Some thoughts prior to COP21

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IPCC's AIMS & PROGRESS

"The aims of the IPCC are to assess scientific information relevant to: (1) Human-induced climate change (2) The impacts of human-induced climate change (3) Options for adaptation and mitigation."

The corollary would appear to be that IPCC does not aim to assess the scientific information relevant to climate change resulting from mechanisms other than those identified with anthropogenic (human) activity.

EXTRACTS FROM IPCC ASSESSMENT REPORTS

AR1: Computer model predictions of the increase in mean surface temperature over the last hundred years due to the anthropogenic enhanced greenhouse effect is of the same magnitude as natural climate variability.

(First published in 1990 and updated in 1992)

EXTRACTS FROM IPCC ASSESSMENT REPORTS

SAR: The balance of evidence suggests a discernible anthropogenic influence on climate.

(Published 1996)

TAR: Since the mid-20th century, most of the observed warming is "likely" (greater than 66% probability, based on expert judgement) due to anthropogenic factors.

(Published 2001)

EXTRACTS FROM IPCC ASSESSMENT REPORTS

AR4: Most of the global average warming over the past 50 years is "very likely" (greater than 90% probability, based on expert judgement) due to human activities. (Published 2007)

AR5: Anthropogenic influence on the climate system is clear. It is extremely likely (95-100% probability) that anthropogenic influence was the dominant cause of global warming between1951-2010. (Published 2014)

THE CLEAR IPCC MESSAGE

So, over the last 25 years the assessment of IPCC has gone from:

there could be an anthropogenic effect on climate

to:

it is almost all our fault that the climate is changing

One could easily conclude (wrongly)that great strides have been made in the understanding of climate mechanisms and that even if the science is not completely settled, it's more or less all over bar the shouting.

WHAT ABOUT THE AGW HYPOTHESES

Six hypotheses now form the overall AGW notion:

1. The increase in carbon dioxide (CO_2) over the last 200 years has been caused by the burning of fossil fuels
2. Effectively all anthropogenic CO_2 emissions since the beginning of the industrial revolution remain in the atmosphere
3. As a greenhouse gas CO_2 absorbs upwelling infra-red radiation from the Earth and re-emits in all direction effectively causing warming,
4. The increase in heat evaporates more of the primary greenhouse gas, water vapour thus multiplying the effect of CO_2 increase by a factor of about 3
5. Further atmospheric heating will release methane from permafrost – a tipping point at which it is postulated run-away global warming will occur
6. The amount of carbon dioxide in the atmosphere is and always has been the main climate driver

(1) The increase in carbon dioxide (CO_2) over the last 200 years has been caused by the burning of fossil fuels

Prof. Murry Salby's as yet unpublished work suggests that most of the increase in atmospheric carbon dioxide is natural. He puts a limit of circa 30% of the increase on anthropogenic emissions. In the case that natural emissions are in control the application of Henry's Law suggests that Murry Salby's 30% figure is an over-estimate.

(2) Effectively all anthropogenic CO_2 emissions since the beginning of the industrial revolution remain in the atmosphere

This hypothesis is a more extreme version of the hypothesis that all the increase of atmospheric CO_2 is anthropogenic in origin. It uses two assumptions. Firstly, that pre-industrial levels of CO_2 were more or less constant around 280ppm and that this level represents a "correct" amount of CO_2 in the atmosphere.

This is not a wholly credible hypothesis for a number of reasons:

(i) The assumption of constancy of past CO_2 levels comes from ice core data. This has some known problems

(ii) The amounts of CO_2 emitted and contained in the atmosphere do not tie up

(iii) Thirty plus experiments, using different methods, have shown that the range of residence times, that an individual molecule of CO_2 remains in the atmosphere, is from 4 to 25 years with 5-6 years being typical.

(3) CO_2 absorbs upwelling infrared radiation from the Earth and re-emits in all directions effectively causing warming

For reasons to do with the laws of physics and thermodynamics in particular, I prefer to describe the effect as one which changes the rate of loss of heat to space which results in a slightly different temperature than if the absorbing gases had not been present. The main infrared absorbing gases present in the Earth's atmosphere are water vapour (highest absorber by far) followed by our old friend carbon dioxide (CO_2) as a poor second. Others include methane, nitrous oxide and ozone.

(4) The increase in atmospheric temperature (caused by the CO_2 warming) evaporates more of the primary greenhouse gas, water vapour, thus multiplying the effect of CO_2 increase by a factor of about three

There is no evidence that over the last 200 years there has been an increase in atmospheric moisture levels. Computer climate models all assume the multiplying effect.

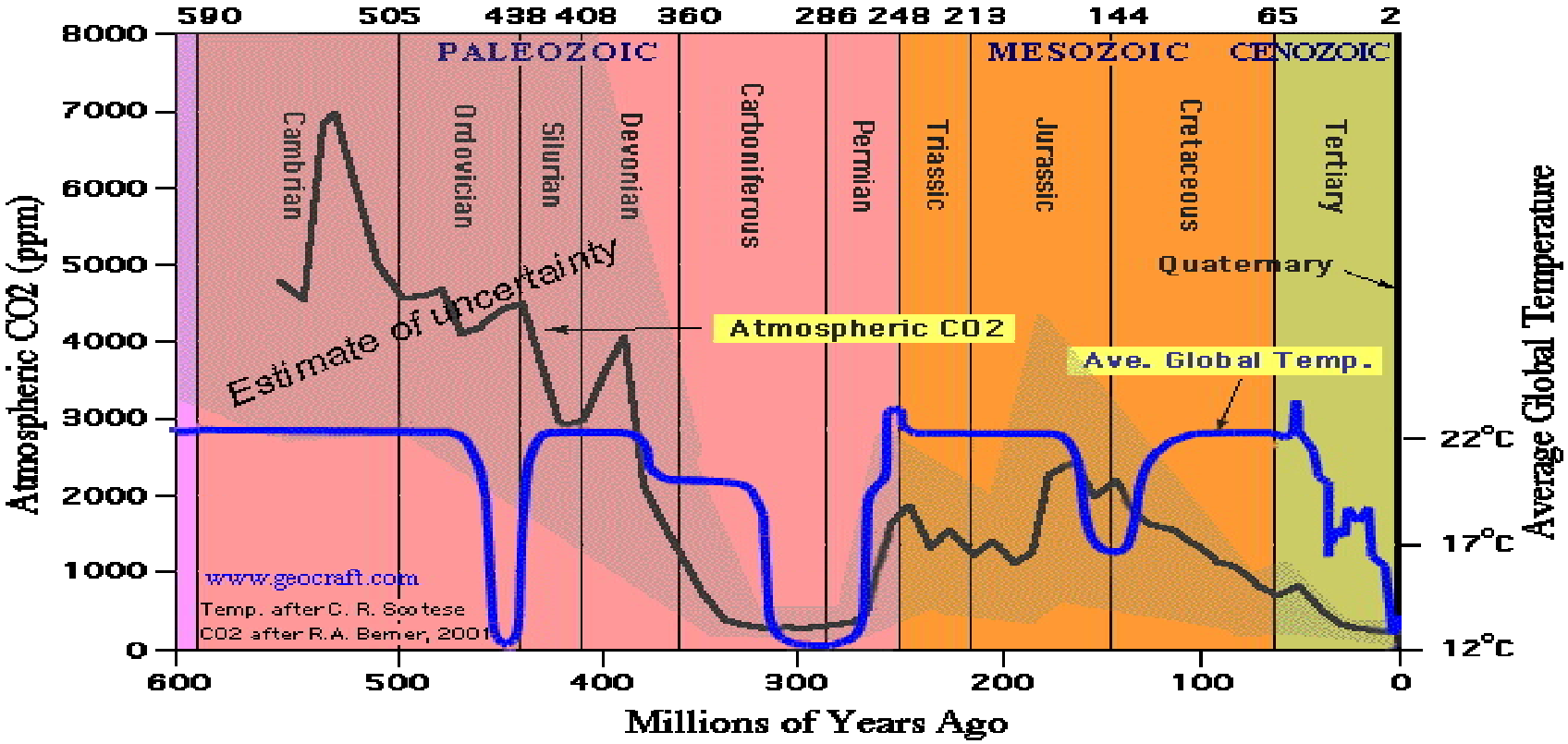
The main issues here are sensitivity to a doubling of CO_2 and system feedbacks whether positive or negative – indications now are that effective sensitivity is much lower than assumed in IPCC Reports.

(5) Further atmospheric heating will release methane from permafrost and cause run-away global warming

The Roman Warm Period (RWP) was almost certainly warmer than the present warm period. The Medieval Warm Period (MWP) was probably warmer than the present warm period. Going back earlier in the present Holocene era the Holocene optimum was very much warmer than the present. In all of these cases, there is no evidence of runaway warming due to CH_4 released from permafrost.

(6) The amount of carbon dioxide in the atmosphere is and always has been the main climate driver

I don't think so:



CAUSE AND EFFECT

- There are clearly correlations between the Global Temperature Anomaly (GTA) and CO_2
- Cause must precede effect which is not what the ice cores show in relation to CO_2 and temperature changes
- There are far stronger correlations with GTA that precede GTA
- The Climate community would be wise to return to work on actual rather than imagined variability and change mechanisms
- CRU would do better to return to the purpose for which it was set-up by Hubert Lamb