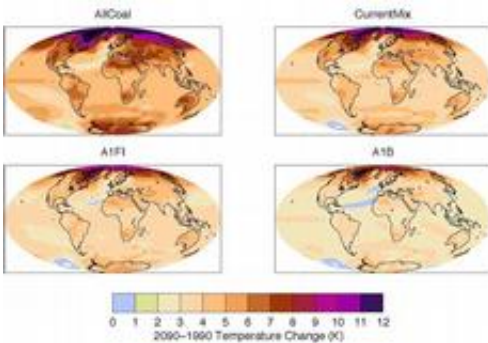


Much warmer than the worst-case scenario?

July 13 2011, By Peter Rüegg



Four new scenarios presented by climate scientists clearly show that it could get much warmer than the present worst-case scenario calculations by the IPCC, particularly around the North Pole. Credit: Sanderson et al., 2011

According to a new study, it could become much warmer towards the end of the century than originally anticipated. The study has found that the average temperatures calculated are much higher than the IPCC's worst-case scenario to date.

You don't have to be more pessimistic than average in order to develop a worst-case scenario. In the case of the nuclear power plant in Fukushima, the reality was even worse than imagined by the plant's operators in their disaster scenarios. The same is true of the discussion surrounding climate change. You can't project too many different scenarios, even if they paint a very uncomfortable picture of the future.

A recently published study conducted by climate researchers in the US

and Switzerland including Reto Knutti, a professor at ETH Zurich, demonstrates that their new calculations of climate change scenarios exceed even those described as worst-case scenarios in the 2007 IPCC Report.

Rising global population included

The assumptions made by the researchers are not even abstruse or grossly overexaggerated. In their models, they took into account the global population growth forecast by the UNO, the per capita [energy](#) consumption and the possible mix of primary energy sources used, such as coal, electricity from nuclear power or renewable energy sources.

On the one hand, the researchers assumed that per capita energy consumption will continue to grow at a constant rate and will have increased to four times today's consumption levels by the year 2100. The population is also expected to rise – possibly up to 15 billion people by the end of this century. In one of the computed scenarios, they also supposed that coal will become the main energy source, accounting for more than 90% of all primary energy at the end of the century. In another scenario, they rolled forward the percentage of energy sources as they are used today without any changes. The researchers assumed that there will be no decline in CO₂, something which is realistic based on the current situation.

Coal heats up the climate

The results are enough to make us sit up and take notice. The model calculated scenarios in which global [average temperatures](#) rise sharply – more sharply than in present IPCC worst-case scenarios. In the coal scenario, which sees coal replacing most of the other [energy sources](#) used at present and the [global population](#) rising to 15 billion by 2100, the

temperature could increase by an average of 5.1 degrees on the 1990 level. The temperature rise could be highest around the North Pole, with increases of 11 to 12 degrees predicted. Even if the researchers assume an energy mix that remains unchanged on today's mix, the global increase is still 3.7 degrees.

The new scenarios also highlight an even more precarious water situation in southern Europe. Annual precipitation could fall by between 20 and 60 percent. By contrast, rainfall amounts over parts of the Sahara could change dramatically, with more rain falling on what is now a desert. According to the new scenarios, the climate would change continuously rather than suddenly. The Arctic summer sea-ice would suffer significantly, and in a worst-case scenario could be lost completely after 2070.

Possibilities, not predictions

However, Professor Knutti warns against jumping to conclusions. "These scenarios show very pessimistic extreme cases, and there is no proof that these will eventuate". He said that the results do not constitute predictions, and no probabilities were given either. Nevertheless, he explained, it is important to explore all possibilities. "It would be a mistake to look at a range that is too restricted".

Ultimately they merely combined pessimistic assumptions that are neither particularly unrealistic nor abstruse, he said. For example, the assumptions surrounding population development stem from rather pessimistic demographic studies. He explained that the assumption that future energy supply will depend more or even exclusively on coal is not unrealistic either, as global coal supplies are large and it could potentially become relevant as a source of energy for a growing population.

Reto Knutti emphasized that everything depends heavily on the

assumptions regarding social, economic and technological development that underlie the scenarios: “The assumptions in the scenarios are in reality our decisions and actions”. This means that humans will ultimately decide which scenario becomes reality.

More information: Sanderson BM, et al. The response of the climate system to very high greenhouse gas emission scenarios. *Environ. Res. Lett.* 6 (2011), published 5th July 2011, [doi: 10.1088/1748-9326/6/3/034005](https://doi.org/10.1088/1748-9326/6/3/034005)

Provided by ETH Zurich

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