Qualitative thoughts on CO2

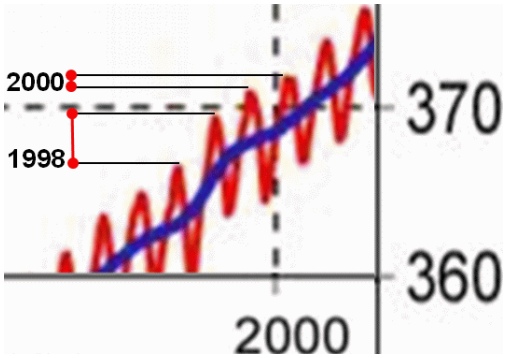
By Frank Lansner, civil engineer biotechnology.

Recently I commented on CO2 concentration as a function of temperature. This paper is my attempt to answer comments and reactions for which I am grateful.

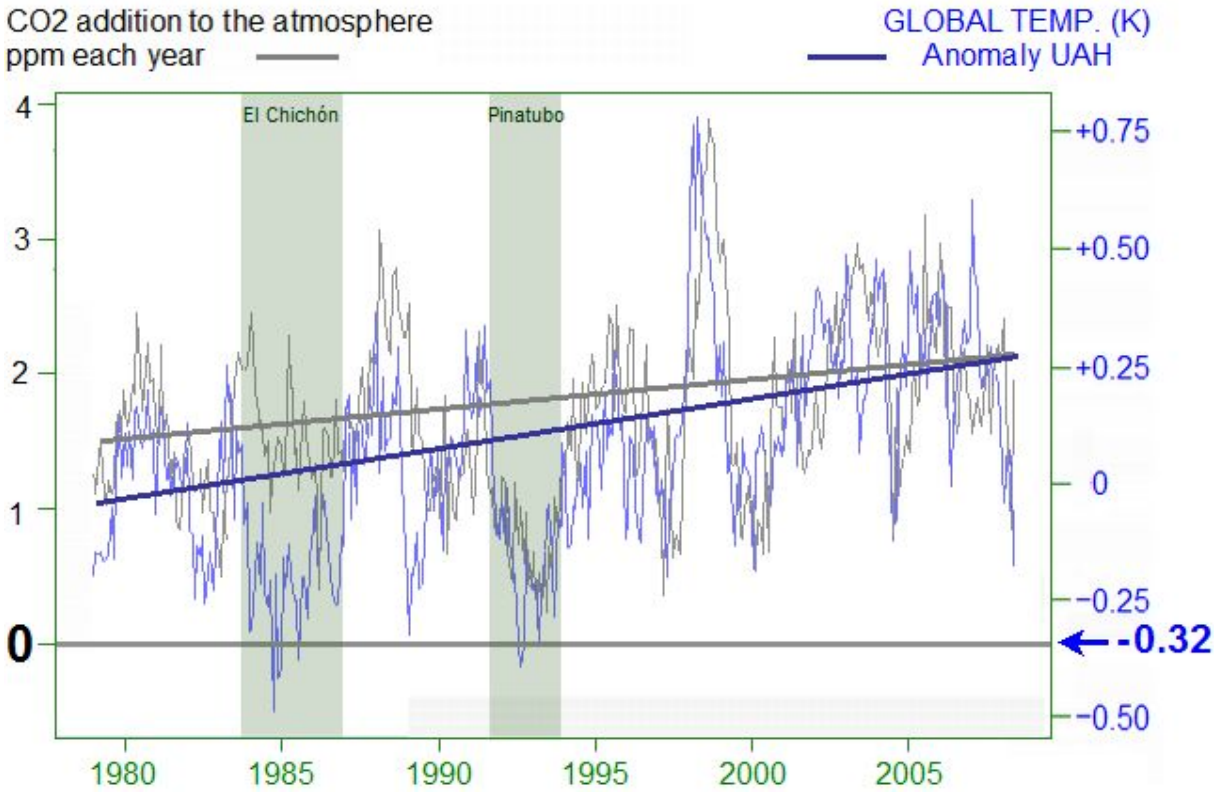
I wrote:

> *It appears from this graph that CO2 concentrations follows temperature with approx 6-9 months. The interesting part is off course that the CO2 trends so markedly responds to temperature changes.*

To some, this is "not possible" as we normally see a very smooth rise on CO2 curves. However, the difference in CO2 rise from year to year is quite different from warm to cold years, and as shown differences are closely dependent on global temperatures. Take a closer look:



For this writing I have slightly modified the presentation of UAH data vs. Mauna Loa data:



The relatively rough relationship between CO2 growth per year and global temperatures (UAH) is:

1979: CO2 growth (ppm/year) = 3.5 * Temp.anomaly(K) + 0.7
2008: CO2 growth (ppm/year) = 3.5 * Temp.anomaly(K) + 1.2

1979-2008:

CO2 growth (ppm/year) = 3.5 * Temp.anomaly(K) + 0.95

For 2007, a UAH temperature anomaly near **– 0.32 K should lead to CO2 rise/year = 0** , that is, CO2-stagnation.

These equations are useful for overall understanding, but so far they don't give a fully precise and nuanced picture, of course. On the graph, I have illustrated that there is a longer trend difference between CO2 and Temperature. Thus, the "constant" of the equation should be a variable as it varies with time (1979: 0.7 2008: 1.2).

The trend difference means, that from 1979 to 2008 the CO2-rise per year compared to the global temperatures has fallen 0.5 ppm/year, or the other way around: It now takes approx. +0.15 K global temperature anomaly more to achieve the same level of CO2 rise/year as it did in 1979.

How can this be? The CO2 rise/year now takes higher temperatures to achieve?

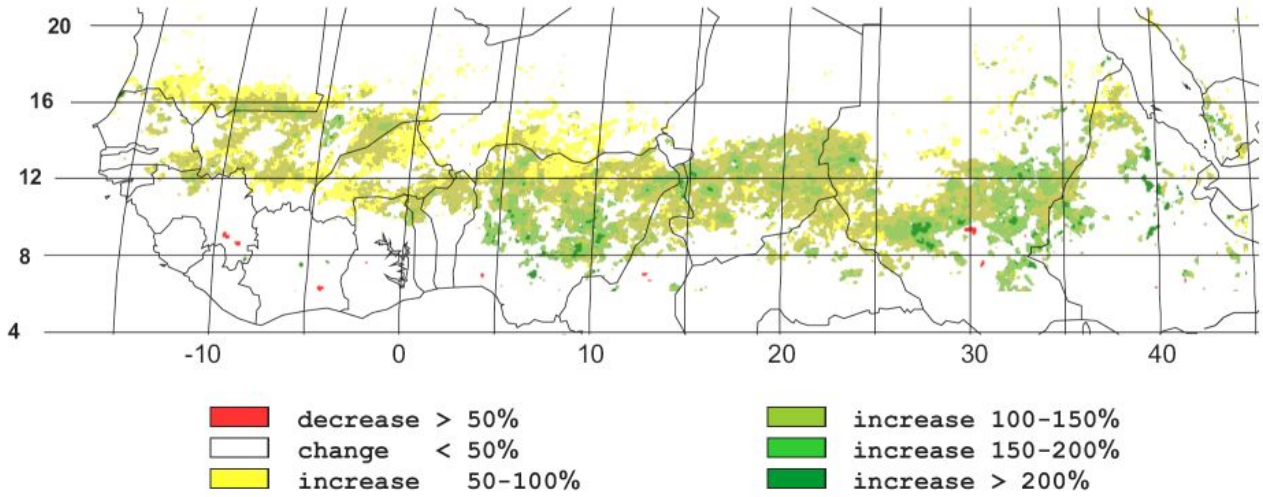
With the human emissions rising in the time interval 1978-2008, one could imagine that it would be the other way around, that CO2 rises came with still smaller temperature rises needed. But no, its becoming "harder and harder" to make CO2 rise in the atmosphere.

So generally, the human emissions effect appears inferior to other effects in this context at least. Which effects could hold CO2 rise/year down as we see?

The fact that we today have higher CO2 concentration in the atmosphere than in 1978 does not favour more CO2 release from the oceans. However the fact that we approx 500 million years ago had almost 7000 ppm CO2 in the atmosphere implies that the 385 ppm today hardly makes a difference.

My guess is, that what we see is mainly the effect of the growing biosphere. In short: A period with higher temperatures leads to higher CO2 rises/year and thus of course after some years higher CO2 concentration in the atmosphere.

In the period of rising temperatures and CO2 concentration, the biosphere has grown extremely much. The results of trend analyses of time series over the Sahel region of seasonally integrated NDVI using NOAA AVHRR NDVI-data from 1982 to 1999:



Source: http://www.eoearth.org/article/Greening_of_the_Sahel

Even if we put every European in ”Plant a tree”-projects we could never reach a fraction of what mother nature has achieved in Sahel alone over these few years. In Addition, in these areas lots of more precipitation is occurring now. (If we here have a “point of no return” I’m not sure Africans would ever want to come back to “normal”. We Europeans want so much to help Africans – but take away the CO2? What kind of help is that?)

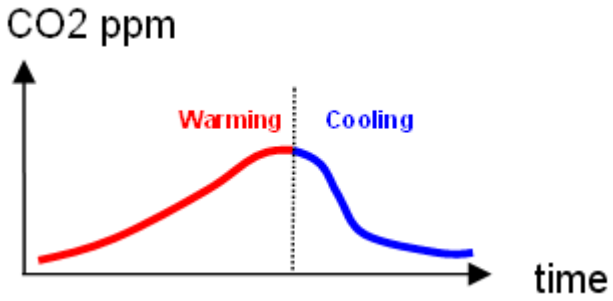
In addition, the seas are much more crowded with life, plankton etc.
The biosphere is blooming due to CO2.

So today we have a larger biosphere. Every single extra plant or plankton cell will demand its share of CO2. It takes more CO2 to feed a larger biosphere. More CO2 is pulled out of the atmosphere today than earlier - an enormous negative feedback on CO2 levels. Roughly: Any human CO2-influence would cause bigger biosphere that eventually omits the human CO2-influence.

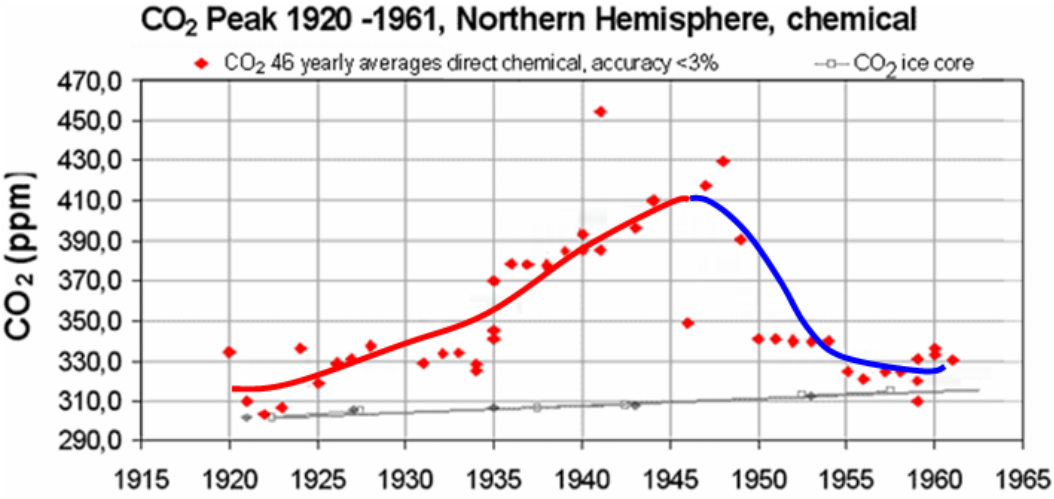
A rather interesting scenario: What happens if temperatures go down below approx – 0.3 K UAH??

Well first it appears from my rough equation that CO2 levels will go down. We will have negative CO2 rise / year. **But the bigger biosphere is still there (!!!)** even though temperature and thus CO2 levels suddenly should drop and it will still demand its bigger share of CO2. And more, in these days of Cold PDO and especially more precipitation due to the solar condition, we might see more CO2 washed faster out of the atmosphere.

This adds up to my belief, that a cooling after a longer warming trend, mostly due to the bigger biosphere, could be accompanied by quite rapid fall in CO2 levels. Faster that temperature raise leads to CO2 rise? In short, I postulate: CO2 often falls quicker than it rises:



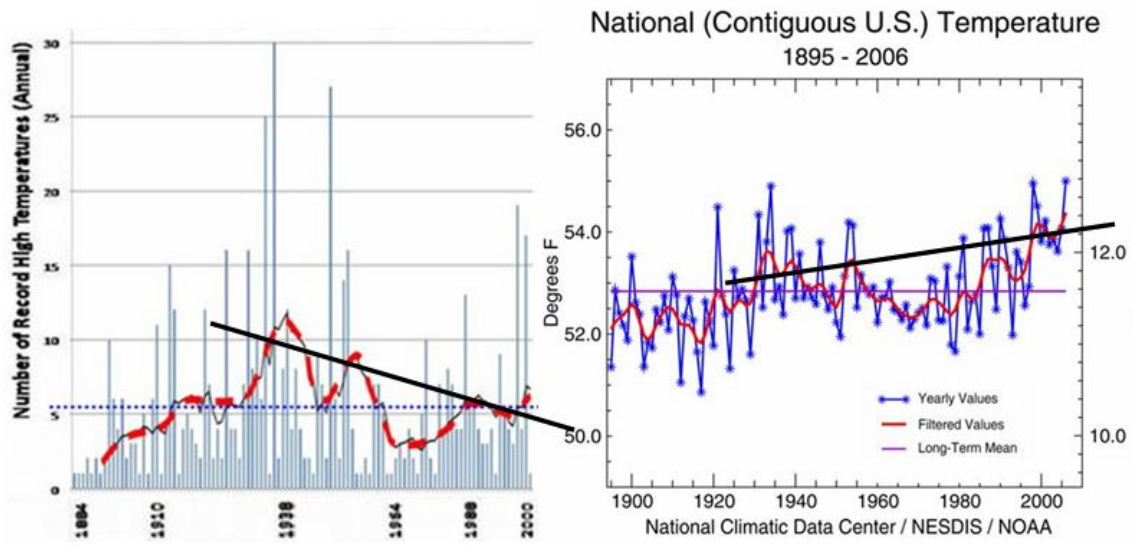
Hmm… Where have I seen such a figure before?
I believe a certain Ernst-Georg Beck may have seen something like this?



1920-47: 90 ppm rise in 27 years.. 3.3 ppm/year.

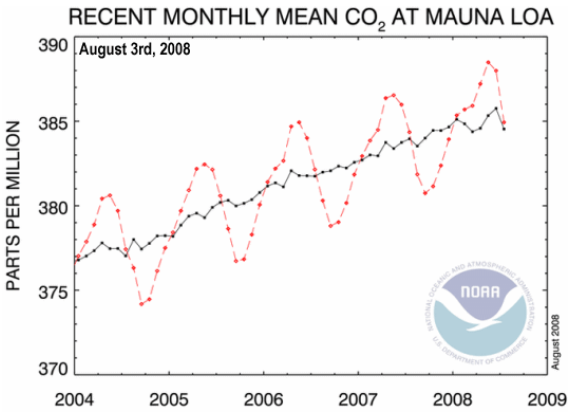
3.3 ppm/year = 3.5* X(K) + 0.95 => Global temperature anomaly 1920-47, X is then approx 0,61 K.

That is in the period 1920-47 there should have been roughly around 0.61 degrees warm anomaly in the period. This is in fact warmer than today's temperature anomalies, and I admit that it could seem a little "too" warm. Its does not fit official temperature graphs, however this would certainly not be the first time results contradicts GISS or NOAA temperature data:



So what to expect now? First of all, how about the present cooling??

We should be able to see the big January 2008 dive in global temperature in CO2? Well yes, this dive should 6-9 months appear thereafter. And if we take a look at Mauna Loa data released Aug 3, nicely in the 6-9 months timeframe after January 2008, we saw a dive.



However, this dive was mostly removed from Mauna Loa data 4 August 2008. If suddenly after corrections, there is no longer the relationship between UAH global temperature anomalies, this should be investigated further.

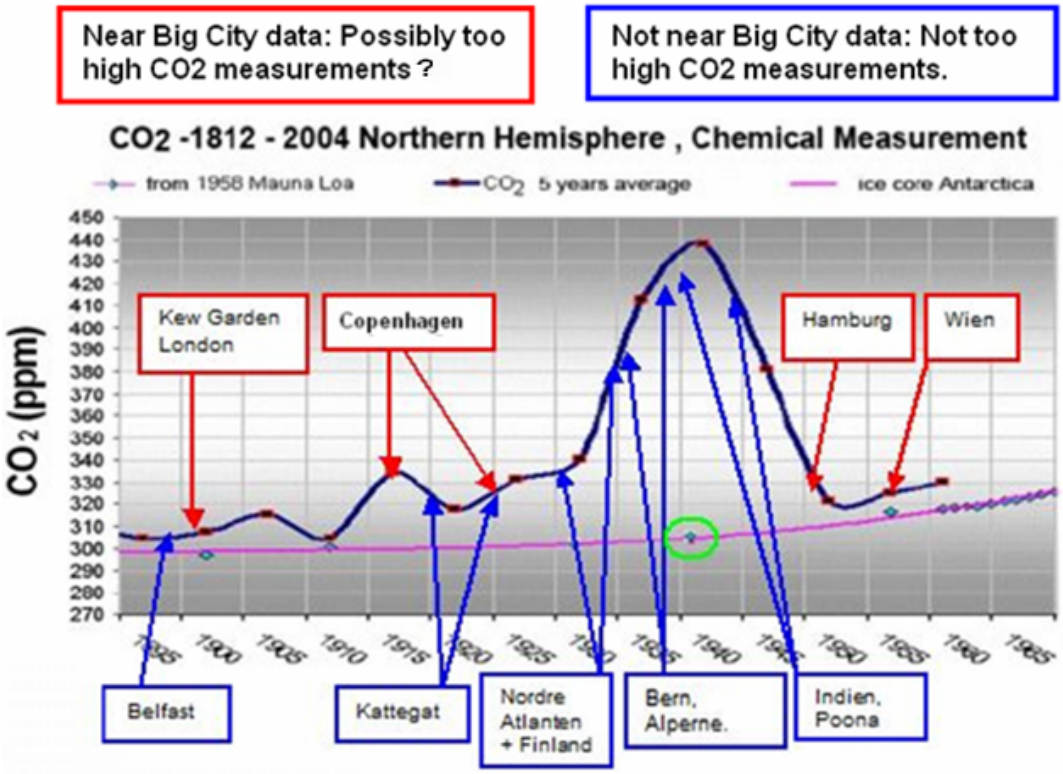
So how about the future years in case of cooling? Well, the Beck “free – fall” CO2 concentrations of the 1950´s, will they be repeated? I dare not guess!!

Finally some extra comments on the verbal attacks on Ernst-Georg Becks data.

In “Realclimate” the CO2 data is questioned with the example of Paris 2008:
“A quick tour through my car-traffic-saturated home town, Paris, can give us a good first impression:
· Jardin Luxembourg (major but still tiny green spot in the center of Paris) 425ppm
· Place de la Bastille: 430ppm
· Place de l’Etoile (the crazy huge roundabout around the Arc de Triomphe): 508ppm
· And the winner was Place de la Nation: 542ppm (ie 160ppm over background!).
All these measurements by David Widory and Marc Javoy (reference below) were snapshot measurements, but they show how CO2 concentrations can vary strongly due to nearby fossil fuel combustion.”

My comments:
1) They find 542 ppm in the traffic. But a green spot IN THE CENTER of Paris is as far down as 425PPM! In other words, you can hardly leave the huge city of Paris before CO2 levels are near the background 385 ppm. This is obvious, so either the people at Realclimate are a little slow, or something else is not as it should be.

2) It so happens, that the Beck Data due to sheer luck is organized to counter this “city-argument”.



- For instance, “Poona” in India was in the 1940´ies a very little province town.

So we see 2 very funny things: First of course, the “could-be-to-high-CO2-measurement-sites” are the ones without high CO2 results and vice versa. Second, we have 2 PERFECT pairs of data sets each taken from same area and same time but both city and non-city, very lucky indeed.

Thus we have **London and Belfast** around year 1900 showing the exact same results. And we have **Copenhagen and Kattegat of Denmark** around 1920 showing the exact same result. In other words, NO CITY EFFECT WHAT SO EVER in Becks data.

In the 1940´s we see that Becks data is more than 100 ppm higher than Icecore results. I will hereby ask Realclimate to go out with 1st class equipment to different non-big-city-sites and see if they can get results today that lies more than 100 ppm over today’s 385 ppm. They must believe that they can obtain 500 ppm samples all around the world.

We have CO2-measuring stations all around the world. Why are none of these measuring over 100 ppm too much then?

The hypothesis against Becks data in the 1940’s is, that ALL measurements are wrong, because in that timeframe, all Becks assembled measurements shows high CO2 concentrations.

How likely is it that 100% ALL measurements are wrong? And much worse, how likely is it, that all measurements are **wrong in the same way** so that these errors form a common “error-trend”? So all equipments used by different scientists in different parts of the world where faulty from 1930-45 in the same way so they got equally too high results that happens to give a continuous trend? And that this trend happened to occur simultaneously with warmer period?

Finally, the Ice data shows a completely smooth flat curve also during the 1940’s.

Now. We have seen first in this writing, that the **CO2 is very responsive to temperature changes 1978-2008. So how come the warmer temperatures in the 1940 has has no effect at all on the extremely flat Antarctic CO2 curve?** I’m afraid there is one and only one explanation: The Antarctic curve is the faulty data set. It is not all other data sets that are faulty.

Let’s calculate back, and show how temperature should have been to make such a flat CO2-trend:

From 1890 to 1940 the Antarctic graph show one continuous rise in CO2 of approx 6 ppm. If UAH and Mauna Loa relation works approximately as for 1979-2008, temperatures 1890-1940 should have been constantly – 0.2 K UAH anomaly, and never left this level all these years.

This absurd scenario has not happened, and there is a indeed severe mismatch between Antarctic CO2 data on one side and Mauna Loa data/UAH data on the other side.**As I cannot see how** Mauna Loa data/UAH data should be totally wrong, Antarctic CO2 data is proven faulty.