

Who contributed?

CO2 thesis supporters vs. sceptics

The earth's temperature has been rising for several decades now. That is a fact generally acknowledged. But the question concerning the causes of this phenomenon has received a lot of different explanations from the scientists. While the vast majority is blaming CO2 as the primary cause for this rise in air temperatures, claiming that its increase is unprecedented in the last 1,200 years, a minority suggests that atmospheric carbon dioxide -- often thought of as a key component of "greenhouse gases" -- is not the cause for global warming. They claim, for example, that rising global temperatures are a natural cause for increasing the level of carbon dioxide, and not the other way round. Environmentalists warn that adverse effects of man-made causes on environment, if left unchecked, may be irreversible. Reduction of rainforests, continued growth of hydrocarbon industries, increases in livestock and depletion of ozone, etc. are all considered crucial factors in the debate. Sceptics maintain that the climate change is a natural phenomenon and that human influence on nature is highly overrated. It is interesting that neither camp has much to say about the strong interrelation between the thermal status of oceans and atmospheric warming.

For a better understanding of the rationale of this investigation, the principal causes for global warming will be provisionally rated on the basis of their contribution, to give each possible cause a 'dimension'. If this investigation succeeds in proving that two major wars changed the course of climate twice in the last century, it will also prove that shipping and other ocean uses also contributed to global warming. Although WWI and WWII saw an aggressive churning of the seas, it was hardly more than a fraction of the turning of the seawater surface layer by vessels year after year since engine propulsion revolutionized shipping, 150 years ago.

Meanwhile, it is obvious that this investigation would identify four main causes for the warming trend which started after the end of the Little Ice Age, in 1850. These causes are: natural phenomena, carbon dioxide, shipping and naval warfare. Other interesting causes, e.g. huge deforestation, urbanisation and building of large networks of roads since industrialization started, etc., play only a distant secondary role. Although these issues deserve greater attention, they are of little interest for this investigation because they represent second or third rank contributors.

What matters?

Global warming or climate change? This question should not be taken lightly as it means quite a lot for the understanding of our matter. Before suggesting a rating for major contributors, as mentioned above, it seems necessary to make clear what we are talking about.

Actually, the relevant United Nation's Convention on Climate Change (1992) should give an answer to this question. While the term "global warming" is frequently used, it is not mentioned in UNCCC. Instead, the Convention defines:

"Climate change" means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".

One can only wonder how a text "Climate change means a change of climate" could be presented as an international law. It is simply absurd. Instead of defining what 'Climate' means in the first place, it introduces the term "Climate System" as follows:

"Climate system" means the totality of the atmosphere, hydrosphere, biosphere and geosphere and their interactions."

This definition also does not make any sense either. According to common scientific understanding, 'Climate' refers to the weather situation over a long period of time, usually 30 years or more, or to meteorological conditions, including temperature, precipitation, and wind that characteristically prevail in a particular region. In a strict sense, 'Climate' is a mere accumulation of weather data expressed in statistics. If one wishes to give Climate a useful meaning, one should define it as the 'continuation of the oceans by other means' or as a 'copy of the oceans'.

The common term 'Climate' is often accompanied with uncertainty. 'Climate System' is even worse. Therefore, the definition 'Climate Change' is an insult to common sense. All these definitions always need further explanation depending on what subject one is talking about: sunshine, rain, wind, temperature, etc.

This investigation explains the reasons for the ranking of contributors to 'climate system changes', then selects the temperature issue, thus concentrating on 'global warming'.

Rate of Contribution

As a starting point, attention focuses on IPCC's warming assessment from 2001¹ according to which global average surface temperature (the average of air temperature over land and sea surface temperature) has increased since 1861. During the 20th century, the increase has been of $0.6 \pm 0.2^{\circ}\text{C}$. The record shows a great deal of variability; for example, the warming occurred with more intensively during two periods: from 1918 to 1939, and from 1980 to 2000.

Discussion on possible causes for global warming leads to heat regulators. The global heat status is largely determined by a balance between the energy that Earth receives from the Sun and the heat that

¹ IPCC, Climate Change 2001: Working Group I: The Scientific Basis, Summary for Policymakers

Earth releases back into space. This is called global energy balance. There are many causes for the alteration of the global energy balance, e.g. aerosols and cities. Indeed, heat balance is what occurs on Earth. In this exercise, the oceans are second in place after the sun but much more relevant than any subsequent source. On distant third place comes the atmospheric water vapour. Less than 0.05% of the ocean is in the atmosphere at any time. In tandem, the water masses of lakes, seas and oceans, and evaporated water co-ordinate and control the global atmospheric heat balance. Weather would not exist without these two factors.

We should always be aware that the sun is the principal player as far as climate is considered. However, for this investigation, its contribution is regarded as constant and stable throughout all seasons and years.

The following rating that we suggest represents an individual guess but may be of significant importance in categorising the scope of the theme.

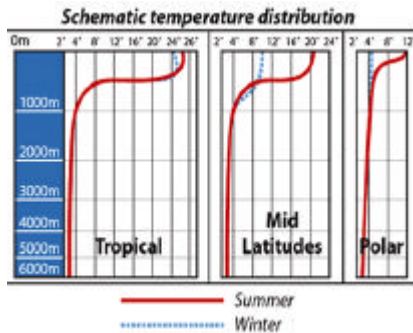
Natural variability

Any 'natural variation' of the atmospheric conditions will have something to do with earthly water conditions, as they exist in the oceans and in the atmosphere. These conditions can suffer diverse influences. The Little Ice Age is certainly such a case. Volcanic dust may not only alter radiation but also influence the amount of water vapour and its height above sea level. A recent NASA study observed that the eruption of Mount Pinatubo (in 1991), a very small volcano compared to Medieval Age eruptions, increased Arctic Oscillation. During the two years following the volcanic eruption, the Arctic Oscillation caused winter warming over land areas, at high and middle latitudes in the Northern Hemisphere, despite a cooling effect due to volcanic particles blocking the sunlight. This winter warming is a strong demonstration that the oceans and water vapour compensated for the loss of sun radiation. A similar situation after Krakatoa had

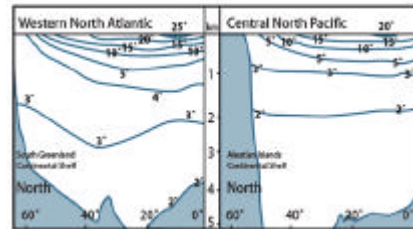
been explained in a previous chapter. But if the amount of volcanic particles is severe and sunrays are blocked out for a longer period, oceanic heat capacity will weaken after some time and a cooling is inevitable. That was presumably one of the principal reasons for severe winter conditions during the Middle Ages. The latest Intergovernmental Panel on Climate Change (IPCC) report (2001) reaffirms in much stronger language that the climate is changing in ways that cannot be accounted for as being natural variability. How did they know?

One can, with high certainty, assign a considerable amount of responsibility for warming to natural variations due to absence of serious volcanic activities during the last 120 years. However, the margin will be somewhere between 20% and 80%. In so far, it seems reasonable to work with an assumed figure of 50%.

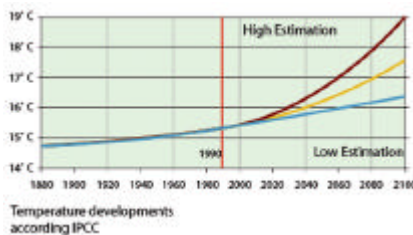
The role of Carbon Dioxide



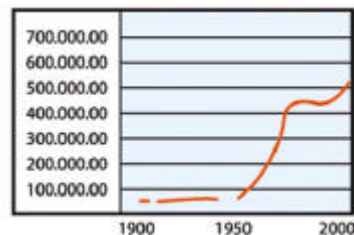
*Only the top sea surface layer is warmed up during summer,
B/W page 201*



*The oceans are cold, the average water temperature is only +5°C,
B/W page 207*



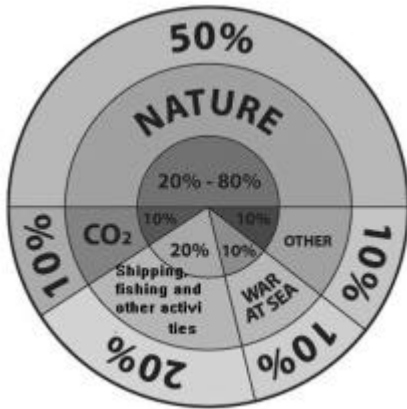
*A great exaggeration?
B/W page 30*



Since the sailing ship area ended, the number, size, draught and speed of vessels increased. B/W page 33

The higher the concentration of carbon dioxide, the greater the warming: this is the conclusion of the IPCC on this matter. According to them, the rising levels of CO₂ anthropogenic emissions (primarily through use of fossil fuels) are responsible for the sustained temperature increase.

Since the beginning of the industrial revolution, atmospheric concentrations of carbon dioxide have increased with nearly 30%, methane concentrations have more than doubled, and nitrous oxide concentrations have risen with about 15%. IPCC experts believe that the increasing concentrations of greenhouse gases are likely to



accelerate the rate of climate change. Scientists expect that the average global surface temperature could rise with 0.6°C - 2.5°C during the next fifty years, and with 1.4°C - 5.8°C during the next century. Of course, there will be significant regional variations, claiming that there is a “high” level of understanding among experts concerning the mechanism of

greenhouses gases.

There is little one can do against the established ‘beliefs’ in certain circles. This investigation gives CO₂ only a marginal rank as a contributor, viz. 5 to 15 % of 10%. This low rating derives particularly from the fact that the atmosphere is not the driving force for the warming mechanism but a mere appendix of the oceans. Furthermore, since its first report, in 1988, IPCC has never offered as an explanation more than the conclusion, by consensus, that there is a link between the rising of CO₂ and the rising of the temperature level. This is hardly a convincing argument.

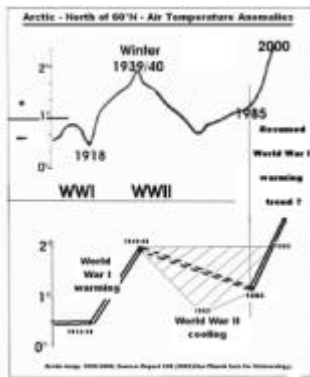
Shipping and ocean uses

Why shipping, as a major user of oceans, has not crossed the mind of the scientific community as a potential contributor to global warming since motorization of vessels took place, in the 19th century? We are of the opinion that shipping is considerably more relevant to global warming than various greenhouse gases, at the same time not hesitating to place it at a rank twice or thrice higher than CO₂, or at least of a percentage of 20%. As this argument is currently difficult to prove, the turning and churning of oceans and seas by naval warfare

shall be presented instead as causes for major climatic changes and global warming with a rating of 20% contribution to global warming.

War at sea issue

Central point of this investigation is how naval warfare during two world wars, in the 20th century, contributed to global warming. An in-depth analysis will show that the overall picture provides clear clues. World War I initiated a two-decade warming, from 1918 to 1939.



World War II initiated a four-decade cooling period, from 1940 to about 1980. What makes things even more interesting are the three consecutive arctic war winters between 1939/40, 1940/41 and 1941/42, caused by military activities in the North and Baltic Sea. The emergence of these three winters will be presented as a powerful demonstration of how naval warfare drove temperatures to Ice Age level, changed regional weather conditions

and left a significant imprint on climatic statistics. This phenomenon is commonly called climate change.

Rating the impact of war at sea on global warming during the last century is somehow not easy as the warming period during WWI was largely neutralized by a much longer cooling period after the beginning of WWII. Furthermore, it cannot be completely excluded that the warming period initiated during WWI re-emerged after the end of the cold period, around 1980. It cannot be completely excluded as well that the forceful warming process which took place during the last 10-20 years has some connections with WWII naval activities.

As the prevailing opinion in this investigation allocates to various kind of ocean uses more relevance for warming than to the war at sea activities, the rating for the war at sea contribution is set at 10%.

Other contributors and summary

One could possibly name many dozen aspects and sources, alone or in combination with others that might contribute to warmer or colder regional and global air temperature. To the best of today's knowledge, none of them belongs in the premier league as a major player. Not to be ignored, they are given a rating of 10 %.

An overall allocation of the causes of the warming process could be divided evenly between natural and anthropogenic forces, at 50% each. More interesting are the assumed positions concerning anthropogenic contribution: direct ocean-related contribution represents 60% of the total while contribution related to other causes is only 40%, including 20% due to CO₂ and other related gases.

The war at sea as significant factor will be elaborated in detail in order to demonstrate that modern naval forces were strong enough to force serious weather modification, including two major climate changes during the last century. The main aim of this investigation is to raise the awareness that anthropogenic atmospheric changes derive primarily (50% and more) from making use of the seas and oceans.