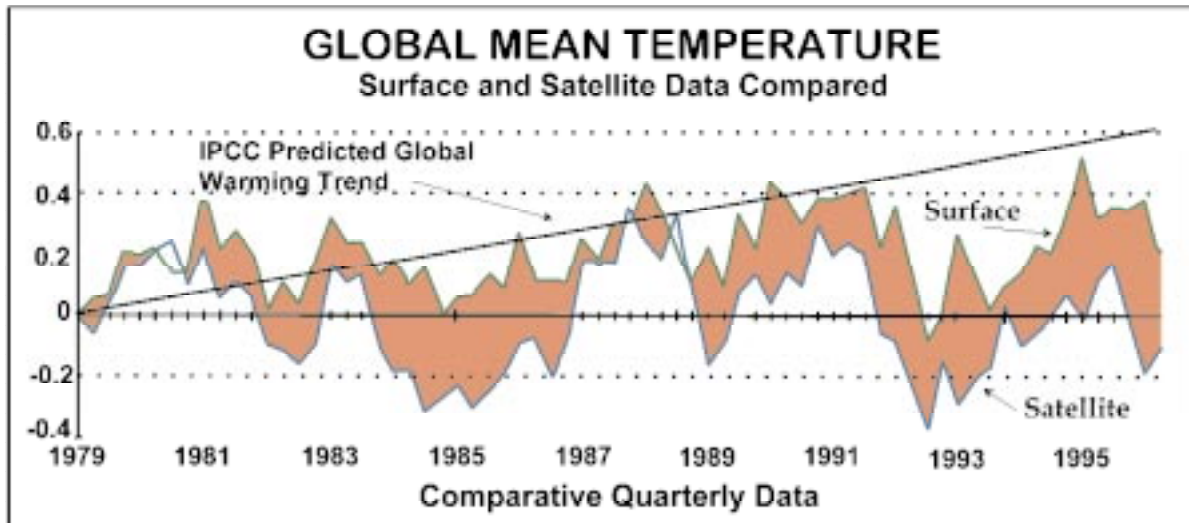


Climate Changes

Random climate changes prevent reliable weather prognoses

Asmund Moene, (former head of the National Forecasting Center, the Norwegian Meteorological Institute, Oslo).

The figure illustrates the global temperature changes from 1979 measured at the surface and in the lower atmosphere by satellite, (NASA). To compare their trends directly they are referred to a common zero point.



The prognoses of the international panel of climate changes, IPCC, show a temperature increase of $1.4 - 4.5^{\circ}\text{C}$ in 100 years caused by a doubling of the atmospheric CO_2 . In the figure a trend of $0.03^{\circ}\text{C}/\text{year}$ is given. There is no significant relationship between this curve and the two other curves which are generated by random changes.

IPCC's prognoses are based on an estimated increase of $0.04\text{W}/\text{m}^2/\text{year}$ of the radiation balance caused by a combustion of fossil fuels. The most important accumulation of solar energy on the earth takes place in the tropical oceans. In the area between 40°S and 40°N the mean supply at the top of the atmosphere is $375\text{W}/\text{m}^2$. The mean annual cloudiness reflects back to space about 25% which is lost for the earth. According to satellite measurement the reflection in years with greater cloudiness is about 40% and in years with smaller cloudiness about 10%. The yearly variations of received solar energy can therefore be over $100\text{W}/\text{m}^2$.

In periods of many years a near energy balance must be achieved. In the equation of balance it is only the loss of the heat of evaporation that has a variation of the same order of magnitude. The variations of absorbed heat and the loss of evaporation heat are yearly random fluctuations. With an order of magnitude of above $100\text{W}/\text{m}^2$ the anthropogenic signal is completely masked, (more detailed in my article in "The global Warming Debate", European Science and Environment Forum, ESEF.org, London 1996).

The evaporation from the tropical oceans is the most important water vapour source of the atmosphere. The water vapour is the most important greenhouse gas in the atmosphere. A doubling of the CO_2 content can be compensated for by only a 3% decrease in water vapour. We are far from being able to observe this highly random variable constituent to that level of precision.

Cloud formations over the tropical oceans release the heat of evaporation. These enormous heat quantities are the most important energy source of the so-called general atmospherical circulation on which the IPCC's prognoses are based. The main problem is the great random variations of this

energy supply from year to year.

The presence of random fluctuations is a consequence of the complexity of the climate system. The climate system is composed of so many processes, including nonlinear processes, that it is impossible to completely control or specify the system to an extent that would prescribe the evolution of the system in a deterministic fashion.

Statistical mechanics is the only theory that can analyse the behaviour of spontaneous random fluctuations.

The so-called relation of uncertainty has proved to be one of the most fundamental laws in nature. The law leads us to a statistical description of the climate system because of its ever-present random short-time fluctuations. According to the relation of uncertainty the climate system is continuously driven by the short-time random fluctuations to an ever-increasing chaos on greater time scales. It is important to be aware of the fact that chaotic behaviour implies the impossibility of long time predictions, and that such behaviour is normal in nonlinear models. The most fundamental law in nature, the relation of uncertainty, therefore prevents reliable climate prognoses.

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Contact Information

E-Mail Address asmoene@c2i.net

Web-Address:

<http://home.c2i.net/asmoene/index.html>

Telephone (country code 047)

*(047) 22523966

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