

Newest Generation of Climate-Model Simulations Pinpoints Anthropogenic Carbon Dioxide Emissions

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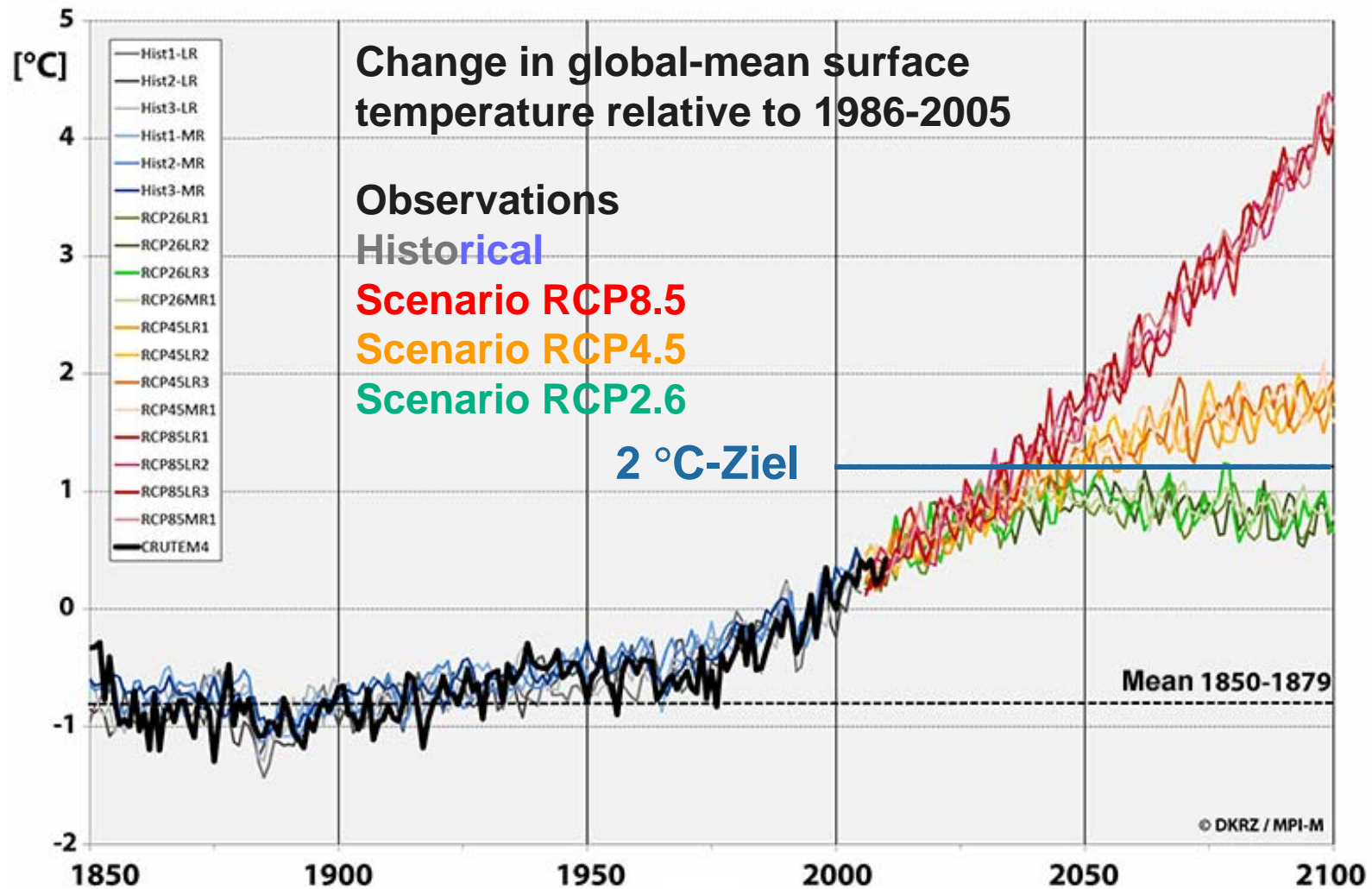
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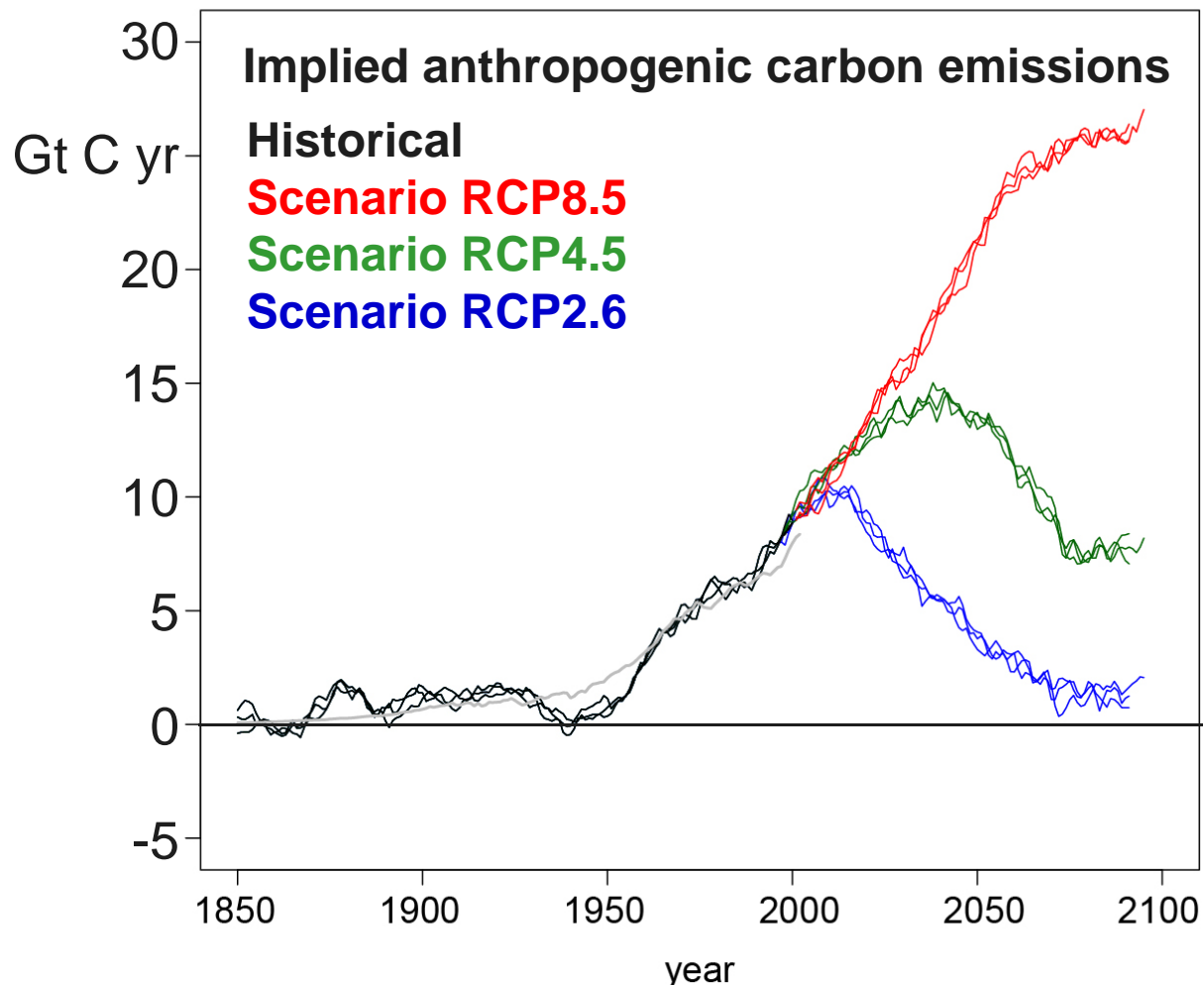
Climate change has always happened - what was special about the 20th century?

- Transition from the last ice age to the current warm phase (IPCC 2007, WG1, p. 451):
 - Global-mean warming: about 5 °C
 - Duration about 5000 years
- Ice age → warm phase: 1 °C warming in 1000 years
- 20th century: 1 °C warming in 100 years
- Humanity is warming the global climate at least ten times faster than nature ever could

MPI-ESM: The 2 °C target can be reached if we follow scenario RCP2.6 ...



...but anthropogenic CO₂ emissions must fall from 2020 onward - by 2100, to 10% of the year-2000 level



Considerable model uncertainty: in several models the 2 °C target is missed even in scenario RCP2.6; often the atmosphere must be “scrubbed” of CO₂

21st-century CO₂ emissions and global warming

Scenario	RCP2.6	RCP4.5	RCP8.5
Cumulative 21st-century CO ₂ emissions (Gt C)	about 500	about 900	about 1900
Warming relative to late 20th century (MPI-ESM)	about 1 °C	about 2 °C	about 4 °C

- About 1 °C further warming for each 500 Gt C; late 20th century was 1 °C warmer than pre-industrial
- We have another 500 Gt C that we “may” emit without failing to reach the 2 °C target. Current emissions: almost 10 Gt C/year
- We would have another 50 years with current emissions, with nothing left.
- Any further increase now would require even more drastic reductions later.