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The Case for Anthropogenic Climate Change

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The talk will critically review the evidence for anthropogenic climate change, concentrating on five key points:

1. The atmospheric CO_2 concentration has risen strongly since about 1850, from 280 ppm (a value typical for warm periods during at least the past 400,000 years) to 380 ppm.
2. This rise is caused by humans and is primarily due to the burning of fossil fuels, with a smaller contribution due to deforestation.
3. CO_2 is a gas that affects climate by changing the Earth's radiative budget: an increase in its concentration leads to a rise in near-surface temperature. If the concentration doubles, the resulting global-mean warming will very likely be between 1.5 and 4.5 ºC.
4. In the 20^{th} Century, global climate has warmed by $\sim$0.6 ºC. Temperatures in the past 10 years have been the highest since instrumental records started in the 19^{th} Century, and for at least several centuries before that.
5. Most of this warming is due to the rising concentration of CO_2 and other anthropogenic gases; a smaller part is due to natural causes, like fluctuations in solar activity.

While these points have been generally accepted amongst climatologists for a long time and have been expressed in one form or other in statements by all relevant professional societies (e.g., the Intergovernmental Panel on Climate Change, the American Geophysical Union, the National Academy of Sciences, the World Meteorological Organisation, many national meteorological societies, and so on), it is worthwhile to revisit their empirical basis and to identify areas of further research need.