

BACKGROUNDER

**Pre-industrial CO₂ levels
were about the same
as today.**



**How and why are
we told otherwise?**

BY TIM BALL

FRONTIER CENTRE SENIOR FELLOW

In brief

- How many failed predictions, discredited assumptions and evidence of incorrect data are required before an idea loses credibility?
- Authorities told us pre-industrial atmospheric levels of CO₂ were approximately 100 parts per million (ppm) lower than the present 385 ppm. They are wrong.
- The pre-industrial level is at least 50 ppm higher than the level put into the computer models that produce all future climate predictions.
- It appears that a multitude of failed predictions, discredited assumptions and pieces of incorrect data are required before an idea loses credibility. Credibility should have collapsed by now but political control and insanity prevail.

CO₂ is not causing global warming or climate change.

CO₂ is not a toxic substance or a pollutant. Despite this reality, President Elect Obama met with Al Gore on December 9 to no doubt plan a climate change strategy based on this “problem.”

Proponents of human-induced warming and climate change told us that an increase in CO₂ precedes and causes temperature increases. They were wrong. They told us the late 20th-century was the warmest on record. They were wrong. They told us, using the infamous “hockey stick” graph, the Medieval Warm Period (MWP) did not exist. They were wrong. They told us global temperatures would increase through 2008 as CO₂ increased. They were wrong. They told us Arctic ice would continue to decrease in area through 2008. They were wrong. They told us October 2008 was the second warmest on record. They were wrong. They told us 1998 was the warmest year on record in the US. They were wrong; it was 1934. They told us current atmospheric levels of CO₂ are the highest on record. They are wrong. They told us pre-industrial atmospheric levels of CO₂ were approximately 100 parts per million (ppm) lower than the present 385 ppm. They are wrong.

This last claim is critical because the claim is basic to the argument that humans have caused global warming and climate change by increasing the levels of atmospheric CO₂ and have throughout the Industrial era. In fact, pre-industrial CO₂ levels were about the same as today, but how did they conclude they were lower?

In a paper submitted to the Hearing before the US Senate Committee on Commerce, Science and Transportation Professor Zbigniew Jaworowski explains,

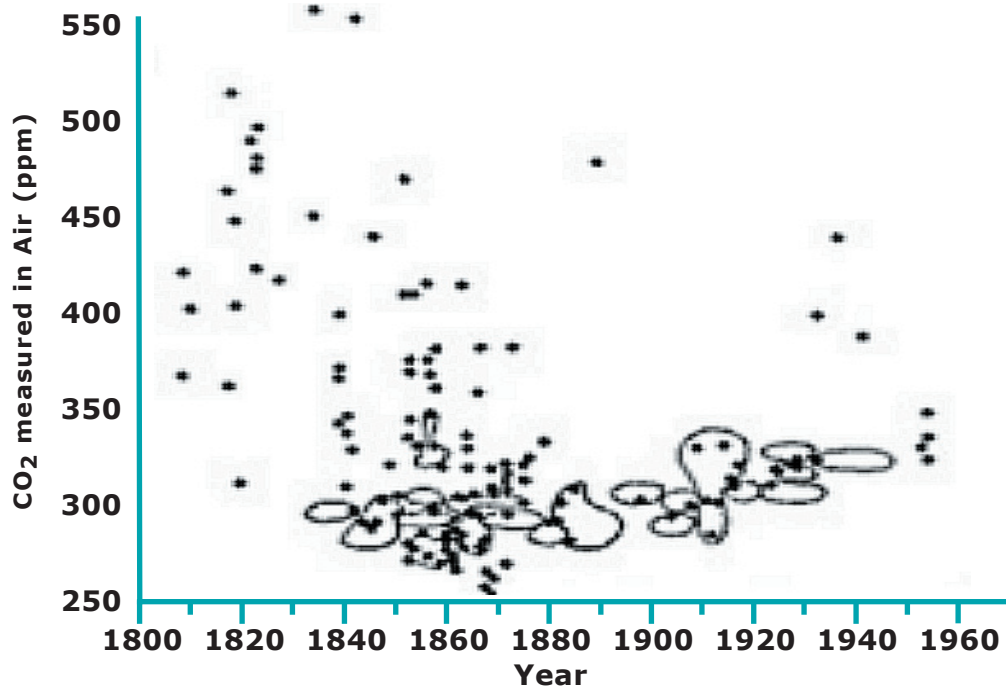
“The basis of most of the IPCC conclusions on anthropogenic causes and on projections of climatic change is the assumption of low level of CO₂ in the pre-industrial atmosphere. This assumption, based on glaciological studies, is false.”

Ice cores provide the historic record and data collected at Mauna Loa the recent record. Both records are drastically modified to produce a smooth continuous curve with little variability. This was necessary to confirm the evidence falsely concluded from many 19th-century measurements that pre-industrial levels were approximately 280 ppm and didn't vary much. So how did they engineer the smooth curves and ignore the fact the 19th century record shows a global average of 335 ppm and considerable variability from year to year?

“Pre-industrial CO₂ levels were about the same as today, but how did they conclude they were lower?”

Modelers ignored the evidence from direct measurements of CO₂ in atmospheric air indicating that in the 19th century its average concentration was 335 ppm (not 280 ppm).

Most people don't know that thousands of direct measures of atmospheric CO₂ were made beginning in 1812. Scientists took the readings with calibrated instruments and precise measurements as the work of Ernst-Georg Beck has thoroughly documented. Guy Stewart Callendar was an earlier visitor to these records. He rejected most of the records including 69% of the 19th century records and only selected certain records that established the pre-industrial level as 280 ppm. Here is a plot of the records with those Callendar selections circled.



It is clear how only low readings were chosen. Also notice how the slope and trend is changed compared to the entire record.

As Jaworowski notes,

“The notion of low pre-industrial CO₂ atmospheric level, based on such poor knowledge, became a widely accepted Holy Grail of climate warming models. The modelers ignored the evidence from direct measurements of CO₂ in atmospheric air indicating that in the 19th century its average concentration was 335 ppmv.”

Beck recently confirmed Jaworowski's research. A September 2008 article in *Energy and Environment* examined the readings in great detail and validated the 19th century findings. In a devastating conclusion Beck writes,

“Modern greenhouse hypothesis is based on the work of G.S. Callendar and C.D. Keeling, following S. Arrhenius, as latterly popularized by the IPCC. A review of available literature raise

the question if these authors have systematically discarded a large number of valid technical papers and older atmospheric CO₂ determinations because they did not fit their hypothesis. Obviously, they use only a few carefully selected values from the older literature, invariably choosing results that are consistent with the hypothesis of an induced rise of CO₂ in air caused by the burning of fossil fuel.”

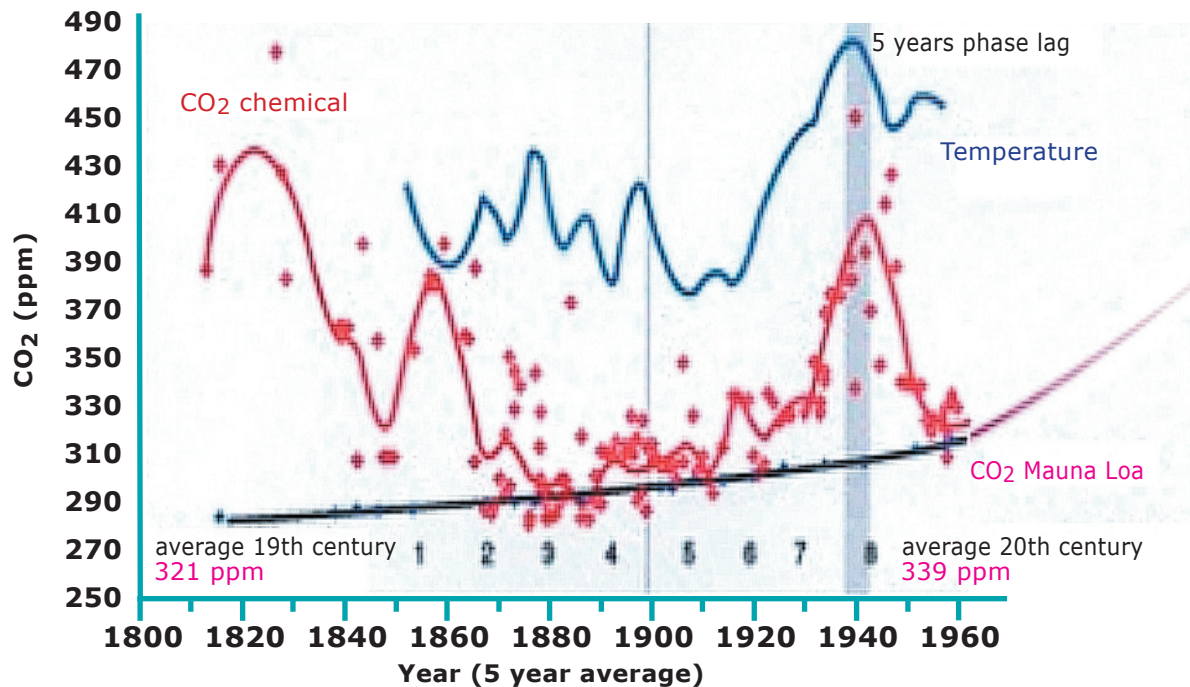
So the pre-industrial level is at least 50 ppm higher than the level put into the computer models that produce all future climate predictions. The models also incorrectly assume uniform atmospheric global distribution and virtually no variability of CO₂ from year to year.

Beck found that, “Since 1812, the CO₂ concentration in northern hemispheric air has fluctuated exhibiting three high level maxima around 1825, 1857 and 1942 the latter showing more than 400 ppm.” Here is a plot from Beck comparing 19th century readings with ice core and Mauna Loa data:

“(They) invariably choose results that are consistent with the hypothesis of an induced rise in CO₂ in air caused by the burning of fossil fuel.”

CO₂ 1812-1961, Chemical Temperature

CO₂ chemical — CO₂ Mauna Loa — CO₂ Ice Core Antarctica — Temp HadCRUT3 2006 —



The atmospheric CO₂ concentrations of the northern hemisphere compared average northern hemispherical temperature and reconstructed CO₂ from ice core records of Antarctica. Data prepared from the historical measurements since 1812-1961 as a five year average (red line) out of 138 yearly averages (red dots), the Keeling Curve (violet), the temperature of the northern hemisphere according to CRU 2006 (blue), the CO₂ concentration of Antarctica from ice core records after Neftel et al.

Compare the variability of the atmospheric measures with the smooth line of the ice core record. Eliminating extreme readings and then applying a long term smoothing average achieved this. When smoothing is done on the scale of the ice core record a great deal of information is lost. Elimination of high readings prior to the smoothing makes the loss even greater. Also note that as with all known records the temperature changes before the CO₂, in this record by approximately 5 years.

Elimination of data is also done with the Mauna Loa and other atmospheric readings, which can vary up to 600 ppm in the course of a day. Beck explains how Charles Keeling established the Mauna Loa readings by using the lowest readings of the afternoon. He ignored natural sources, a practice that continues. Beck presumes Keeling decided to avoid these low level natural sources by establishing the station at 4000 meters (m) up the volcano. As Beck notes "Mauna Loa does not represent the typical atmospheric CO₂ on different global locations but is typical only for this volcano at a maritime location in about 4000 m altitude at that latitude." (Beck, 2008, "50 Years of Continuous Measurement of CO₂ on Mauna Loa" (as noted in *Energy and Environment*, Vol 19, No.7).

Keeling's son continues to operate the Mauna Loa facility and as Beck notes, "owns the global monopoly of calibration of all CO₂ measurements." Since the young Keeling is a co-author of the IPCC reports they accept the version that Mauna Loa is representative of global readings and that they reflect an increase since pre-industrial levels.

The Ice Core Record

Jaworowski estimates the ice core readings are at least 20% low. That is more reasonable given the CO₂ levels for 600 millions years using geologic evidence. Here the current level of 385 ppm is the lowest in the entire record and only equalled by a period between 315 and 270 million years ago (mya). There are many problems with the ice core record. It takes years, sometimes up to 80, for air to be trapped in the ice so the question is what is actually being trapped and measured? Melt water moving through the ice especially when the ice is close to the surface can contaminate the air bubble. Bacteria form in the ice releasing gases even in 500,000-year-old ice at great depth. Under the pressure below 50m ice changes from brittle to plastic and begins to flow. The layers formed with each year of snowfall gradually disappear as the ice layers meld and compress. A

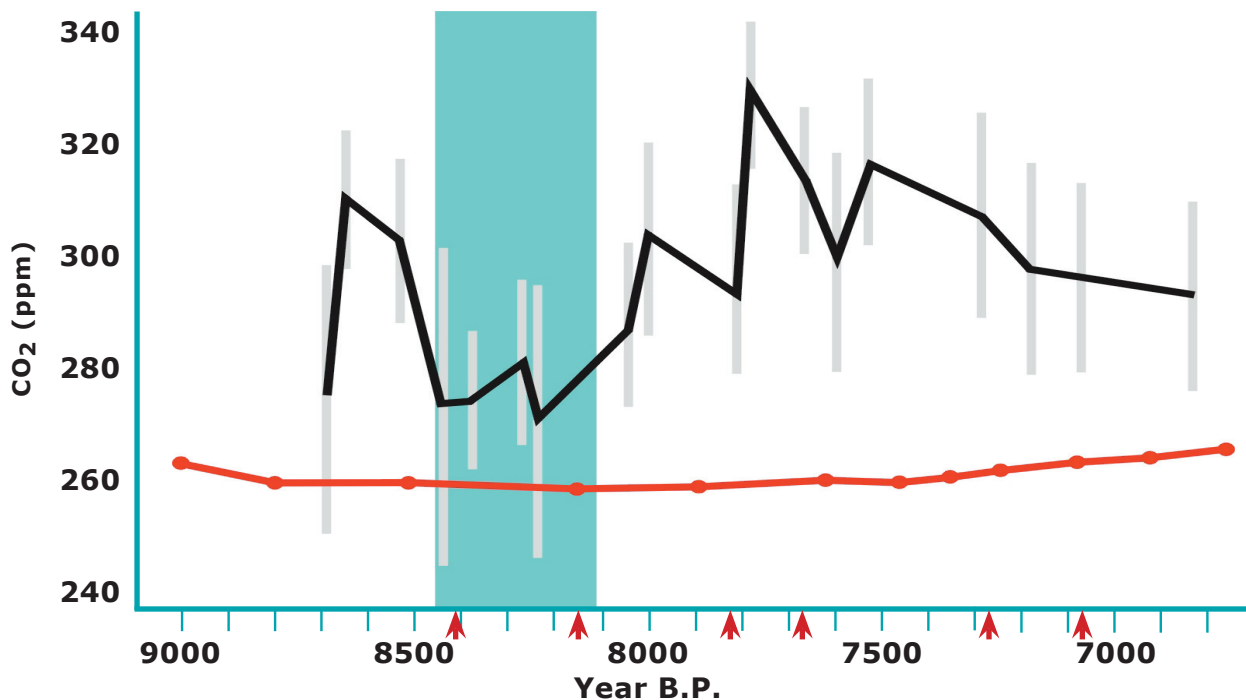
Mauna Loa Observatory,
Hawaii, USA



considerable depth of ice covering a long period of time is required to obtain a single reading at depth. Further evidence of the effects of smoothing and the artificially low ice core readings are provided by measurements of stomata. Stomata are the small openings on leaves that vary directly with the amount of atmospheric CO₂. A comparison of a stomata record with the ice core record for a 2000-year period illustrates the issue. Stomata data on the right show the higher readings and variability when compared to the excessively smoothed ice core record on the left. This aligns quantitatively with the 19th century measurements as Jaworowski and Beck assert. A Danish stomata record shows levels of 333 ppm 9400 years ago and 348 ppm 9600 years ago.

The EPA is planning to declare CO₂ a toxic substance and a pollutant. Governments are preparing to create carbon taxes and draconian restrictions that will cripple economies for a completely non-existent problem. It appears that a multitude of failed predictions, discredited assumptions and pieces of incorrect data are required before an idea loses credibility. Credibility should have collapsed but political control and insanity prevail.

“A multitude of failed predictions, discredited assumptions and pieces of incorrect data...”



Reconstructed CO₂ concentrations for the time interval between =8,700 and =6,800 calendar years B.P. based on CO₂ extracted from air in Antarctica ice of Taylor Dome (left curve; ref.2; raw data available via www.ngdc.noaa.gov/paleo/taylor/taylor.html) and SI data for fossil *B.pendula* and *B.pubescens* from Lake Lille Gribssø, Denmark (right curve). The arrows indicate accelerator mass spectrometry ¹⁴C chronologies used for temporal control. The shaded time interval corresponds to the 8,200 B.P. cooling event. Quantification of mean CO₂ concentration is based on the rate of historical CO₂ responsiveness of the European tree birches; ±1^o CO₂ estimates are derived from the standard deviation of the SI mean values.

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ABOUT THE AUTHOR



Tim Ball is a Senior Fellow at the Frontier Centre and has an extensive science background in climatology, especially the reconstruction of past climates and the impact of climate change on human history. He had a long academic career at the University of Winnipeg until he moved to Victoria in 1996. He has a BA from the University of Winnipeg, an MA from the University of Manitoba and a Ph.D (Doctor of Science) from the University of London England.

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The author of this study has worked independently and the opinions expressed are therefore his own, and do not necessarily reflect the opinions of the Board of the Frontier Centre for Public Policy.

Frontier Centre for Public Policy

MB: 203-2727 Portage Avenue,
Winnipeg, Manitoba Canada R3J 0R2
Tel: 204 977-5049 Fax: 204 957-1570

SK: 2353 McIntyre Street,
Regina, Saskatchewan Canada S4P 2S3
Tel: 306 352-2915 Fax: 306 352-2938

AB: Ste. 2000 – 444, 5th Avenue SW
Calgary, Alberta Canada T2P 278
Tel: (403) 230-2435

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Online at www.fcpp.org Email: newideas@fcpp.org