

BarnolaCO2 := READPRN("Barnola Vostok CO2 1987.TXT")  IceAgeCO2Level := 205

Vostok cores show that CO2 concentrations are at the highest level in 160,000 years.

An imperative for climate change planning: tracking Earth’s global energy
Kevin E Trenberth
http://www.cgd.ucar.edu/cas/Trenberth/trenberth.papers/EnergyDiagnostics09final2.pdf

Plot data from above article for Fig 1
http://www.cru.uea.ac.uk/cru/data/temperature/hadcrut3vgl.txt

HadCrut := READPRN("hadcrut3vgl.txt")  rows(HadCrut) = 320  cols(HadCrut) = 14  n := 0..159
HadCrutx := READPRN("hadcrut3glx.txt")  rows(HadCrutx) = 160  cols(HadCrutx) = 14  n := 0..159

\[
T_{\text{Crut}}_n := \sum_{m=1}^{12} \left( \text{HadCrut}_{2n,m} \cdot \frac{1}{12} \right) \quad \text{TrendCO2} := \frac{T_{\text{Crut}} - 330}{100} \quad \text{Time}_{\text{Crut}}_n := \text{HadCrut}_{2n,0} \quad \text{TCrutPlus} := (\Phi(T_{\text{Crut}}) \cdot T_{\text{Crut}})
\]
Correlation between CO2 ppm and Temp Anomaly (1854-2009)

Correlation Does Not Necessarily Mean Causation

Covariation Between CO2 and δD
If the δD change reflects a proportional T drop, then more than ½ of the interglacial-to-glacial change occurred before significant removal of atmospheric CO2

Values shown normalized to their mean values during the mid-Holocene (5–7 kya BP) and the last glacial (18–60 kya BP) Clearly visible are the disproportionately low deuterium values during the mid-glacial (60–80 Kya BP), the glacial inception (95–125 KyaBP), and the penultimate glacial maximum (140–150 Kya BP)
Covariation of carbon dioxide and temperature from the Vostok ice core after deuterium-excess correction" Kurt M. Cuffey & Françoise Vimeux
Miskolczi Saturated Humidity Model:
Total infrared optical depth is a constant ~1.87


Miskolczi predicts that RH must decrease as CO2 increases. The ESRL RH data supports this. General Circulation Climate Models assume that RH is constant. The RH data shows this is false. Evidence Reveals that Relative Humidity has been decreasing as CO2 has been rising.

Data: http://www.esrl.noaa.gov/psd/cgi-bin/data/timeseries/timeseries1.pl

Higher Surface Levels (Decreasing Pressure): 700, 500, and 300 mb

![Annual Global Relative Humidity Decreasing vs. Years](image-url)
Miskolczi Saturated Humidity Model:
Total infrared optical depth is a constant ~1.87

The cumulative greenhouse effect of all atmospheric greenhouse gases has not been changed, that is, the atmospheric TIOD is constant.

http://miskolczi.webs.com/

The Miskolczi - Principle

Earth-type planetary atmospheres, having partial cloud cover and unlimited reservoirs of water vapor, maintain a energetically maximized (constant, ‘saturated’) greenhouse effect that cannot be increased by emissions.