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How will climate change in the future? (Page B8)

Scientists have made major advances in the observations, theory, and modeling of Earth’s climate system; and these advances have enabled them to project future climate change with increasing confidence. Nevertheless, several major issues make it impossible to give precise estimates of how global or regional temperature trends will evolve decade by decade into the future. Firstly, we cannot predict how much CO₂ human activities will emit, as this depends on factors such as how the global economy develops and how society’s production and consumption of energy changes in the coming decades. Secondly, with current understanding of the complexities of how climate feedbacks operate, there is a range of possible outcomes, even for a particular scenario of CO₂ emissions. Finally, over timescales of a decade or so, natural variability can modulate the effects of an underlying trend in temperature. Taken together, all model projections indicate that Earth will continue to warm considerably more over the next few decades to centuries. If there were no technological or policy changes to reduce emission trends from their current trajectory, then further warming of 2.6 to 4.8 °C (4.7 to 8.6 °F) in addition to that which has already occurred would be expected during the 21st century [Figure B5]. Projecting what those ranges will mean for the climate experienced at any particular location is a challenging scientific problem, but estimates are continuing to improve as regional and local-scale models advance.

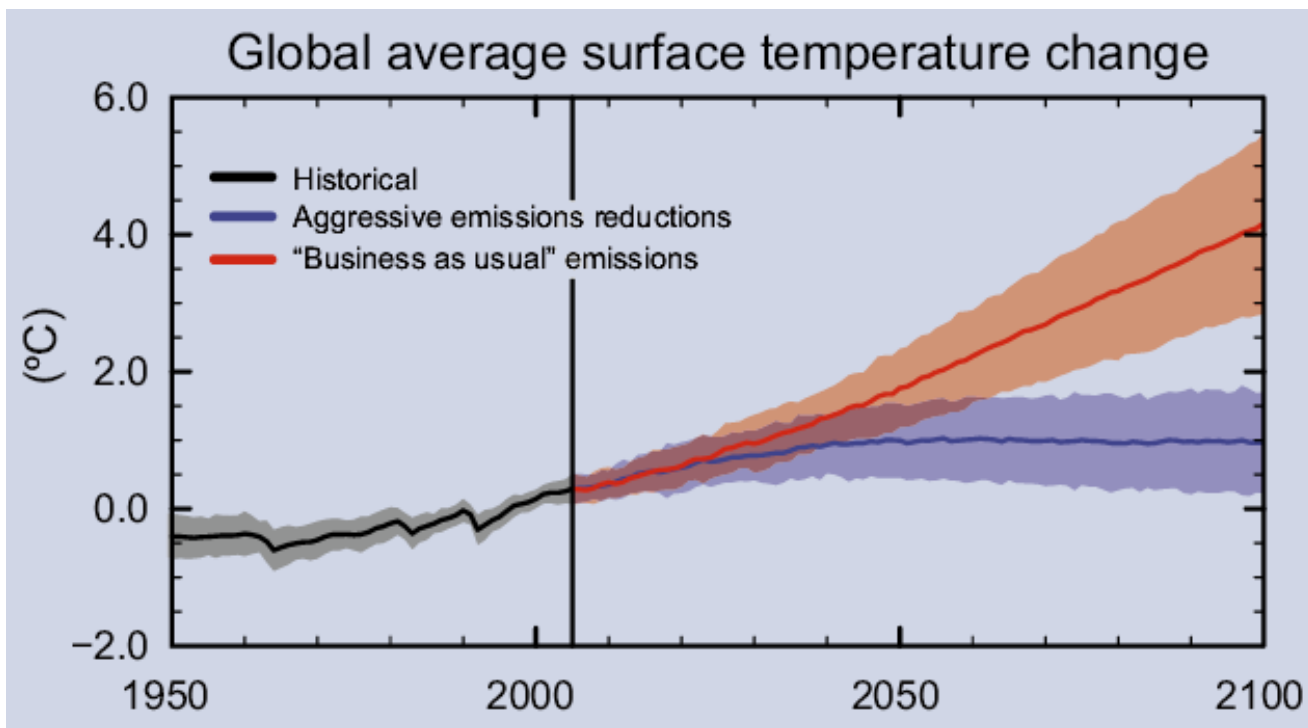


Figure B5. The amount and rate of warming expected for the 21st century depends on the total amount of greenhouse gases that humankind emits. Models project the temperature increase for a business-as-usual emissions scenario (in red) and aggressive emission reductions, falling close to zero 50 years from now (in blue). Black is the modeled estimate of past warming. Each solid line represents the average of different model runs using the same emissions scenario, and the shaded areas provide a measure of the spread (one standard deviation) between the temperature changes projected by the different models. All data are relative to a reference period (set to zero) of 1986-2005. Source: IPCC AR5