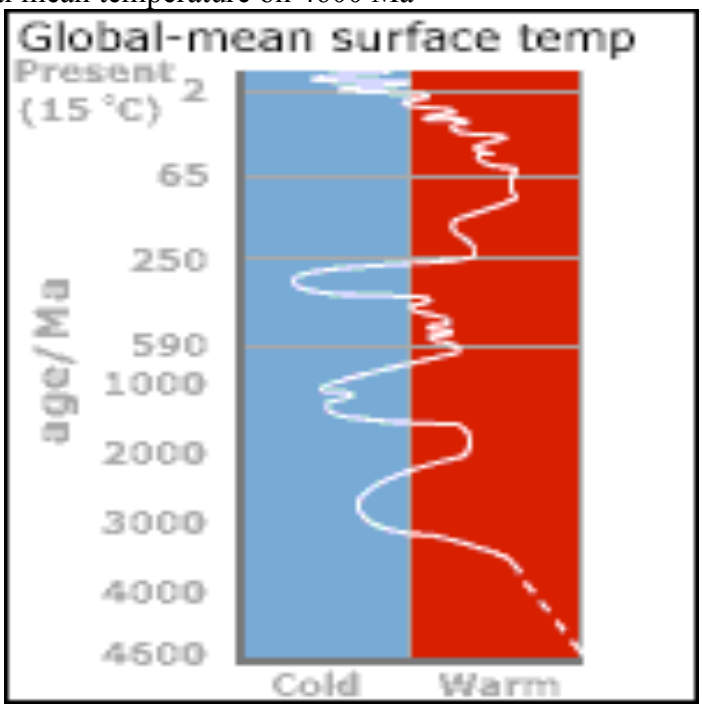
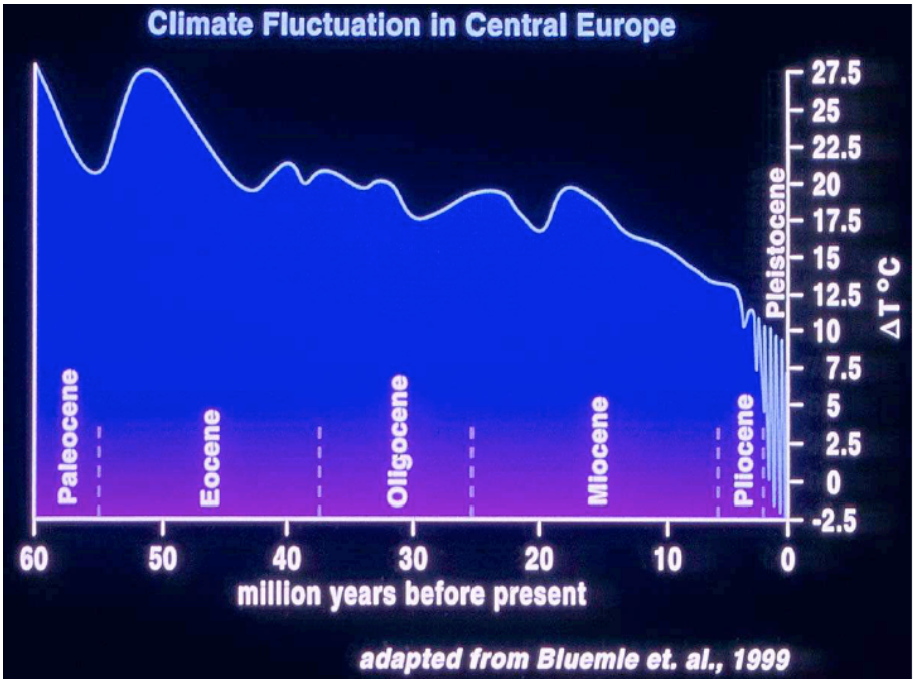
Universidad de Castilla-La Mancha 24 April 2007

Uncertainty of data and forecasts for fossil fuels
by Jean Laherrere

Annex
Climate Change: some graphs and doubts
Climate change is new for some people when in fact climate change can be seen on geological outcrops since billions of year. Studies on climate changes needs to rely on geological data and geologists are quite qualified to speak about climate change because past can explain present and future.
Geological works has found that warm climate was more frequent than cold climate for the entire life of the earth of 4,6 Ga,. Main cold periods were 3 Ga, 1 Ga, 300 Ma and now.
Figure A1: Global mean temperature on 4600 Ma

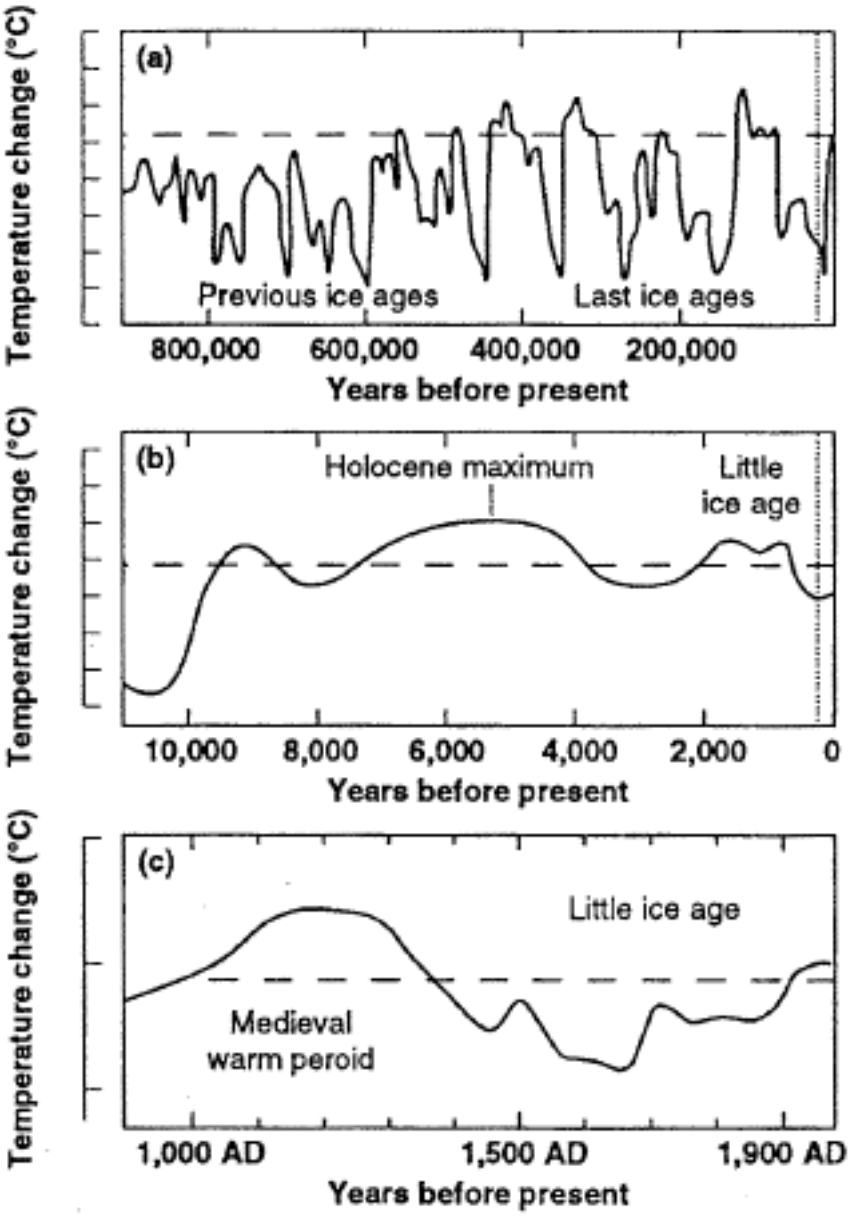


Since 2 Ma we are in glaciation period and since 10 000 years in a inter-glacial period and we should go back to glaciation some day.
Figure A2: Central Europe temperature fluctuation on 60 Ma

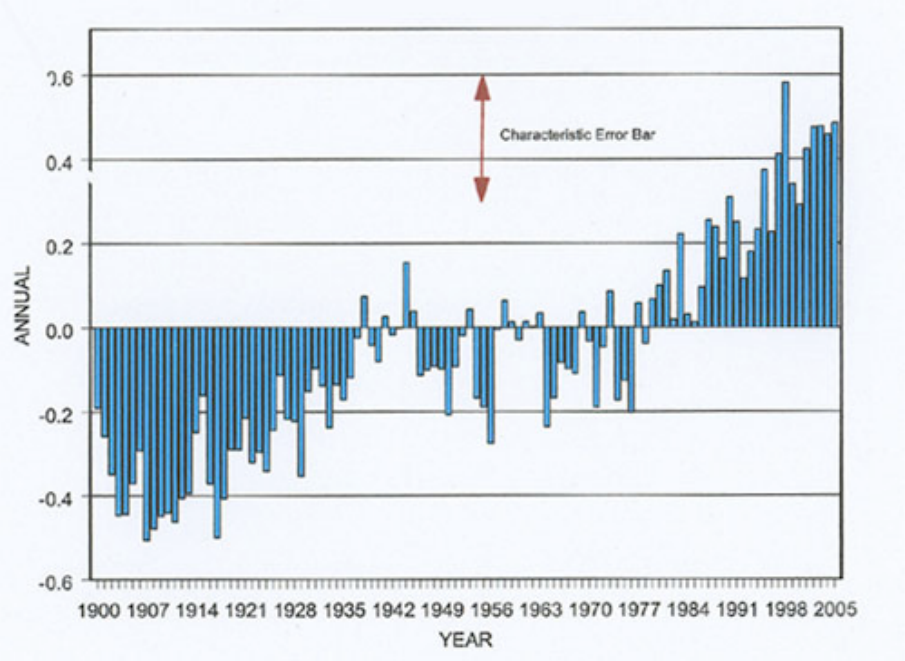


Going down to shorter periods from million years to millenniums and centuries, again cycles of different periods.

Figure A3: temperature change on 900 ka, 10 ka and 1 ka



It is obvious from the past that climate changes are the rules and talking about stabilizing climate is utopia.
All the previous graphs temperature were estimated through proxies being the ratio of isotopes of oxygen or hydrogen in ice or chemical elements of fossils
Only since 1860 temperature can be measured directly and the trend is clearly showing a global warming from 1910 with a slight cooling from 1945 to 1975
Figure A4: global mean temperature 1900-2005



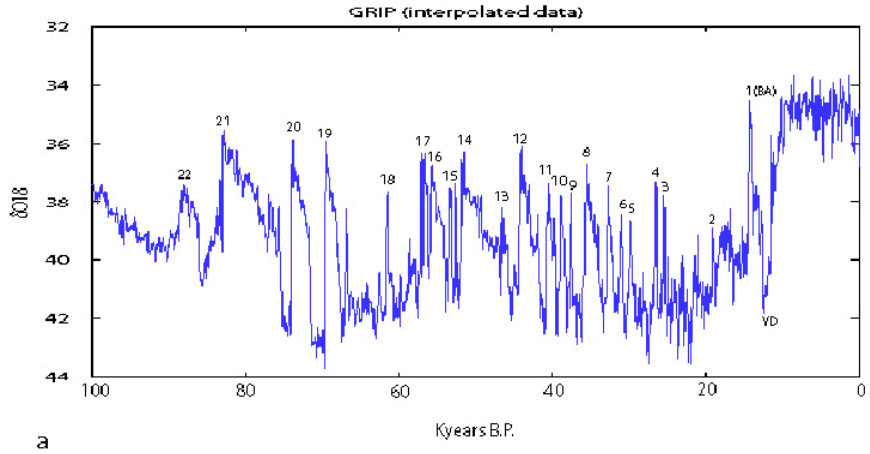
Température globale moyenne annuelle de 1900 à 2005
avec barre d'erreur intrinsèque. Source: Met Office Britannique

Global warming cannot be denied. The problem is to find what is the causes of such warming. There are many sources, some being natural others being anthropogenic. The big problem is to estimate which is the main driver.

Is the Nature with the end of the Little Ice Age (1300-1850) corresponding to the start of the industrial period or is the anthropogenic emissions due to the industrial time and the increase of population ? They both contribute to the present global warming, but **which will prevail in the future: nature or human activity?**

Past temperature cycles are quite complex. In addition to the solar geometry (Milankovitch) more cycles a have been found as the 1500 years cycle called Dansgaard-Oeschger (DO) events which offers very quick change as the Younger Dryas as shown in the temperature (delta O18) from Greenland ice core project

Figure A5: GRIP delta O18 100 ka BP



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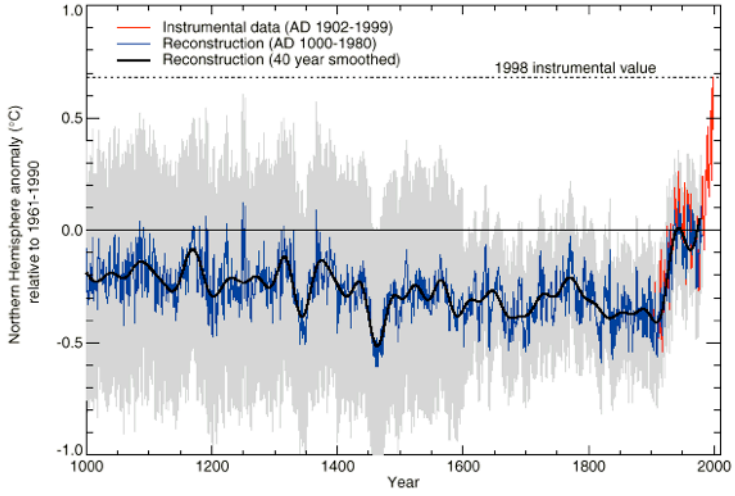
The period is around 1500 years but its cause is unknown (solar forcing or ocean cycle). Fred Singer (his site TWTW denounces IPCC global warming) has writing a book in 2007 « Unstoppable global warming every 1500 years » where the Little Ice age will be part of it

One of the most famous temperature graph is known as the hockey stick presented by IPCC 2001 for the last millennium

Figure A6: northern hemisphere temperature (Mann 1999) 1000-2000 = hockey stick

Figure 1: Millennial Northern Hemisphere (NH)
Temperature Reconstruction (blue) and Instrumental Data (red) from AD 1000-1999

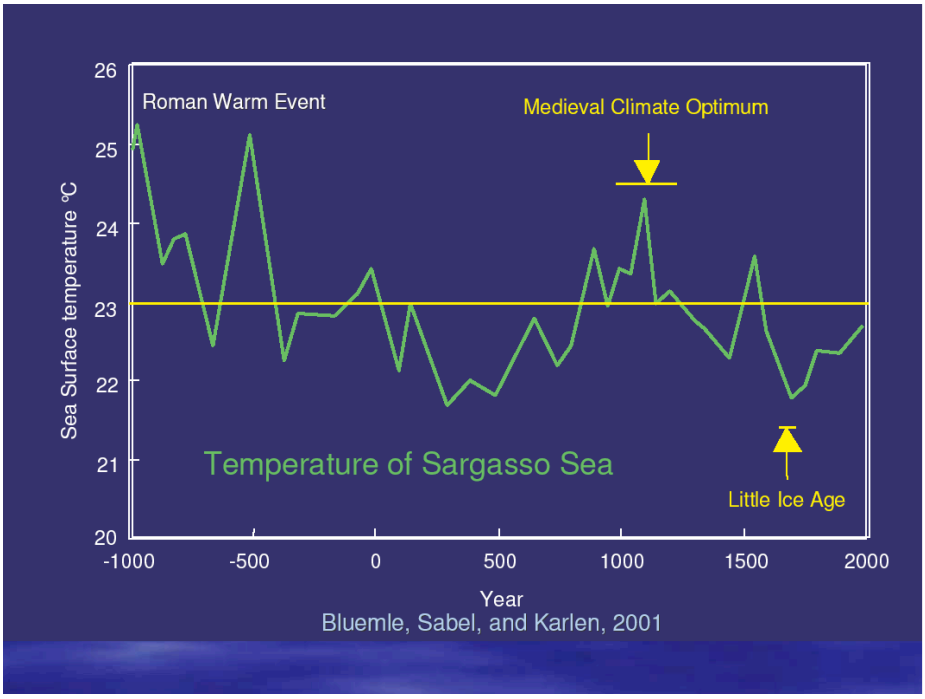


Source: Mann et al. 1999.

The hockey stick relies mainly on tree rings studies which are annual cycles (high frequency) and it is well known in geophysics that it is difficult to obtain low frequency (centurial change) from high frequency data where low frequency is filtered. Furthermore this graph denies historical records of Little Ice age and Medieval Warm period well described by historians (Leroy-Ladurie 1987).
This graph denies a similar graph which appears in IPCC 1990
Figure A7: temperature 1000-2000 in IPCC 1990

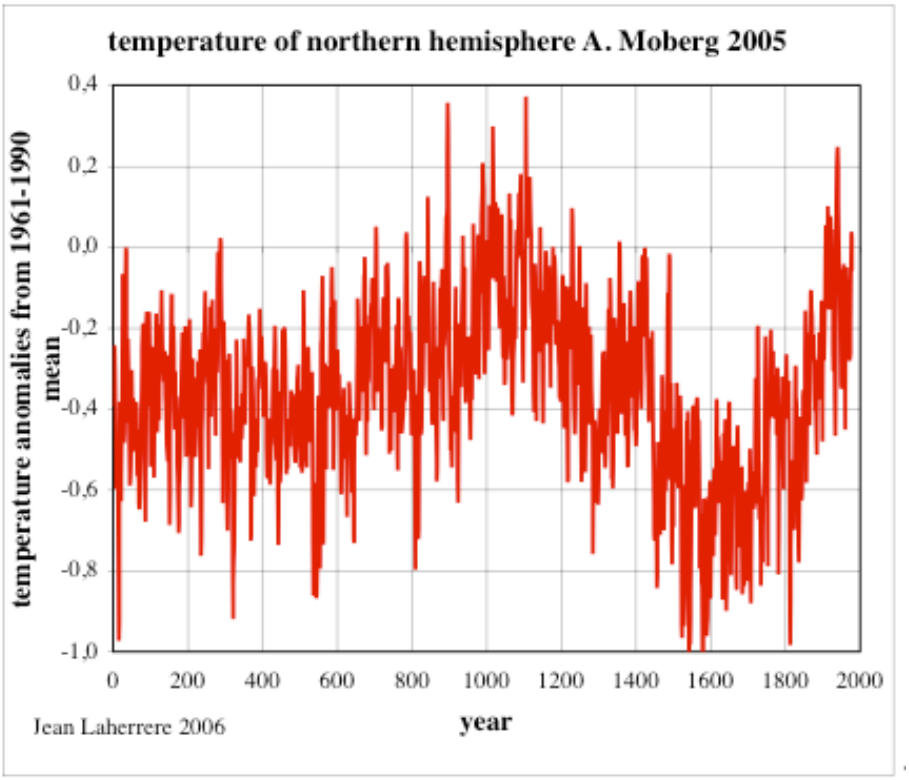
Figure 4.5: Here we have digitized the temperature profile as presented in the IPCC Assessment Report 1990. The early period between 1100 to about 1400 of above average temperatures is known as the Medieval Warm Period and the period from about 1500 to 1900 is known as the Little Ice Age.

Other proxies from sea data
Figure A8: temperature -1000-2000 from Gerhard



Moberg reports temperature for the northern hemisphere where the Medieval warming is quite obvious as the Little Ice age

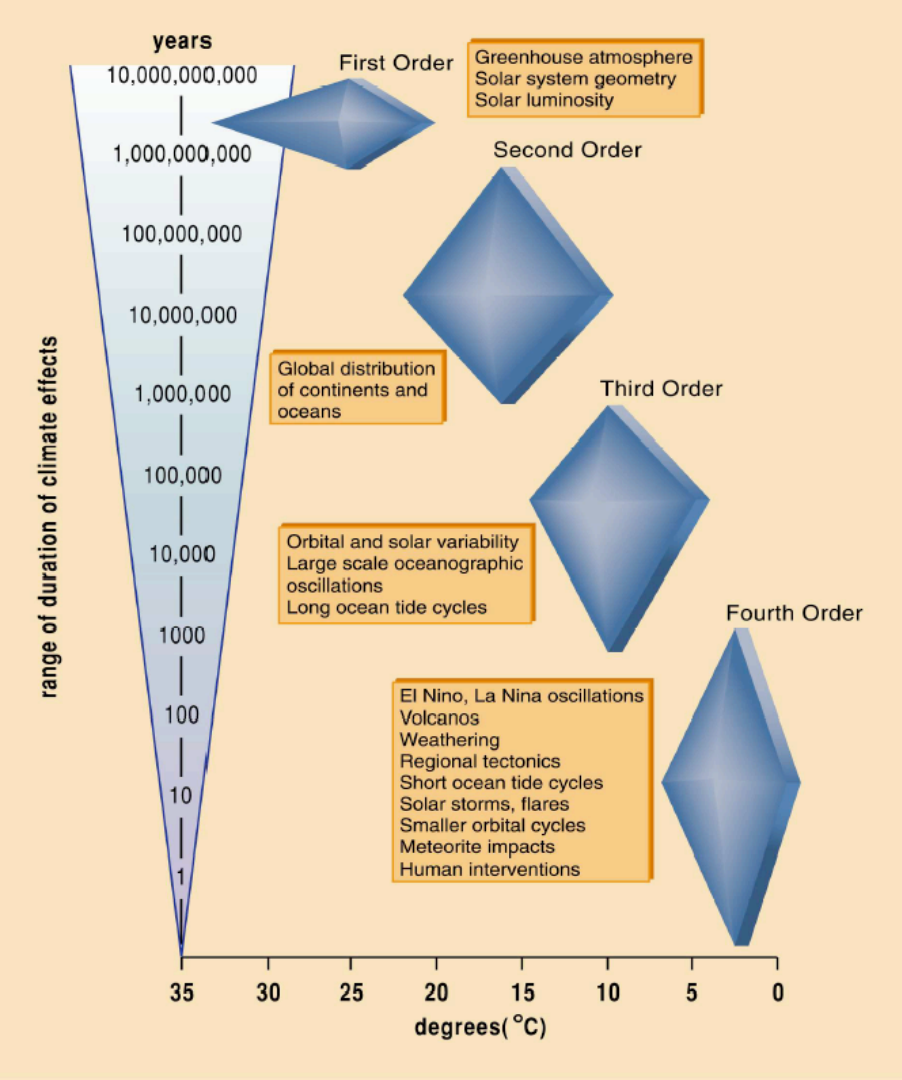
Figure A9: temperature of northern hemisphere 0-2000 by Moberg



The hockey stick does not appear anymore in the last IPCC 2007 report.

Climate change causes

Since Milankovitch has demonstrated that the main driver of climate change is the solar system geometry with eccentricity of the earth orbit around the sun, the obliquity of earth axis and the precession of equinoxes, leading to cycle of about 10 000, 20 000 and 100 000 years. But Earth is alive when Mars and Venus are dead because Earth temperature is about 15°C because of greenhouse atmosphere. Without greenhouse gases GHG Earth should be frozen and dead. But live needs not only a good temperature but also light as source or energy when plants can transform CO2 with light into food. So greenhouse atmosphere, solar system geometry and solar luminosity are the first order of climate changes
The geologist L.C.Gerhard « Geologic constraints on global climate variability » has drawn this graph of different orders. Second order is global distribution of continents . During the Cretaceous time (80 Ma) there was no ice on the poles because there were only open oceans. Glaciations need continents at or around the poles as now.
Figure A10: range of climate effects from Gerhard



Fourth order is human interventions, but also meteorite impacts, volcanoes, El Nino and other.

Greenhouse gases GHG

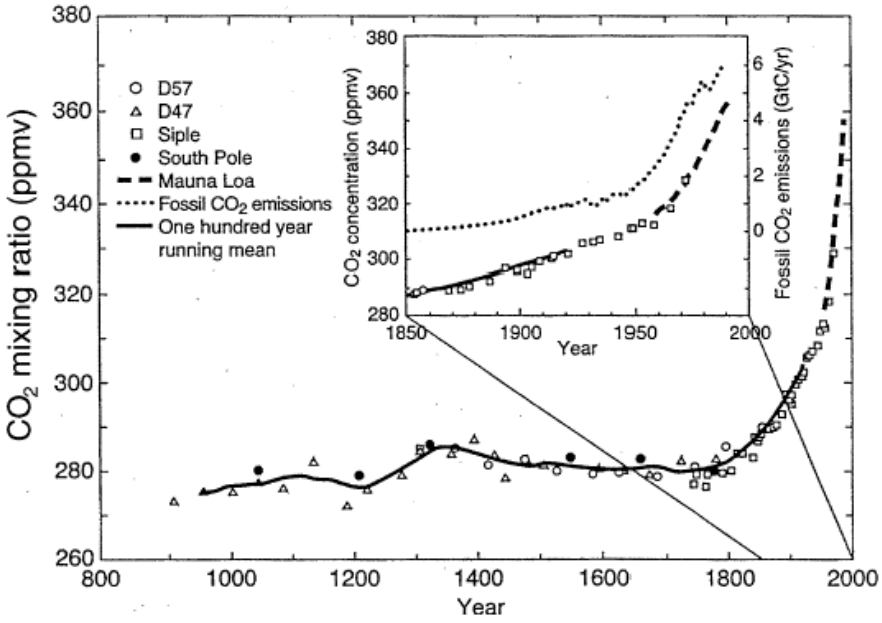
Greenhouse gases are first vapour (about 60%) then CO2 (about 25 %), then CH4 and others. But vapour and clouds being difficult to measure and to model, most of studies were concentrated on CO2 which became the bad guy.

CO2

CO2 is represented by IPCC with this graph

CO2 concentration is given for the last millennium by data form ice core and few stations at Stiple Station ice core (Antarctica) for the 19th and 20th century tied to direct measures at Mauna Loa.

Figure A11: CO2 from Antarctica ice core fitted to direct measures at Mauna Loa 900-2000

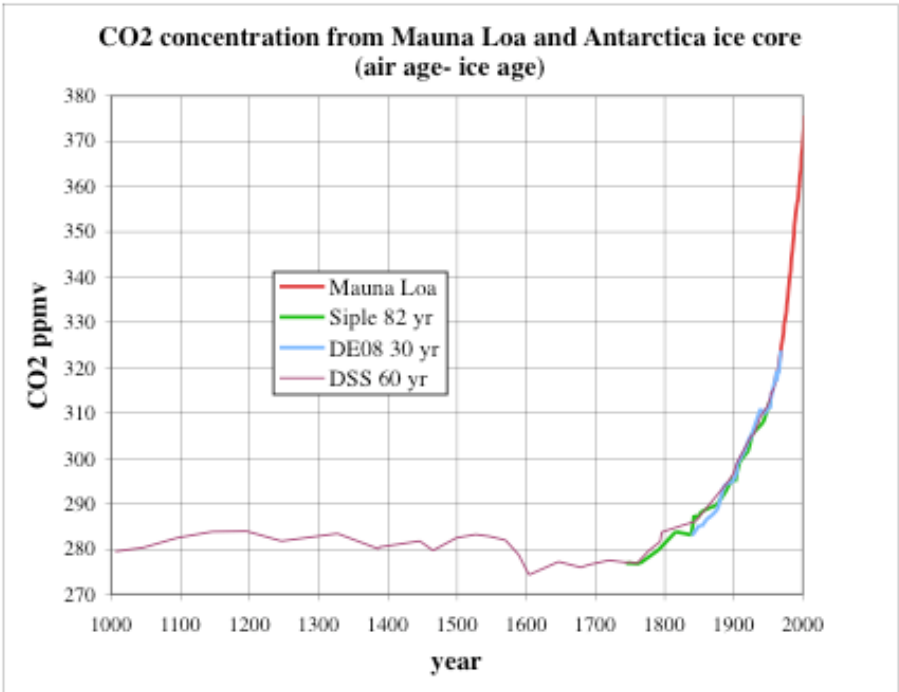


As the hockey stick for temperature, CO2 is almost flat before the industrial era. It is simple and the fit is perfect !

Paul Valery wrote « all that is simple is false and all that is not is useless. »

The CO2 data found on the web on official sites is easy to plot but the difference from air age and ice age varies.

Figure A12: CO2 from Antarctica ice core fitted with different ice-air lags



This plot displays a very good fit between different sources making the full plot very reliable but a careful readings of all articles reveal that the different sources are calibrated between them, and that all data not fitting the simple trend are eliminated as artefacts.
Recent articles and TV shows (UK CH4) is talking about fraud. And this claim is not new.

Jarowowski 1997 «Another global warming fraud exposed Ice core data show no carbon dioxide increase » 21st Century Science & Technology Spring p 42-52
Jarowowski was professor at the Central laboratory for radiological protection in Warsaw. He refers to « pathological science » (Langmuir) about strange selection of Callendar of CO2 measures of 19th and 20th century
Figure A13: CO2 data rejected to fit model from Jarowoski 1997

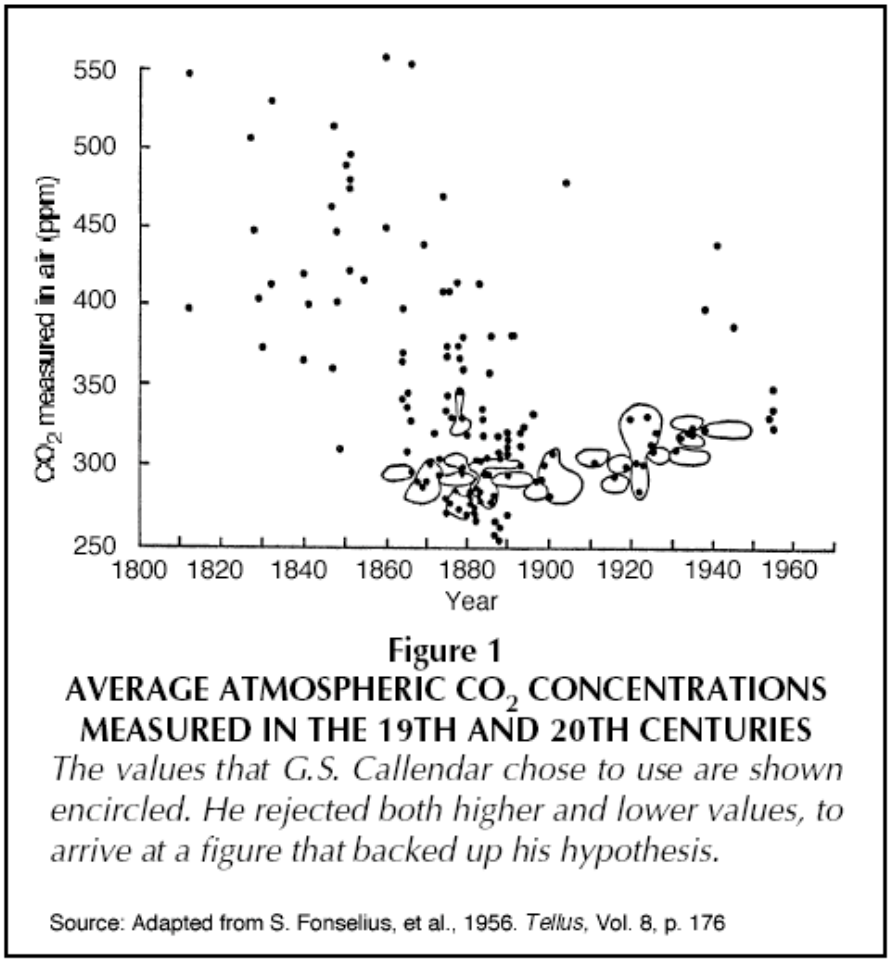
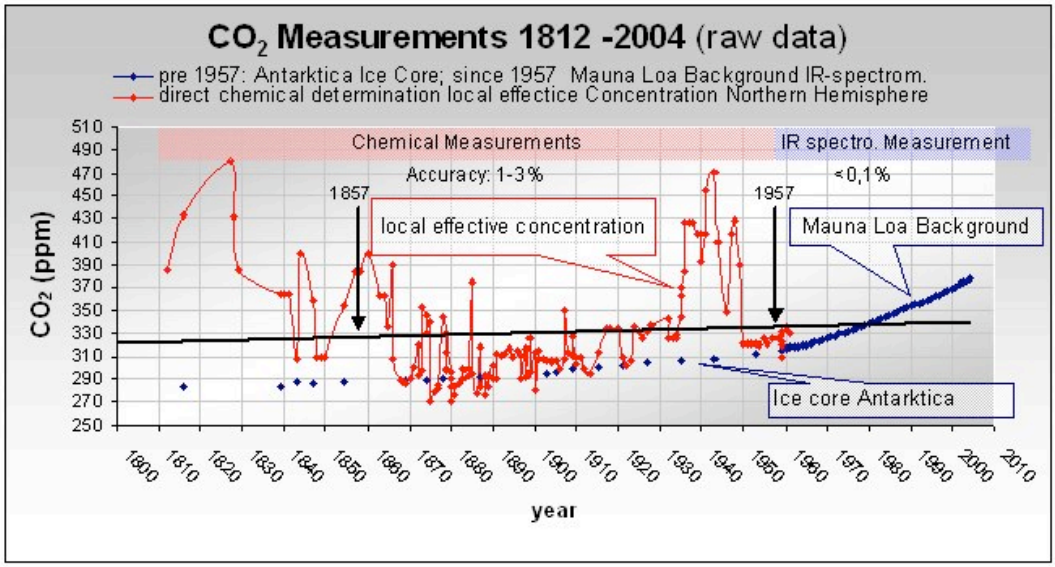


Figure 1
AVERAGE ATMOSPHERIC CO_2 CONCENTRATIONS MEASURED IN THE 19TH AND 20TH CENTURIES
The values that G.S. Callendar chose to use are shown encircled. He rejected both higher and lower values, to arrive at a figure that backed up his hypothesis.

Source: Adapted from S. Fonselius, et al., 1956. *Tellus*, Vol. 8, p. 176

These critics were ignored and I found them only recently because Jarowowski did a new article in 2007 as also Beck 2007 who publishes the old chemical measures (done by several Nobel prizes) compared to ice core data
«180 Years of atmospheric CO2 Gas Analysis by Chemical Methods The greatest scandal in modern history of science»
Ernst-Georg Beck Dipl. Biol.; ENERGY & ENVIRONMENT; VOLUME 18 No. 2, 2007
Figure A14: CO2 data 1812-20014 from Beck



CO2 measures have been carried out in birches and oaks (Stomatal frequency) in particular in Spain and in Denmark (Wagner et al 2002 « rapid atmospheric CO2 changes associated with the 8200 years BP cooling event »). Comparison with ice core data displays a difference over 60 ppm, but this range can be found in the same area if the measure is at night or at day, close to vegetation or not. CO2 concentration is not easy to measure exactly.
Figure A15: CO2 data 9000-6800 BP from ice core and fossils from Wagner

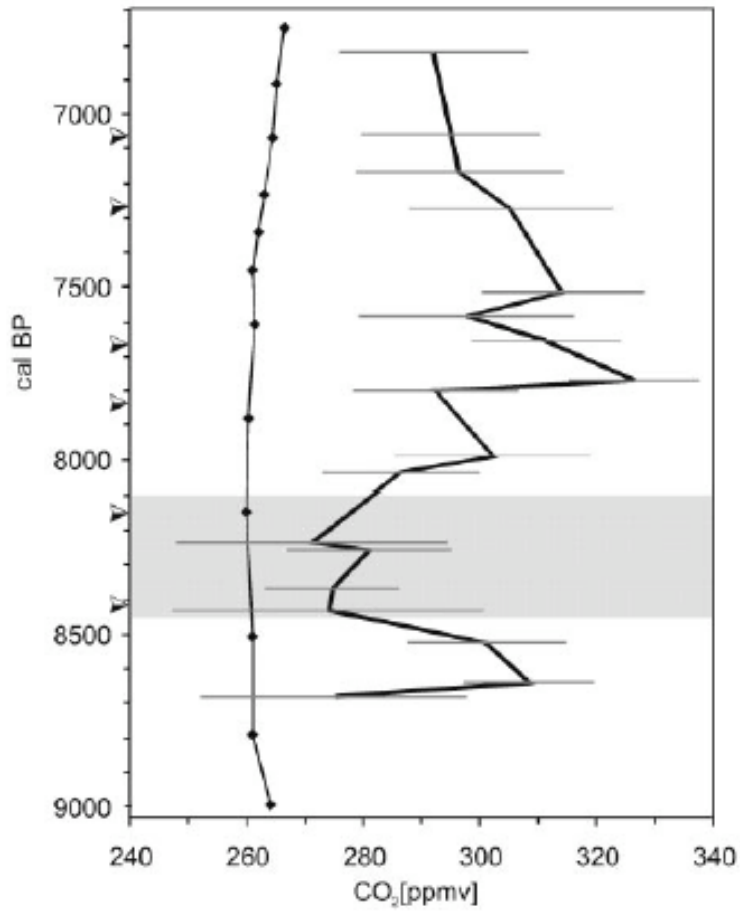
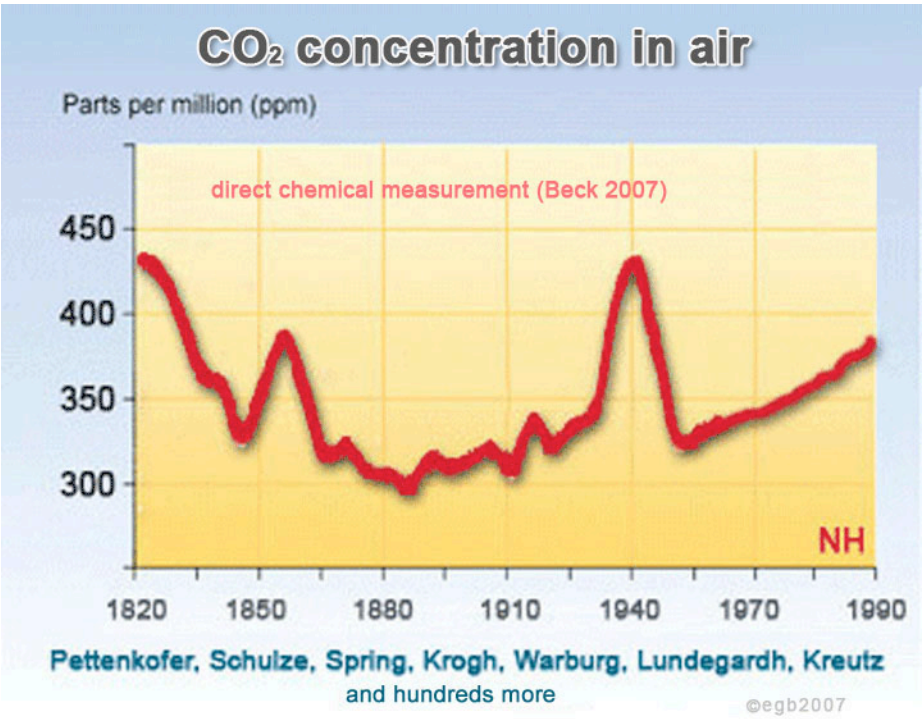


Fig. 2. Reconstructed CO_2 concentrations for the time interval between ≈8,700 and ≈6,800 calendar years B.P. based on CO_2 extracted from air in Antarctic ice of Taylor Dome (left curve; ref. 2; raw data available via www.ngdc.noaa.gov/paleo/taylor/taylor.html) and SI data for fossil *B. pendula* and *B. pubescens* from Lake Lille Gribsø, Denmark (right curve; see Table 1). The

Beck's synthesis is in complete disagreement with the official graph where CO2 started only to increase with industrial time.
Figure A16: CO2 in air from Beck 1820-1990



It is amazing to see so many different measures to be ignored to adopt ice data on two sites in Antarctica = Siple and Law Dome

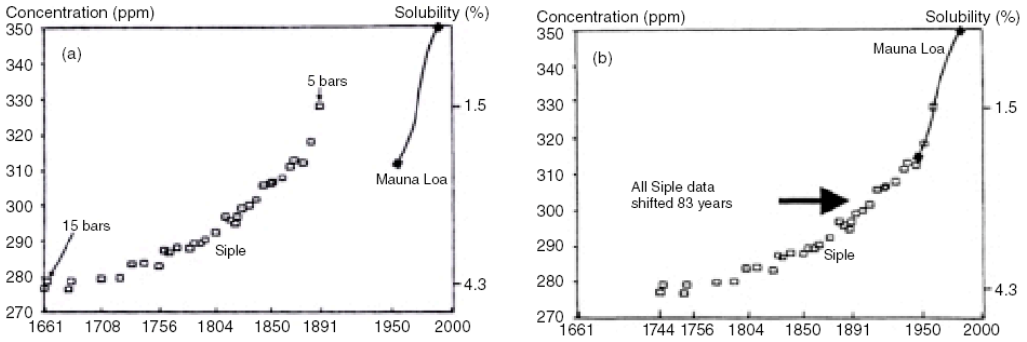
Jarowowski (2007 « CO2: The Greatest Scientific Scandal of Our Time, Arbitrary shift between age of air and age of ice » EIRScience March) gives the detail of the CO2 values from Siple Station ice core data for the 19th century.

The more recent CO2 measure was reported at 330 ppm in 1980 when in fact it should be reported 90 years before because it was assumed a lag of 90 years between ice date and air date.

Figure A17: CO2 concentration fitted between ice bubbles and direct measures with arbitrary (?) correction 1660-1986

FIGURE 2(a) and (b)

Mother of All CO_2 Hockey Curves



Source: Adapted from Friedli et al. 1986 and Neftel et al. 1985.

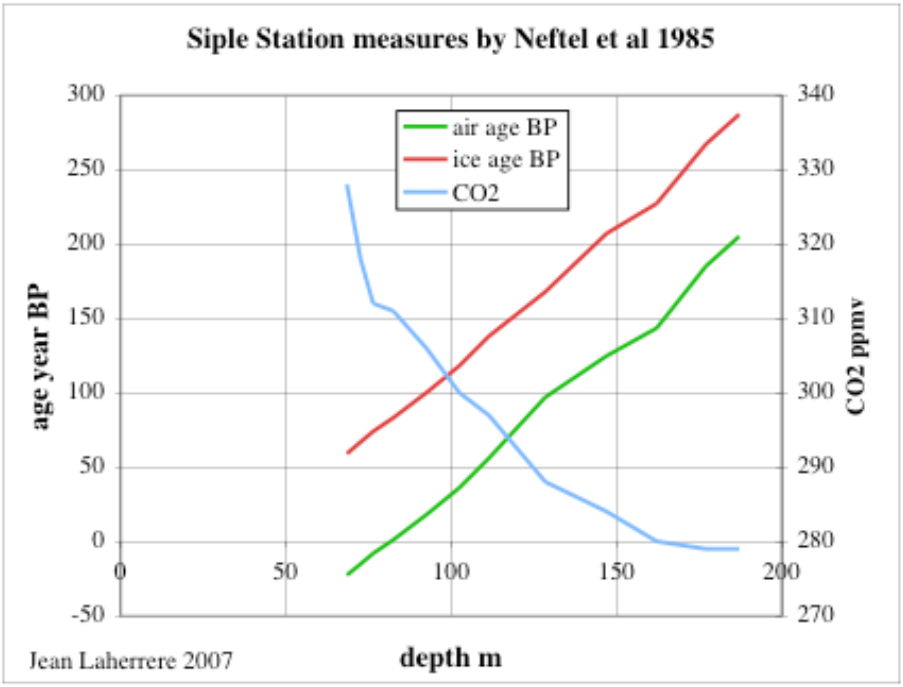
Concentration of CO_2 in air bubbles from the pre-industrial ice from Siple, Antarctica (open squares), and in the 1958-1986 atmosphere at Mauna Loa, Hawaii (solid line). In (a), the original Siple data are given without assuming an 83-year-younger age of air than the age of the enclosing ice. In (b), the same data are shown after an arbitrary correction of the age of air.

The data published by Neftel et al 1985 report, in front of the depth, the CO2 concentration and two sets of date : the first being ice core date and the second being gas date.

Depth (m)	Samples measured	Date of ice (yr AD)	Date air enclosed (yr AD)	CO2 concentration in extracted air (ppmv)

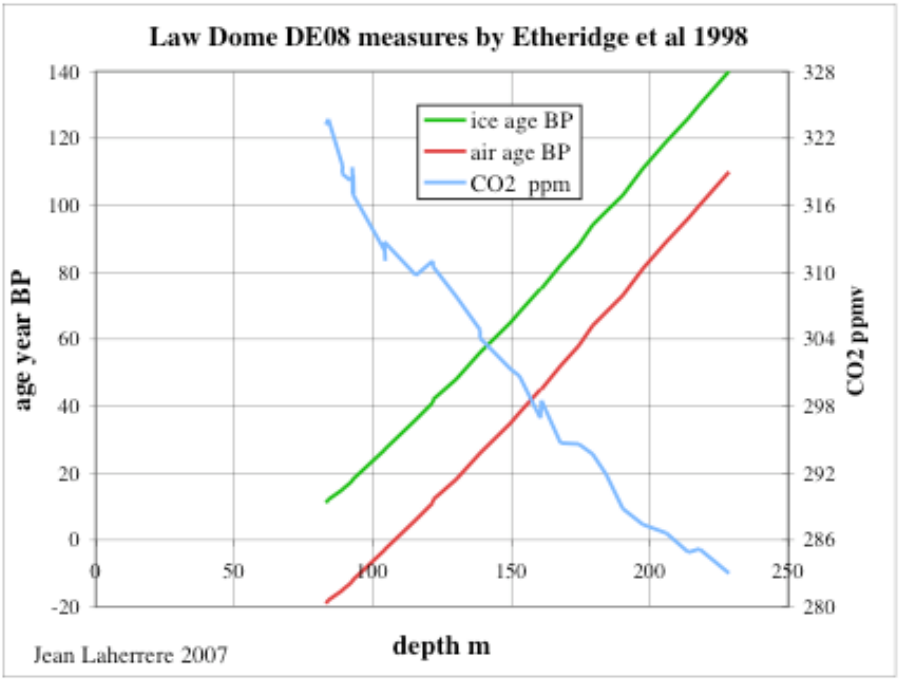
187.0-187.3	10	1663	1734-1756	279
177.0-177.3	10	1683	1754-1776	279
162.0-162.3	9	1723	1794-1819	280
147.0-147.2	10	1743	1814-1836	284
128.0-129.0	47	1782	1842-1864	288
111.0-112.0	26	1812	1883-1905	297
102.0-103.0	26	1832	1903-1925	300
92.0-93.0	25	1850	1921-1943	306
82.0-83.0	28	1867	1938-1960	311
76.2-76.6	11	1876	1947-1969	312
72.4-72.7	11	1883	1954-1976	318
68.2-68.6	8	1891	1962-1983	328

I plotted both and I was surprised to see that the lag between two sets was constant from 68 m to 187m when the lag was supposed to change (as it does with location).
Figure A18: age, CO2 plot versus depth from measures at Siple Station by Neftel et al 1985

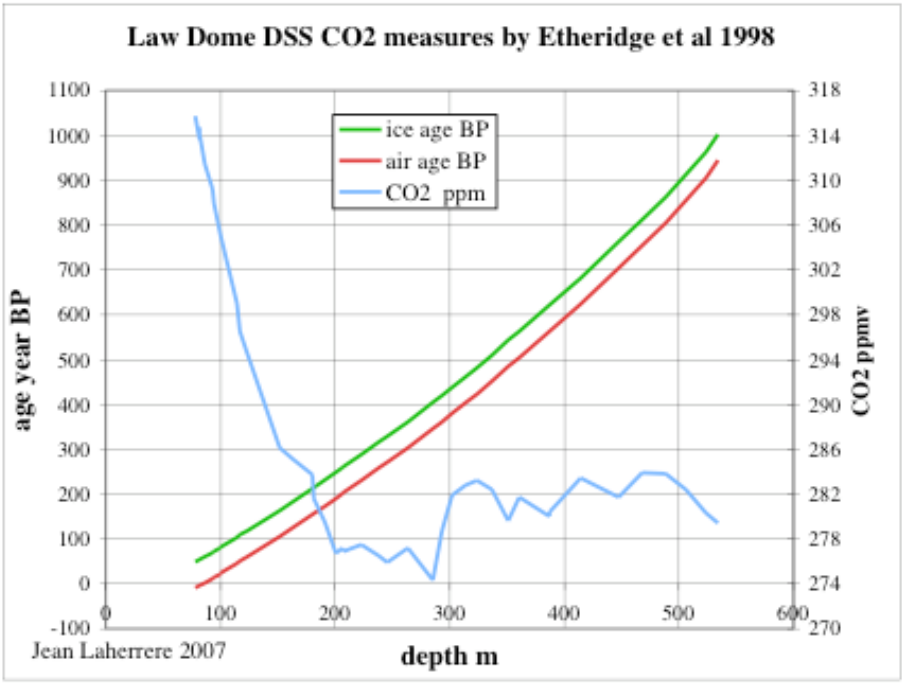


The following year 1986 Friedli et al reported at the same place another set of data very similar but with only one set of data being the air date

In 1998 Etheridge et al report also air age and ice age for Law Dome, using the same methodology for two sites DE08 and DSS :
Figure A19: age, CO2 plot versus depth from measures at Law Dome DE08 by Etheridge



For DSS covering a longer period the plot age versus depth is curved
Figure A20: age, CO2 plot versus depth from measures at Law Dome DSS by Etheridge



Kaspers et al 2004 »model of calculates of the age of firn air across the Antarctic continent » assumed that the upper part of the ice is permeable (called firn) and at a certain depth (20-150 m with an accuracy of better than 12 m) the pore (or bubble) closoff depth (PCOD), ice is impermeable and at this depth the air has the composition of the atmosphere at surface. He publishes PCOD maps for the entire Antarctica for depth and age.
Figure A21: Pore close off depth map from Kaspers

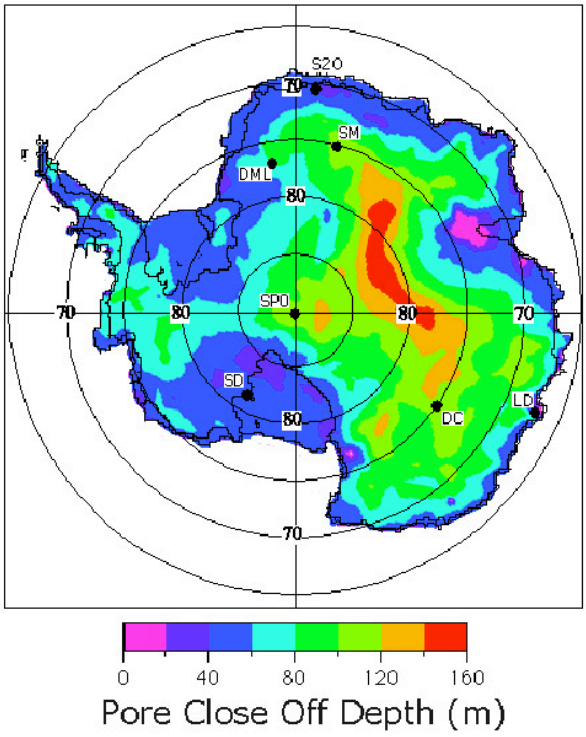


Fig. 6. Depth of the PCOD in m, calculated with the density-depth model of Herron and Langway (1980). The location with the deepest PCOD, being 150±15 m (2σ), is found for 72° E and 82° S.

The age at PCOD varies from 20 to 140 years
Figure A22: Pore close off age map from Kaspers

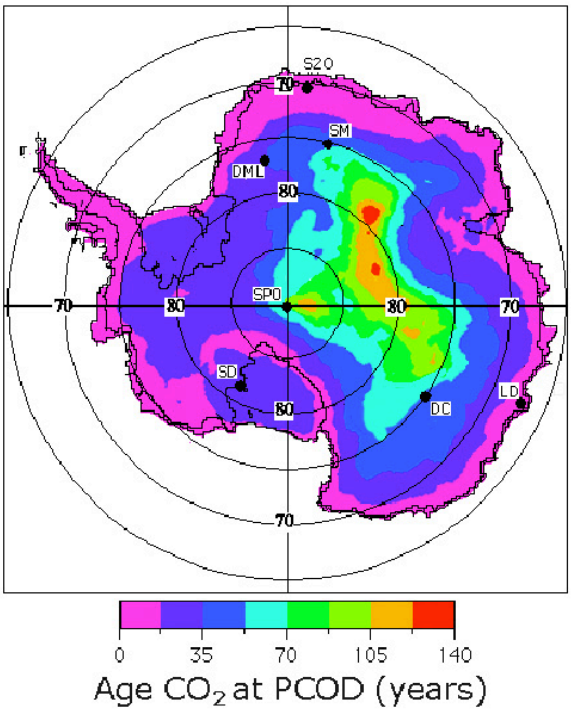


Fig. 9. The mean CO_2 age at PCOD in years for the entire Antarctic continent. The oldest CO_2 at PCOD, being 148±23 years (1σ), is predicted as located at 43° E and 78° S.

From 2004 Kaspers maps, PCOD for Dome C (DC) is 50 years and 100 m, but the 2004 measures (Jouzel et al) at Dome C are reported in meter and year before 1950 (BP)

Depth/top	Depth/bot.	Age/Top	Age/bot.

7	10	38	102
10	14	102	175
14	18	175	256
18	22	256	333
22	26	333	417
26	30	417	504
30	34	504	596
34	37	596	684
37	41	684	777
41	45	777	866
45	49	866	965
49	53	965	1065

Dome C does not show at 100 m an age of 50 years but at 50 m an age of 1000 years.
The bubble closeoff zone was reported (Bender 1997) at 8 m at Vostok in contradiction Kaspers 2004 map with 160 m with an accuracy of 12 m
It means that the results on ice age are contradictory between published papers, despite the efforts by teams to calibrate their results from other works to offer a homogeneous display.

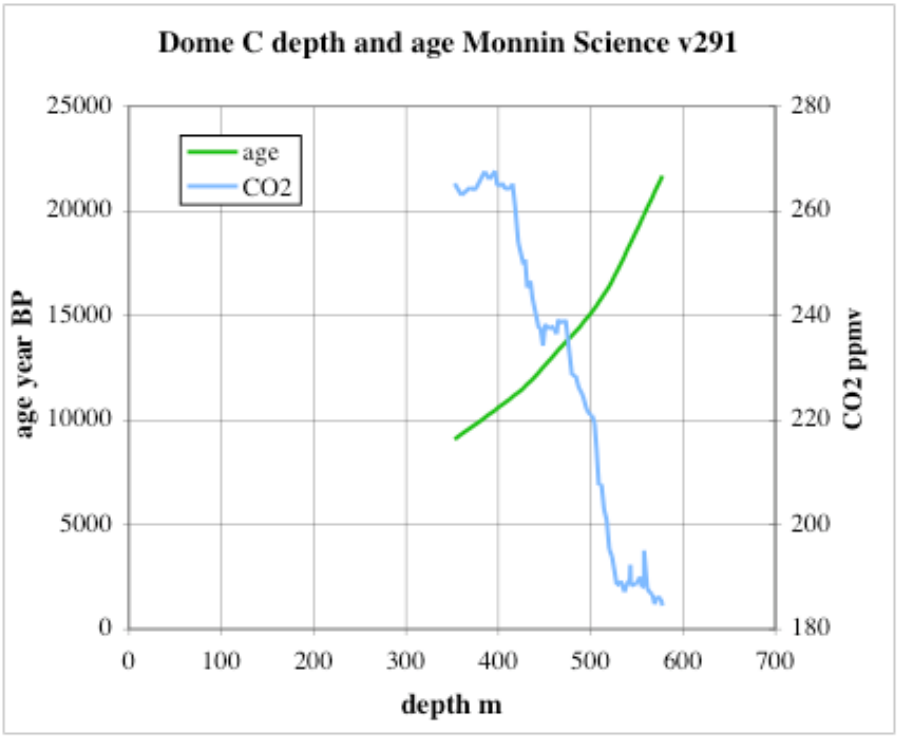
The assumption that the difference between air age and ice age is constant on one site in depth for over 1000 m depth but varies with sites or distance is contrary to the best rule of geology of outcrops being:
variation found horizontally has to be found vertically.

It is hard to believe that firn (uncompacted ice) over 100 m is permeable to present air atmosphere and content the present composition.
I find very few explanations on the web about the discrepancy between air age and ice age.
Gas bubbles disappear in ice about 1000 m being diffused into liquids or changed into hydrates.
Wikipedia : *There are great problems relating the dating of the included bubbles to the dating of the ice, since the bubbles only slowly "close off" after the ice has been deposited. Nonetheless, recent work has tended to show that during deglaciations CO2 increases lags temperature increases by 600 +/- 400 years.*
Dating the air with respect to the ice it is trapped in is problematic. The consolidation of snow to ice necessary to trap the air takes place at depth (the 'trapping depth') once the pressure of overlying snow is great enough. Since air can freely diffuse from the overlying atmosphere throughout the upper unconsolidated layer (the 'firn'), trapped air is younger than the ice surrounding it.
Trapping depth varies with climatic conditions, so the air-ice age difference could vary between 2500 and 6000 years (Barnola et al., 1991). However, air from the overlying atmosphere may not mix uniformly throughout the firn (Battle et al., 1986) as earlier assumed, meaning estimates of the air-ice age difference could be less than imagined. Either way, this age difference is a critical uncertainty in dating ice-core air samples. In addition, gas movement would be different for various gases; for example, larger molecules would be unable to move at a different depth than smaller molecules so the ages of gases at a certain depth may be different. Some gases also have characteristics which affect their inclusion, such as helium not being trapped because it is soluble in ice.
Dating is a difficult task. Five different dating methods have been used for Vostok cores, with differences such as 300 years at 100 m depth, 600yr at 200 m, 7000yr at 400 m, 5000yr at 800 m, 6000yr at 1600 m, and 5000yr at 1934 m.

Jarowowski 1997 claims that no study has yet demonstrated that the content of greenhouse gases in old ice, or even in the interstitial air from recent snow, represents the atmospheric composition.

But most of data measured from gases in bubbles from ice core provide only one set of time, which has to be assumed to be the air age, without giving the lag ice-bubble which is important to know

Figure A23: age, CO2 plot versus depth from measures at Dome C by Monnin



Vostok and Dome C data from CDIAC reports only one age for deuterium

Figure A24: age, delta Deuterium plot versus depth from measures at Vostok from CDIAC

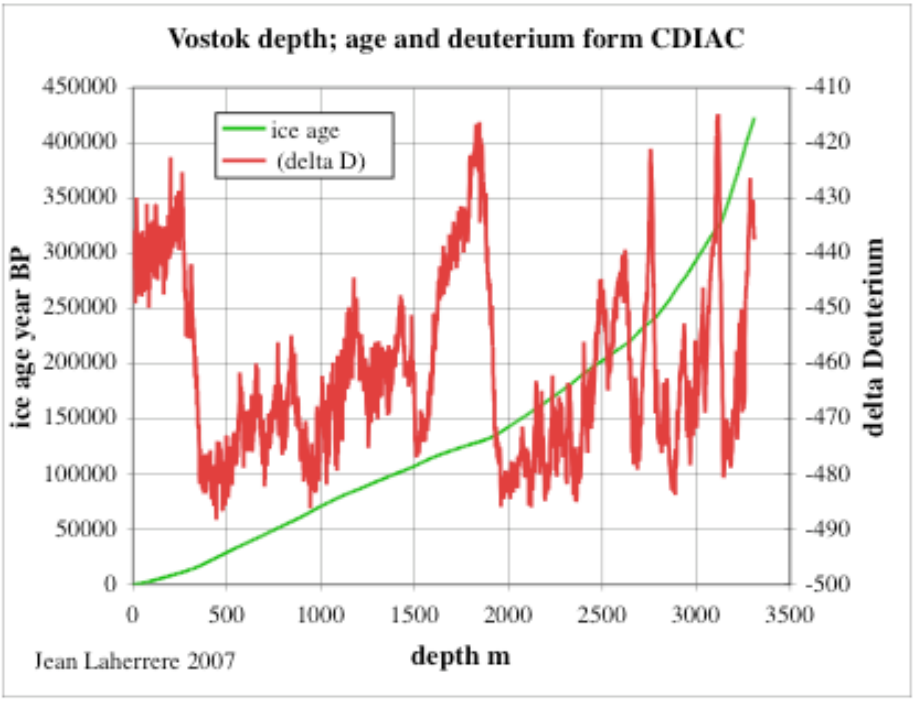
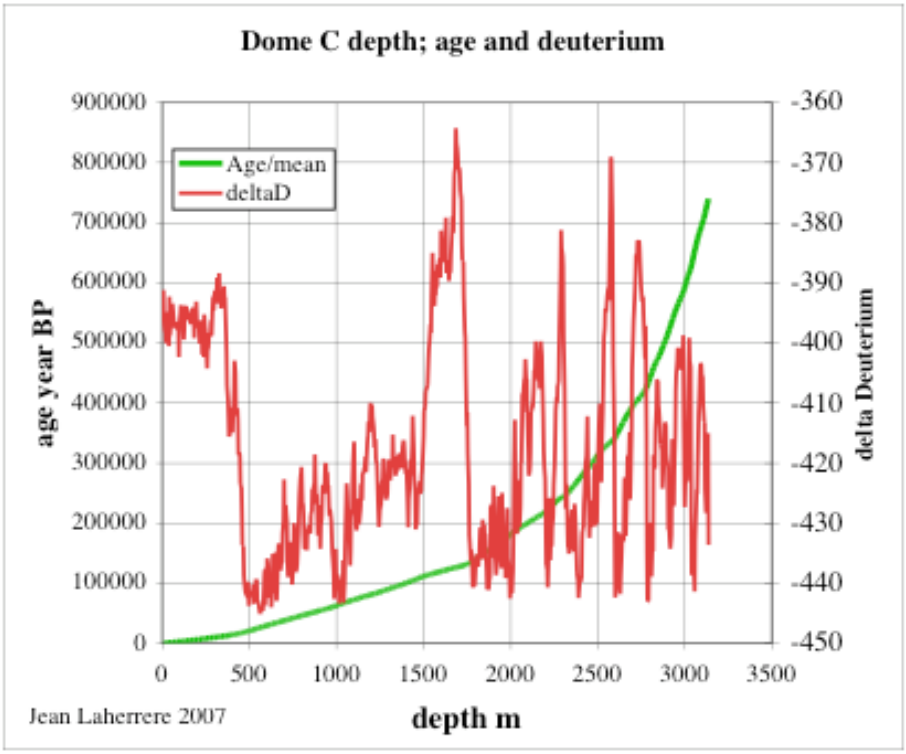
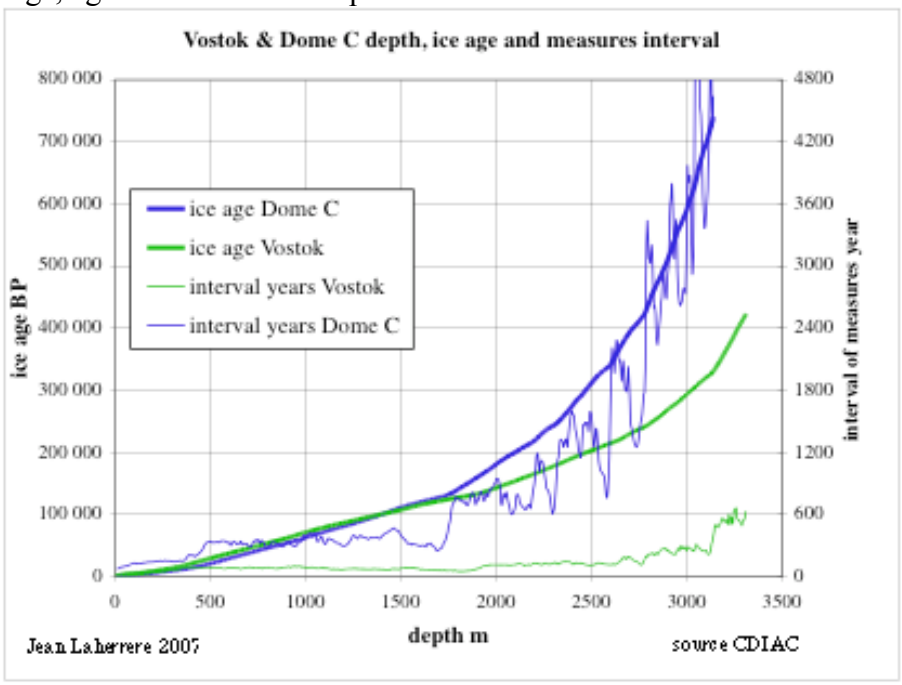


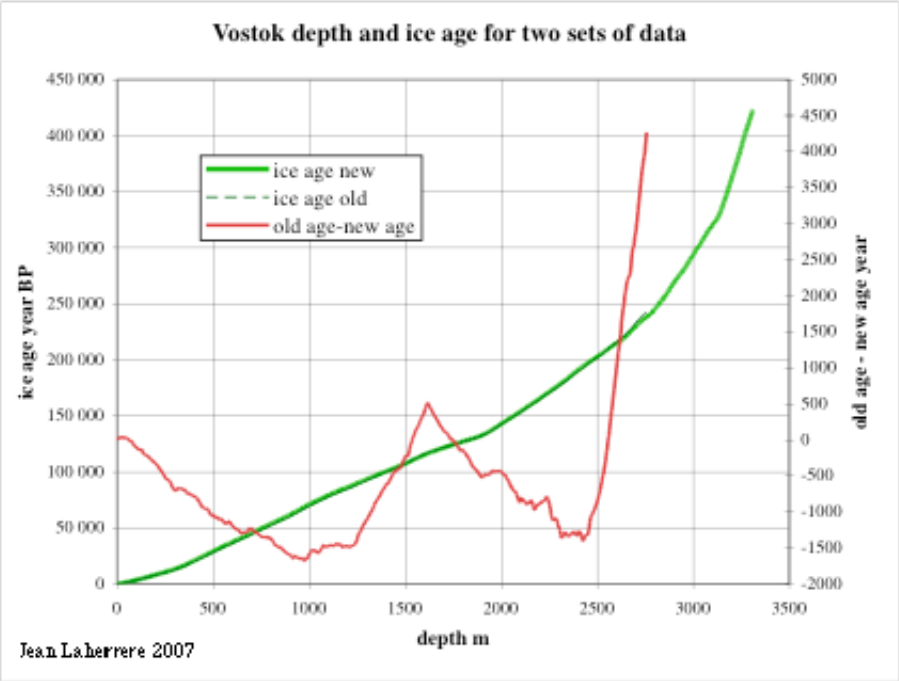
Figure A25: age, delta Deuterium plot versus depth from measures at Dome C from CDIAC



It seems that CO2 estimates from ice core lead to unreliable date for the first centuries, only measures for periods over a millennium can be trusted. As gas bubbles are few, a minimum of 50 cm is used to get enough air to be analyzed and such length corresponds in deep core at about or more one millennium.
It means that CO2 ice values are century or millennium values.
The interval between measures in Vostok and in Dome C increases with depth. It is over 1000 years for age over 200 000 years for Dome C.
Figure A26: age, age interval versus depth at Vostok and Dome C

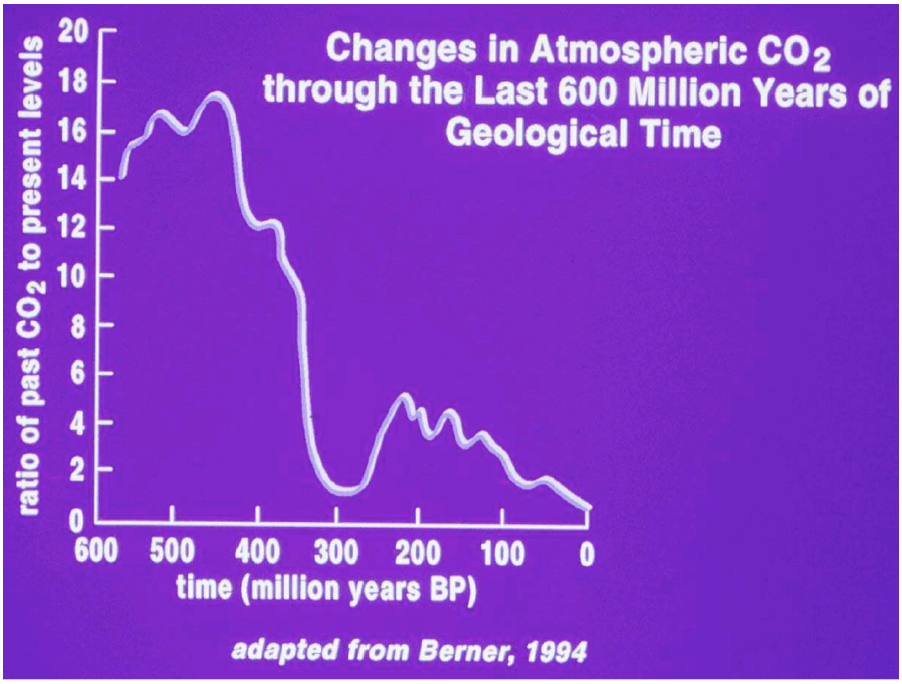


Previously reported Vostok data had age intervals over millennia but recent data has only intervals of 600 years at end. The difference of age for the new set of data compared to old set for the same data on delta Deuterium varies by several millennia, showing the unreliability of gases ages in ice core.
Figure A26: age, age interval versus depth at Vostok from 2 sets of data



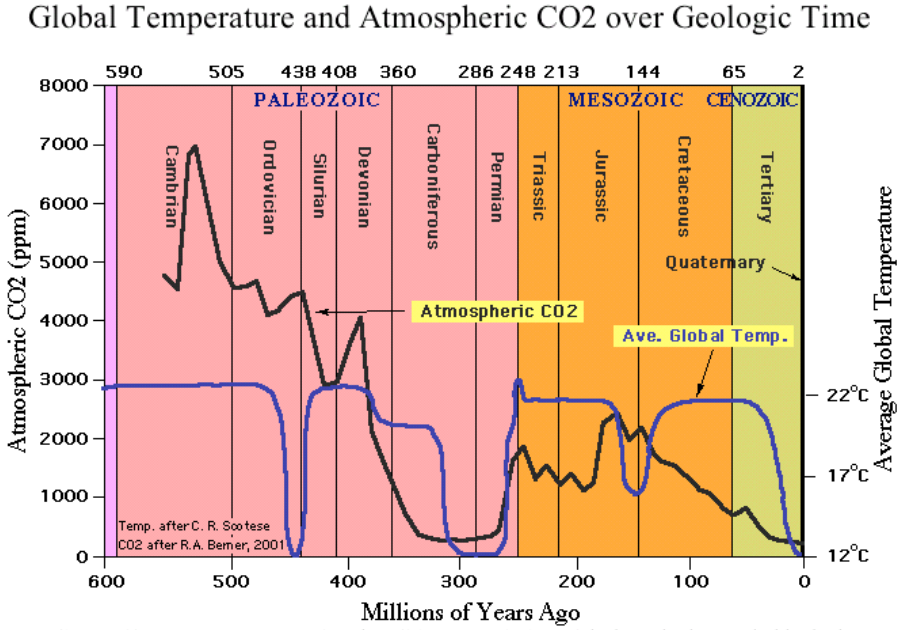
The dating of gases seems unreliable and furthermore the values average long periods.
It is wrong to compare present annual data to centennial or millennial average data over 300 000 years ago !

CO2 has been estimated for the entire geological times and it appears that the present concentration is quite small compared to the past (except for the end of Carboniferous time 300 Ma where glaciations occurred also). At Cambrian time 500 m Ma ago CO2 was 18 times higher and life was exploding ;
Figure A27: atmospheric CO2 through 600 Ma BP from Gerhard



Another older graph also by Gerhard displays a slightly different CO2 plot for the Mesozoic.

Figure A28: temperature and atmospheric CO2 through 600 Ma BP from Gerhard

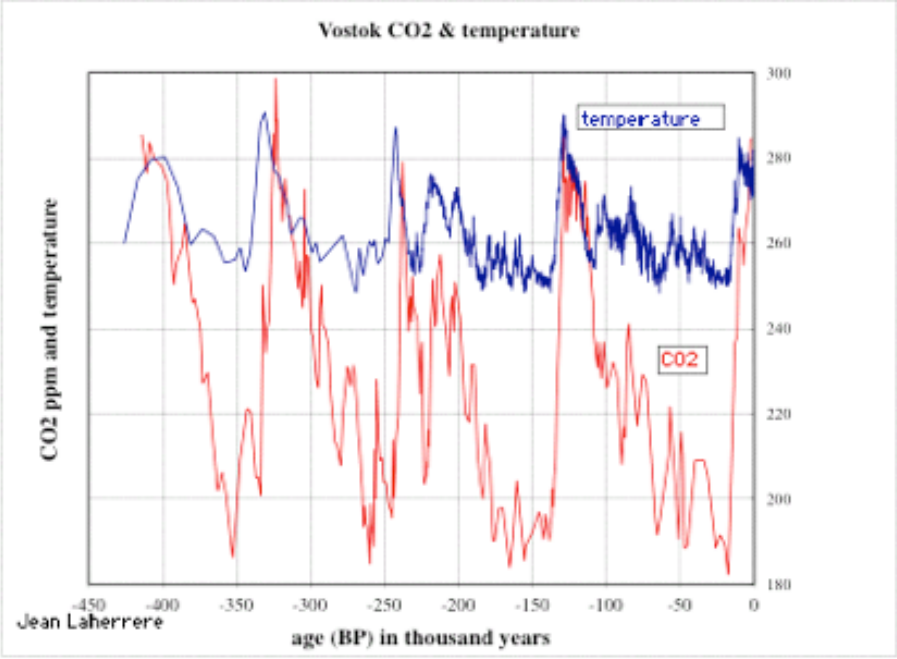


Late Carboniferous to **Early Permian** time (315 mya -- 270 mya) is the only time period in the last 600 million years when **both** atmospheric **CO2** and **temperatures** were as low as they are today **(Quaternary Period).**

CO2 and temperature

As CO2 is a greenhouse gas, it is obvious for many that a CO2 increase is the driver for temperature increase. But if past data from ice core displays a very good correlation between CO2 and temperature.

Figure A29: temperature and CO2 at Vostok 450 ka BP



But detail observation shows that temperature is the driver, when temperature increases CO2 increases with a lag of about1000 years :
Monnin 2001 800 ± 600 years on the period 9000-22000 years.
Caillon 2003 800 years at Dome Concordia
Figure A30: temperature and CO2 lag at Dome Concordia by Caillon

Fig. 4. Vostok records of $\delta^{40}Ar$ and CO_2 with respect to gas age (*1*). Atmospheric CO_2 concentration is a combination of new data and published data (*1*, *44*). The age scale for the CO_2 proxy has been shifted by a constant 800 years to obtain the best correlation of the two datasets.

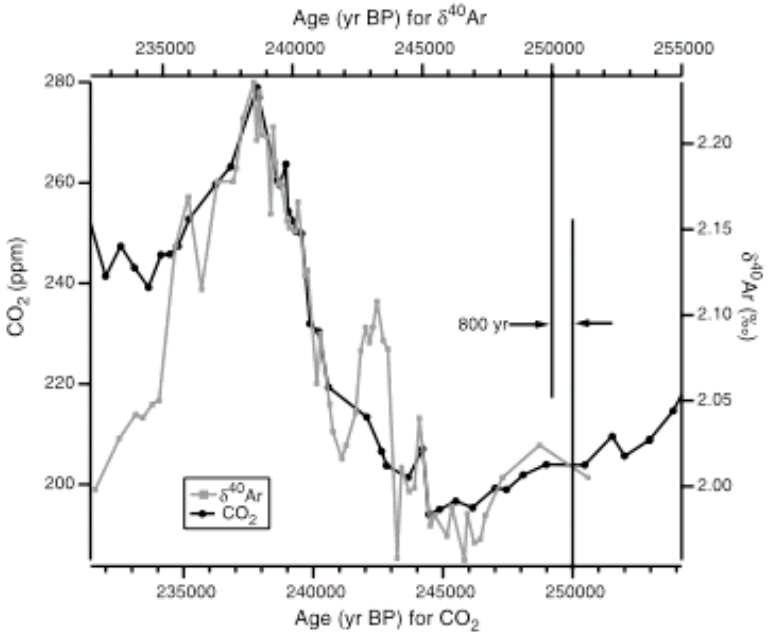
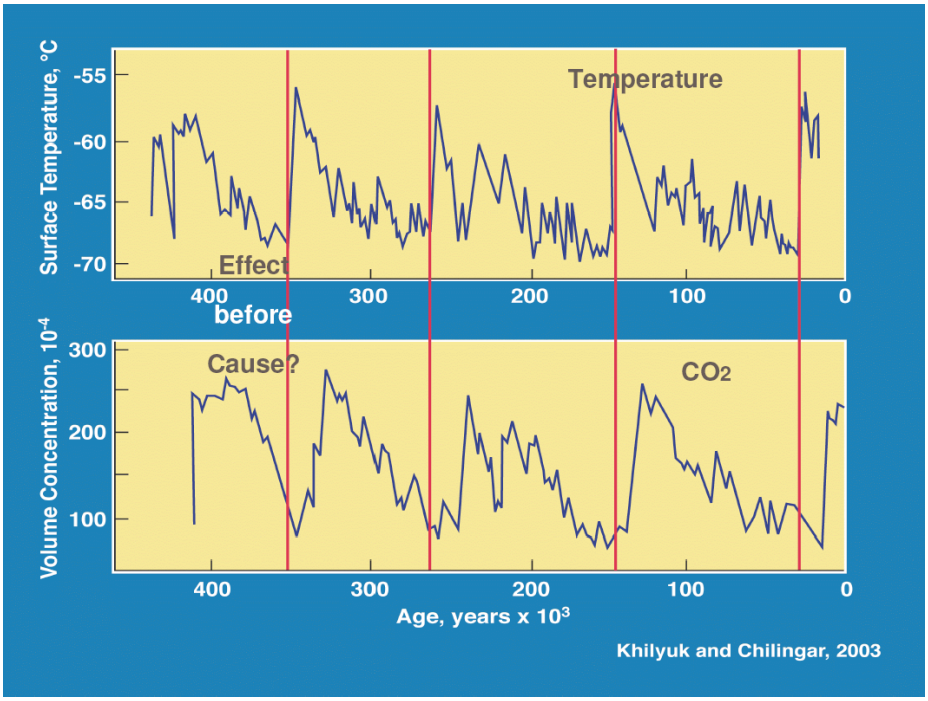


Figure A31: temperature and CO2 lag by Khilyuk & Chilingar 2003



When temperature of oceans increases the solubility of CO2 decreases sharply. Solubility of CO2 in sea water is 1,4 at O°C and only 0,6 at 30°C. It means that twice more CO2 can be dissolved in freezing water than in water at 30°C. Arctic seas are a sink for CO2 when equatorial seas are a source.
When sea water temperature increases, CO2 is released from the ocean and CO2 increases in atmosphere. The lag between temperature and CO2 of one millennium in the ice cores is connected to the cycle of the oceans which is about 1000 years (thermohaline circulation).

CO2 is useful being the main source of food for plants.
Idso, C.D. and Idso, K.E. 2000. « Forecasting world food supplies: The impact of the rising atmospheric CO2 concentration » Technology 7S: 33-55 found that the Industrial Revolution's flooding of the air with CO2 has resulted in mean yield increases of 70% for other C3 cereals, 28% for C4 cereals, 33% for fruits and melons, 62% for legumes, 67% for root and tuber crops, and 51% for vegetables.
CO2 is added in greenhouses in Holland to get better flowers and fruits
Post-carbon era promoted by some is an utopia: Nature needs CO2 which is the food of plants which are the food of animals, including humans.

CH4
Methane is 20 times more powerful as CO2 but its concentration is 1.75 ppm compared to 370 ppm for CO2. The direct measures of CH4 show a flattening, contrary to CO2. This flattening was interpreted first as being a diminution in the leaks of Russian gas pipelines, but recently as the result of deforestation because it was discovered that forest is a CH4 source.
Figure A32: global CH4 1981-2004

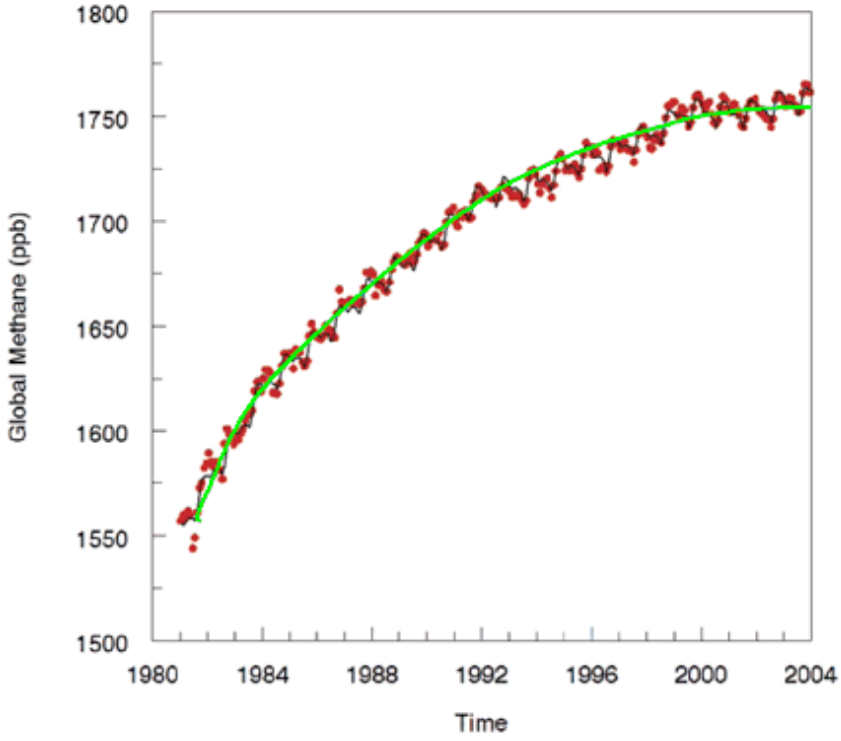
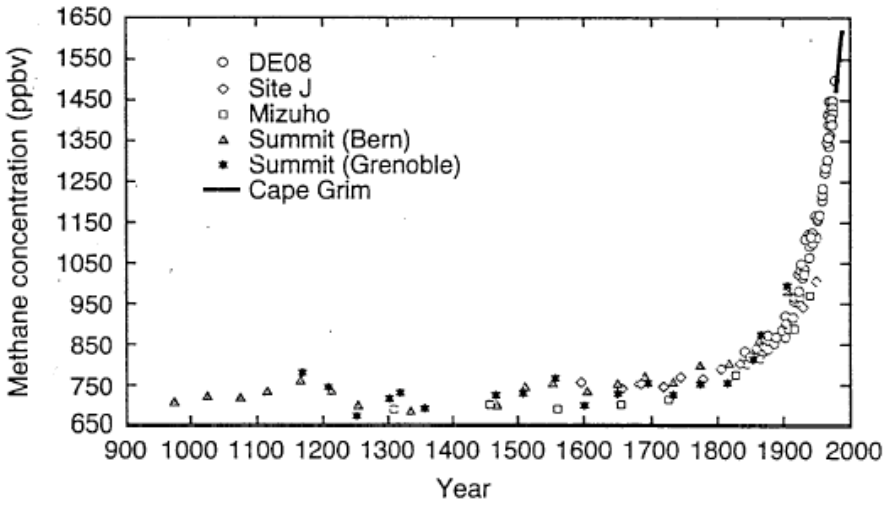


Figure 1. Global methane (CH_4) concentration. Adapted from Khalil et al. (2007).

The recent past fitted to recent again as CO2 : same method same results leading to a hockey stick

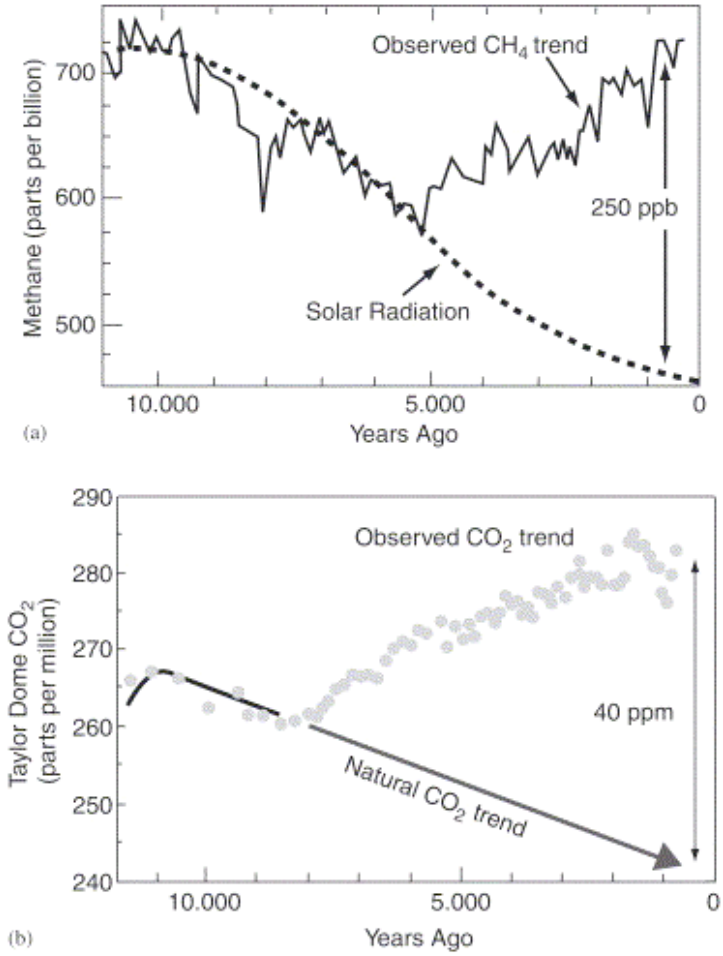
Figure A33: CH4 from ice bubbles fitted to direct measures Wuebbles 1997



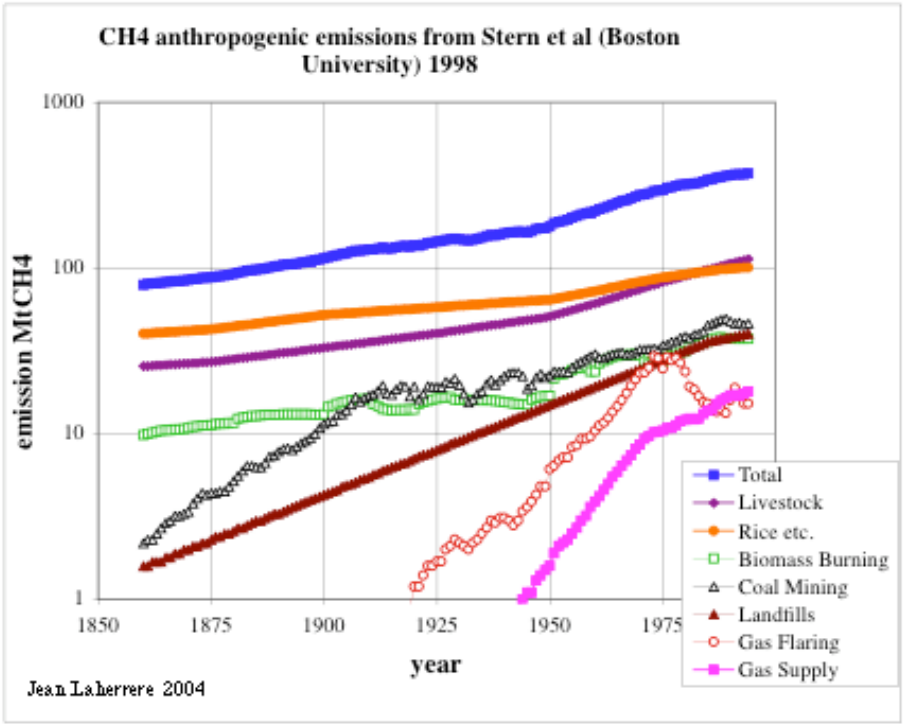
It is likely that CH4 values form ice cores have the same problem of dating as CO2

Rudimann (2005) believed that CH4 with rice plants 5000 years a go and CO2 with deforestation 8000 years ago has prevented an early new glaciation. But it is hard to estimate what is the natural trend.

Figure A34: Ruddiman hypothesis on anthropic CO2 et CH4 8000 & 5000 years ago



CH4 anthropogenic sources are numerous, the main one is the livestock and rice plants.
Figure A35: anthropogenic CH4 1860-1995

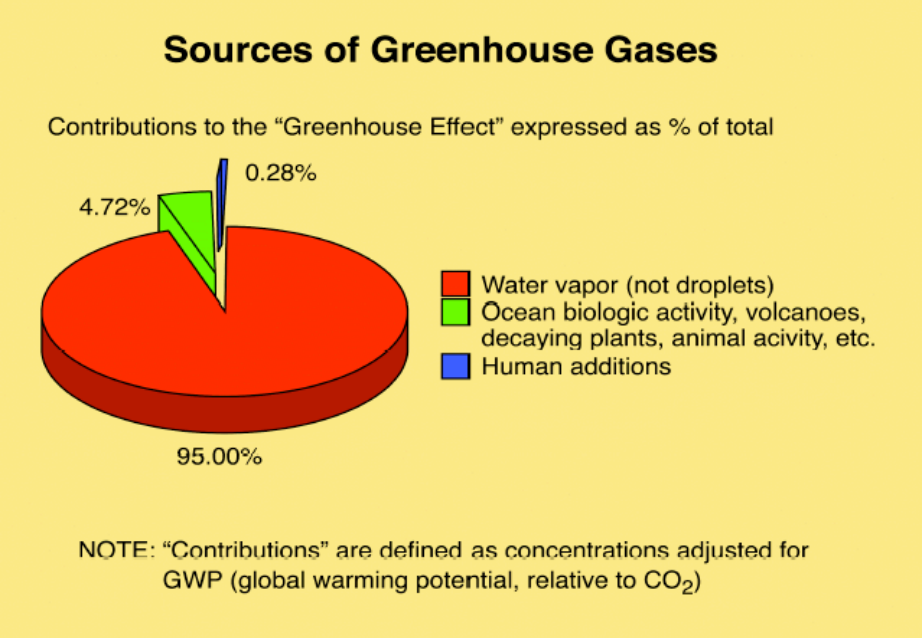


Many authors claim that oceanic hydrates are a danger by a sudden release of CH4 with global warming. Oceanic hydrates are dispersed and with very limited continuity = ranges in millimetre to centimetre vertically and in meter horizontally and claims of huge resources completely unrealistic (Soloviev 2004 « on gas methane mythology ». Furthermore they occurs by more than 500 m of water where temperature of water on seafloor corresponds to the heaviest gravity of water for 2 to 4 °C. Warming of oceans will not occur at such seafloors. Warming will release a lot of biomass of permafrost but it should be remembered that 20 000 years ago Paris was covered with permafrost and the disappearance of most of the permafrost was not a catastrophe for mankind.

Clouds

IPCC 2001 TAR wrote : probably the greatest uncertainty in future projections of climate arises from clouds and their interactions with radiations.

Figure A35: sources of greenhouse gases from Gerhard

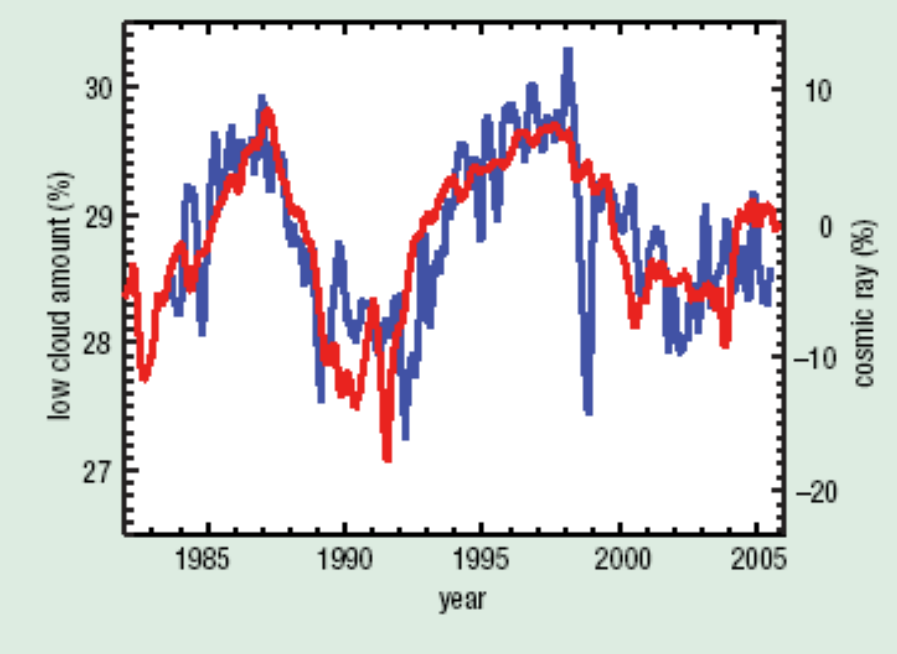


Clouds are very hard to model and to forecast. Low clouds cool when high clouds warm. Clouded days are cooler, but cloudy nights warmer.

Clouds and cosmic rays

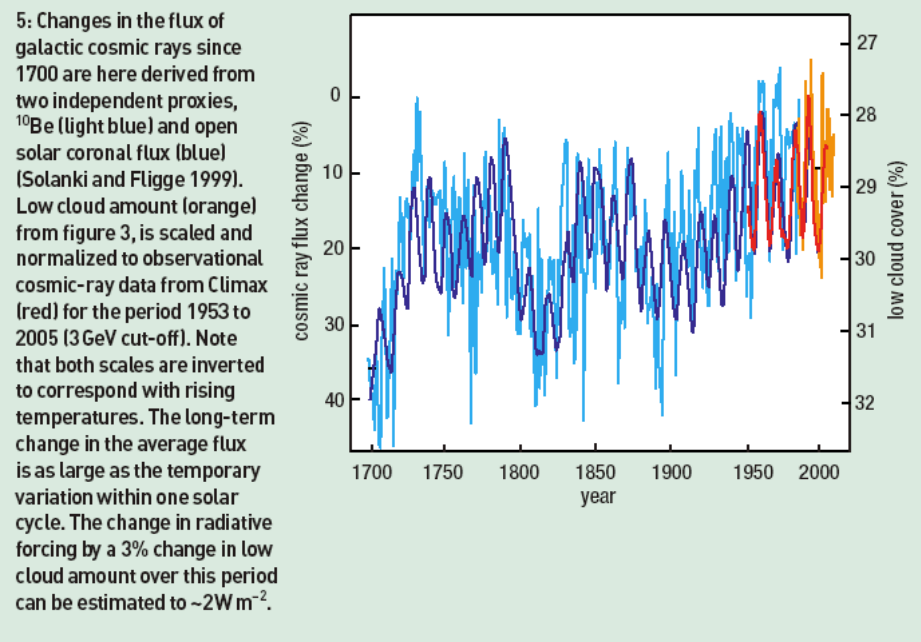
Svensmarck (director of the centre for sun-climate research Danish National Space centre) claimed in 1997 that cosmic rays has some impact on clouds and that cosmic rays have to be taken into account in climate change. His claim was rejected by IPCC 2001 and 2007. Recently he wrote new articles « Do electrons help to make the clouds ? » and with N.Calder 2007 « The chilling stars. A new theory of climate change » Icon Books introducing a new term = cosmoclimatology, galactic cosmic rays react on vapour increasing clouds, but still in dispute (only lower clouds seem to be affected). CLOUD experiment at CERN probably will test it in 2010.

Figure A36: low clouds amount and cosmic rays by Calder 2007



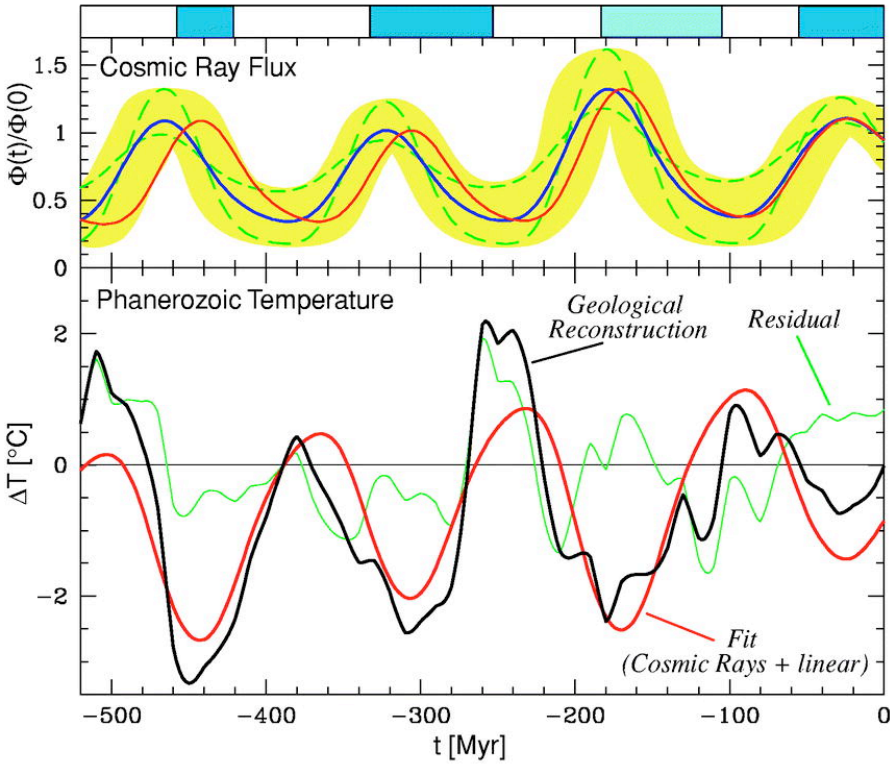
Flux of cosmic rays since 1700 displays an increase which can be connected to the end of the Little Ice Age

Figure A37: changes in galactic cosmic ray flux 1700-2000



N.J.Shaviv, J.Veizer 2003 « Celestial driver of Phanerozoic climate ? » GSA vol13, issue1 July figure 2 displays the cosmic ray flux (from iron meteorite) related to temperature change for the last 500 Ma with a cycle of about 200 Ma which corresponds to the Wilson cycle being the cycle of our galaxy.

Figure A38: cosmic ray flux 500 Ma BP



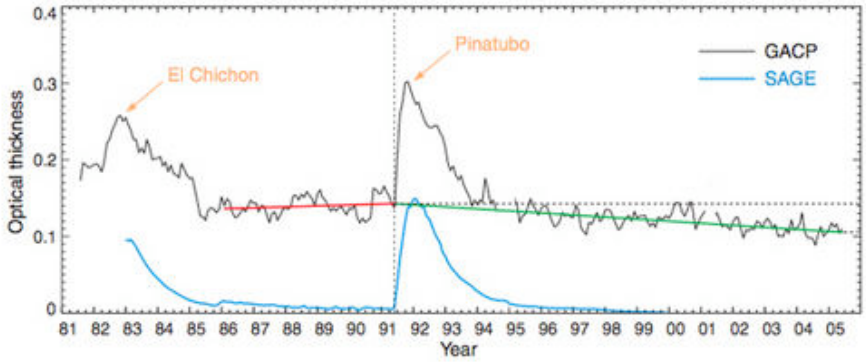
Aerosols

Aerosols is well known as a good cooler. IPCC denied aerosols in 1995, but explains the 1945-1975 cooling with aerosols.

Volcanic eruptions are used to explain most of the great extinctions with huge volumes of lava (Dekkan traps in India has a volume to cover France with 2000 m of lava.

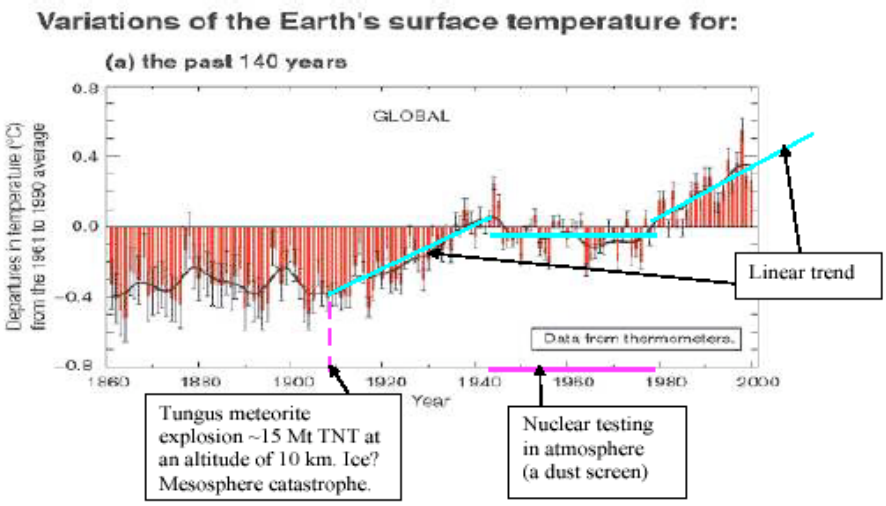
Recently there is a decrease in aerosols after El Chichon and Pinatubo (Mishchenko et al 2007), but when the next volcanic eruption ?

Figure A39: aerosols 1981-2005



V.Shaidurov 2006 « Atmospheric hypotheses' of Earth's global warming » arXiv :physics/0510042 v2 6 march claims that cosmic scale events as 1908 Tungus meteorite explosion at 10 km altitude changing protective properties of the Earth's atmosphere leading to warming and 1945-1980 nuclear tests in atmosphere leading to cooling by dust screen.

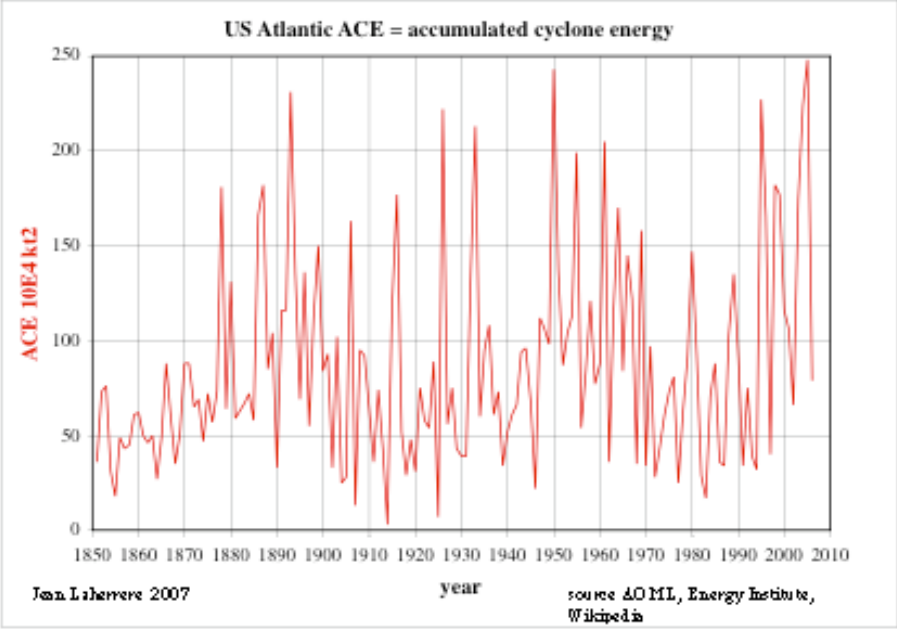
Figure A40: variations of temperature with Tungus meteorite and nuclear tests 1880-2000



Cyclones

Many believe that Katrina hurricane is due to global warming. But it is easy to measure cyclone activity (maximum air speed and time). It has been done since 1851 and the plot is obvious : ACE=accumulate »d cyclone energy is cyclic (60 years ?) and differs from temperature variations (1950-1970 high)

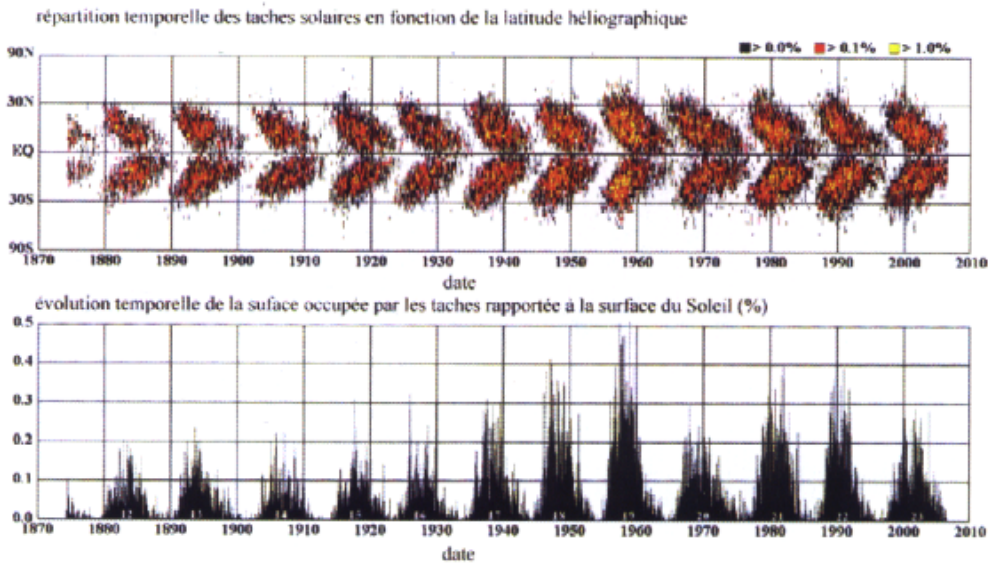
Figure A41: US Atlantic accumulated cyclone energy ACE 1850-2006



Solar Activity

It is known since a long time that the Little Ice Age was due to the Maunder minimum, it means the lack of dark spots in the sun. Solar activity (Kikien Decouverte Mars 2007) displays in addition to the 11 years cycle a strong increase of the peaks of areas occupied by the dark spots on the surface of the sun from 1880 to 1960, a sharp decrease in the 70s and up again

Figure A42: solar dark spots distribution and area 1880-2006

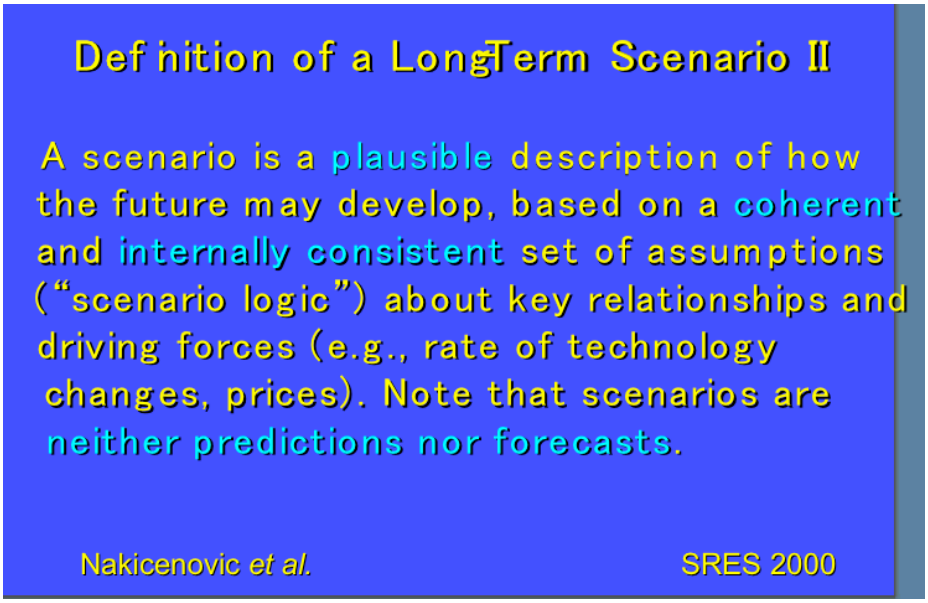


Who can foresees what will go next and what the impact on earth temperature as it did few centuries ago?

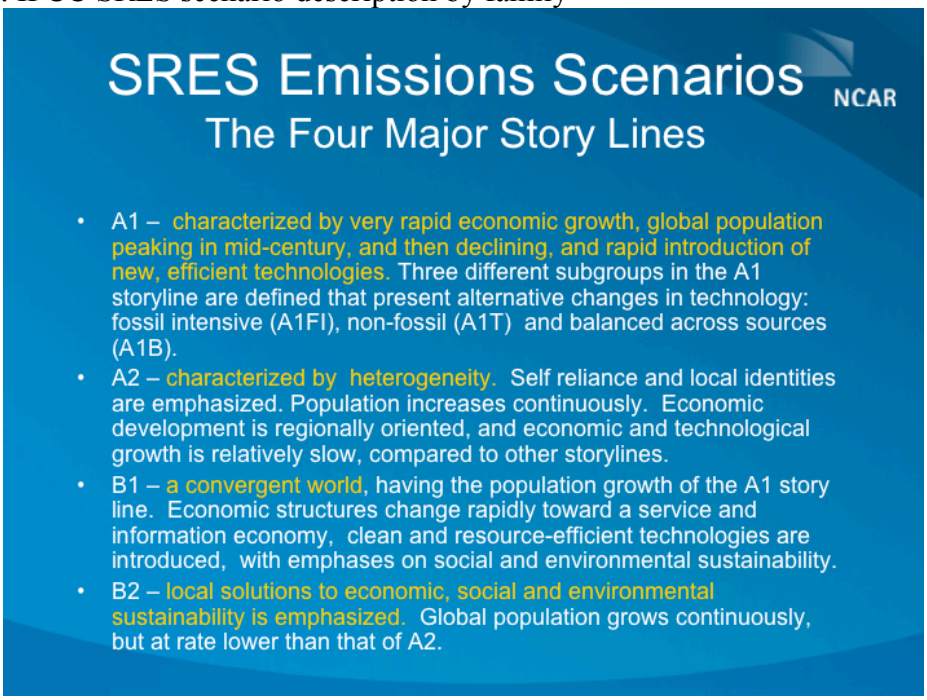
Irregular events : El Nino and others
No one knows how to forecast such events.

Cycles
Nature is cycles
-earth 1 day, 1 year
-sun activity: 11 yr, 22 yr, 90 yr (Gleissberg), 200 yr (Suess)
-oceans 1000-1500 yr
-solar geometry 10 000 yr, 20 000 yr, 100 000 yr
-galaxy 200 M yr

IPCC
The Intergovernmental Panel on Climate Change IPCC has given, in 2001 (TAR) and 2007 (4AR) reports, forecasts based on 40 scenarios called SRES (Special Report on Emissions Scenarios) designed by Dr Nakicenovic in IIASA (International Institute of Applied System Analysis) in Vienna. He insists that **scenarios are neither predictions or forecasts.**
Figure A43: IIASA SRES scenario definition by his author



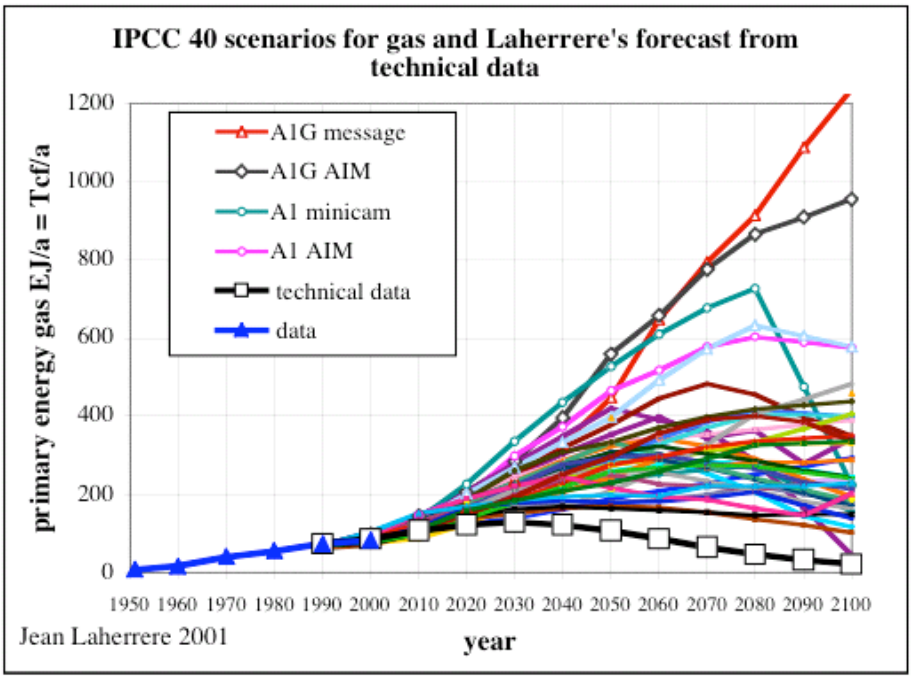
SRES were not forecasts at the start, but passing through climate models with the help of 2500 scientists the results are presented by the medias as forecasts !
For many what is coming from a computer is Gospel !
SRES scenarios are brainstorming on 4 different families describing the social and economic situations
-A1 =rapid economic growth
-A2 = heterogeneity
-B1 convergent world
-B2 local solutions
Figure A44: IPCC SRES scenario description by family



House of Lords - Economic Affairs - Written Evidence
The scenarios are presented as an exercise in "free thinking" about the future. The SRES states that they are "images of the future or alternative futures" ...

www.publications.parliament.uk/pa/ld200506/ldselect/ldeconaf/12/12we13.htm

I presented at IIASA 2001 International Energy Workshop June 19-21 Laxenburg
Laherrère J.H. "Estimates of Oil Reserves "
http://www.iiasa.ac.at/Research/ECS/IEW2001/pdffiles/Papers/Laherrere-long.pdf
several graphs showing the at the energy scenarios were unrealistic, in particular for natural gas
Figure A45: IPCC 40 scenarios for gas consumption and my forecast presented at IIASA 2001



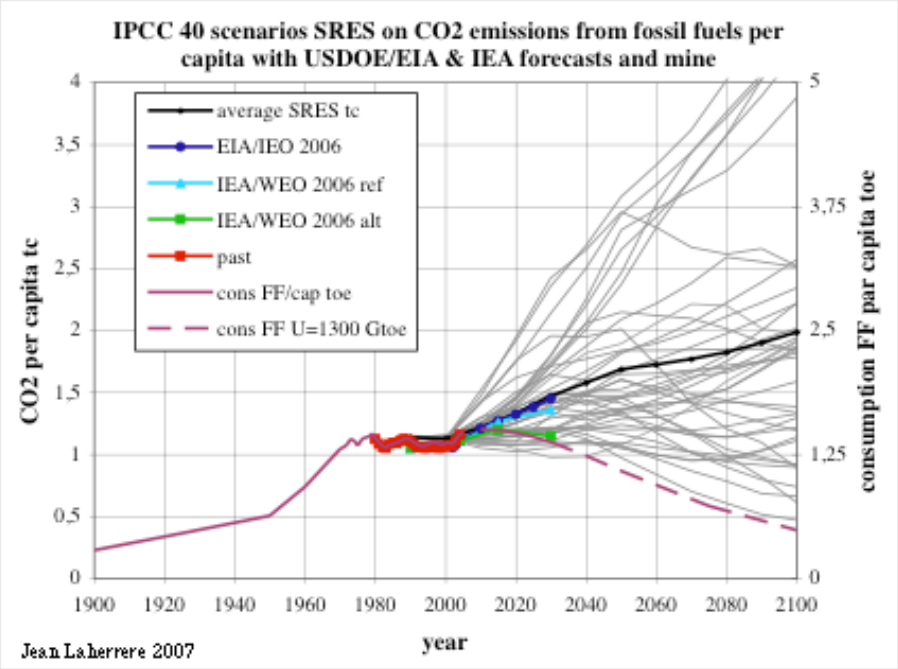
Despite that these 1998 energy scenarios were criticized as unrealistic they were used again for the 2007 IPCC report (4AR)
My critics on SRES were ignored as demonstrated by the small number of sites quoting my comments on SRES, despite a large number of quotes (300 times more) for my statements on IPCC.
Google 27 march 2007

Laherrere +oil	93000
Laherrere +IPCC	35800
Laherrere +SRES	124

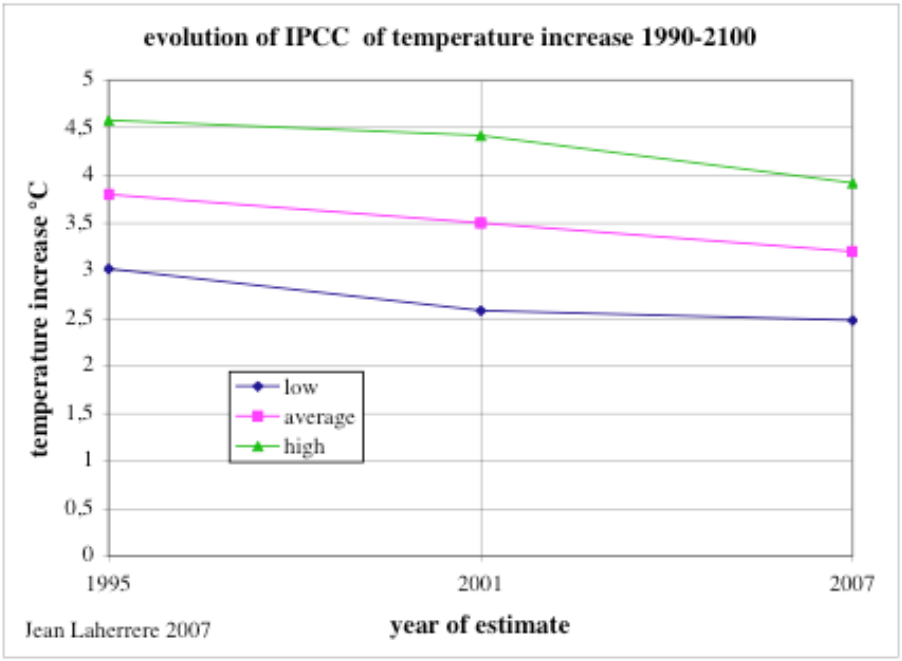
In a 2006 paper in Beijing Laherrère J.H. «Fossil fuels: what future? » Global Dialogue on Energy Security, The Dialogue International Policy Institute, China Institute of International Studies, 16-17 October www.oilcrisis.com/laherrere stated that the 2007 report will confirm the 2001 report because using the same hypotheses and I wrote :
The result of a model depends upon the quality of the model but also of the hypotheses. As said the Americans GIGO and it can be modified for the 2007 IPCC report as SGISGO: ***same Garbage In, same Garbage Out.***
Criticisms are mainly ignored. In a presentation at IIASA in 2001 I criticized the SRES scenarios designed by IIASA as unrealistic and my paper is on IISA site.

When in 2006 I argued on SRES with the expert Jean Jouzel in EGU in Vienna, he told me , *we have to wait for the next report in 2012.*

The SRES scenarios gives the fossil fuels emissions per capita and these scenarios are compared with the past, with EIA/IEO 2006 and IEA WEO 2006 forecasts.
The EAI is in agreement with the average of SRES.
The IEA reference which is declared by his Director Claude Mandil **unsecured, unattainable, unsustainable, and unrealistic** is below the SRES average and IEA wished alternative forecast is close to my forecast
Figure A46: IPCC 40 scenarios on CO2 emissions per capita with USDOE & IEA forecasts and mine



Fossil fuels emissions per capita have been almost constant for the last 25 years and will stay constant for the next 20 years before declining because of the coming peaks of oil, gas and coal.
It is interesting to notice that the evolution of the last 3 IPCC forecasts is slightly decreasing despite using the same hypotheses.
Figure A47: IPCC evolution on temperature increase 1990-2100



The main argument of anthropic global warming is the number of scientists who are involved with IPCC, but University students and professors need funds and it is easier to get some when studying a subject involving human activity than natural activity
There are many scientists who argued about IPCC results and on the so-called consensus on global warming.
Wikipedia provides the list of scientists who argue
-the cause of global warming is unknown
-global warming is mostly due to natural processes
-climate forecasting isn't as accurate as IPCC ranges imply
-global warming is good for human society
http://en.wikipedia.org/wiki/List_of_scientists_opposing_global_warming_consensus

I have many doubts on what I read on climate change but I have no expertise on the subject. The problem is that it is almost impossible to get an answer from experts when asking explanations on graphs or statements by others which do not agree with them. The answer is immediately an attack on the persons and not on the data. It is what I got from 3 experts. Serenity does not rule on climate change.

I shall be pleased to receive data showing that I am wrong in some of my interpretation shown above, but I do not need to receive only statements or opinions.