Global Warming of 1.5°C

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

The report in numbers

91 Authors from **40** Countries

133 Contributing authors

6000 Studies

1 113 Reviewers

42 001 Comments

Ashley Cooper / Aurora Photos

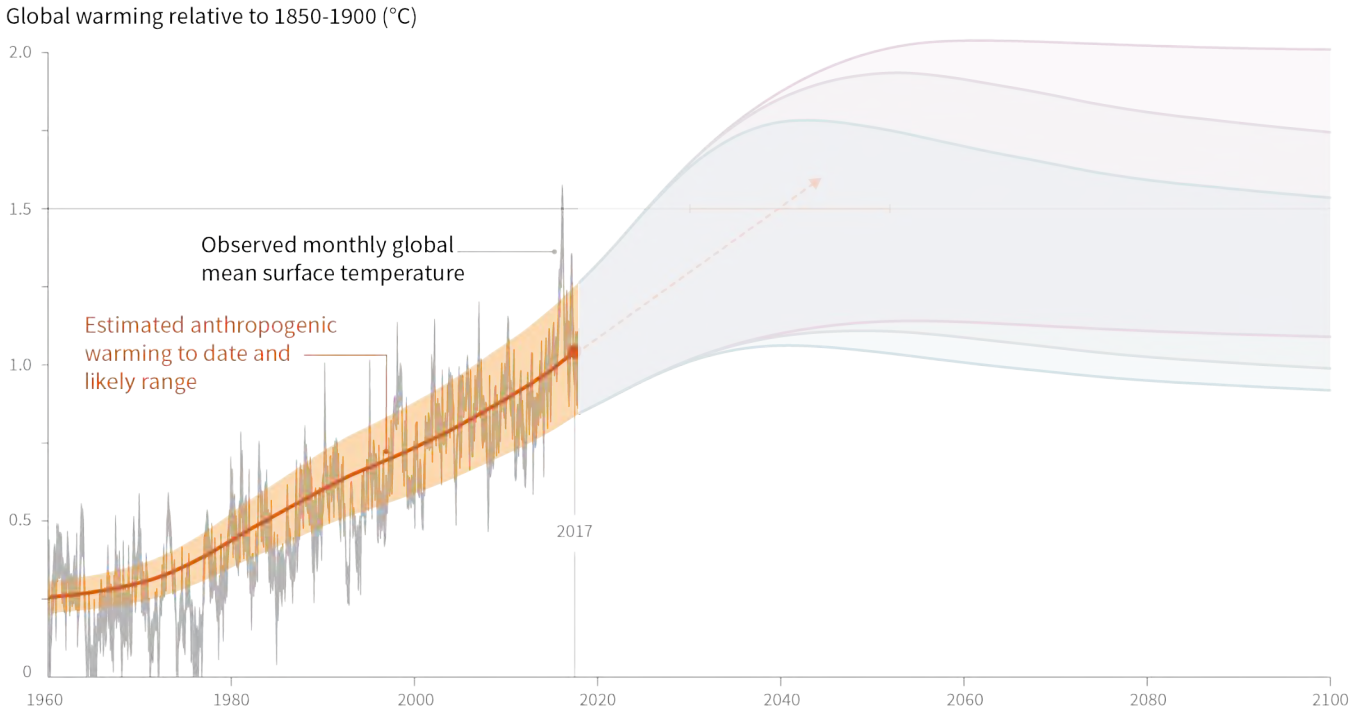
Where are we?

Since pre-industrial times, human activities have caused approximately 1.0°C of global warming.

- Already seeing consequences for people, nature and livelihoods
- At current rate, would reach 1.5°C between around 2030 and 2050
- Past emissions alone do not commit the world to 1.5°C

Cumulative emissions of CO_2 and future non-CO_2 radiative forcing determine the probability of limiting warming to 1.5°C

a) Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways



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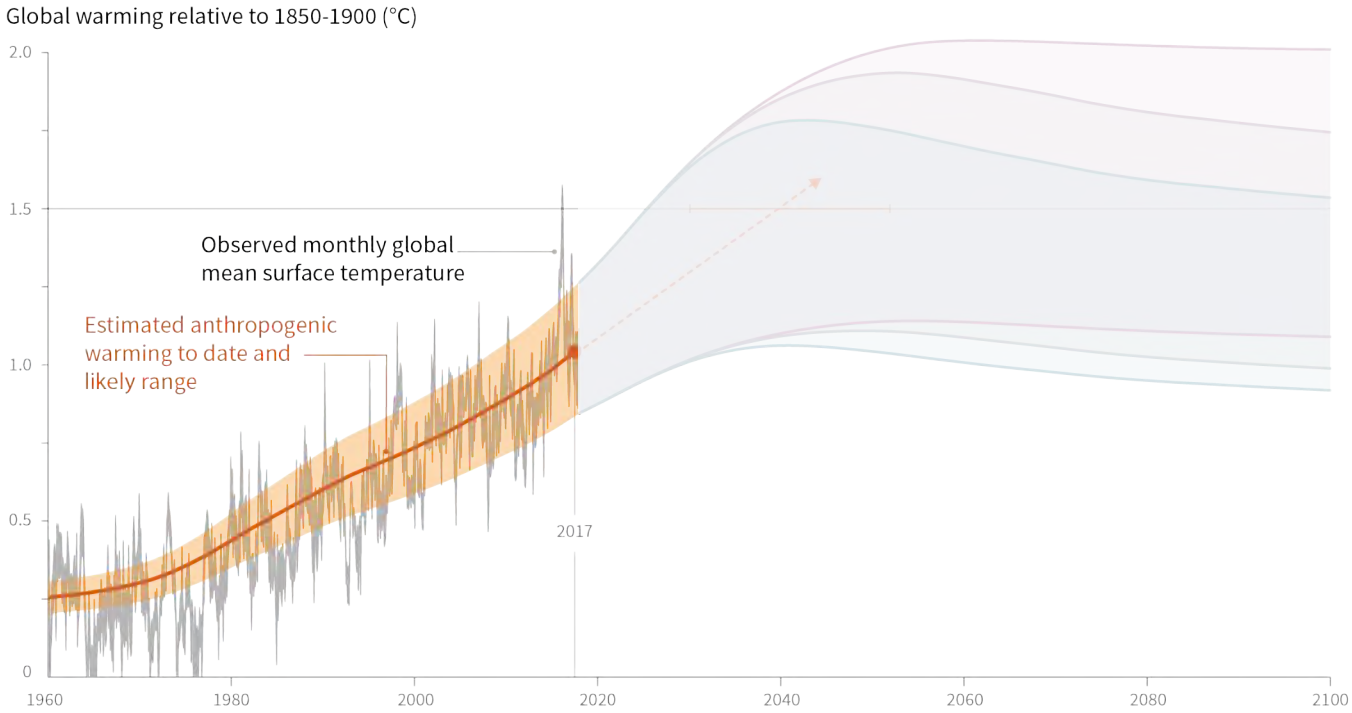

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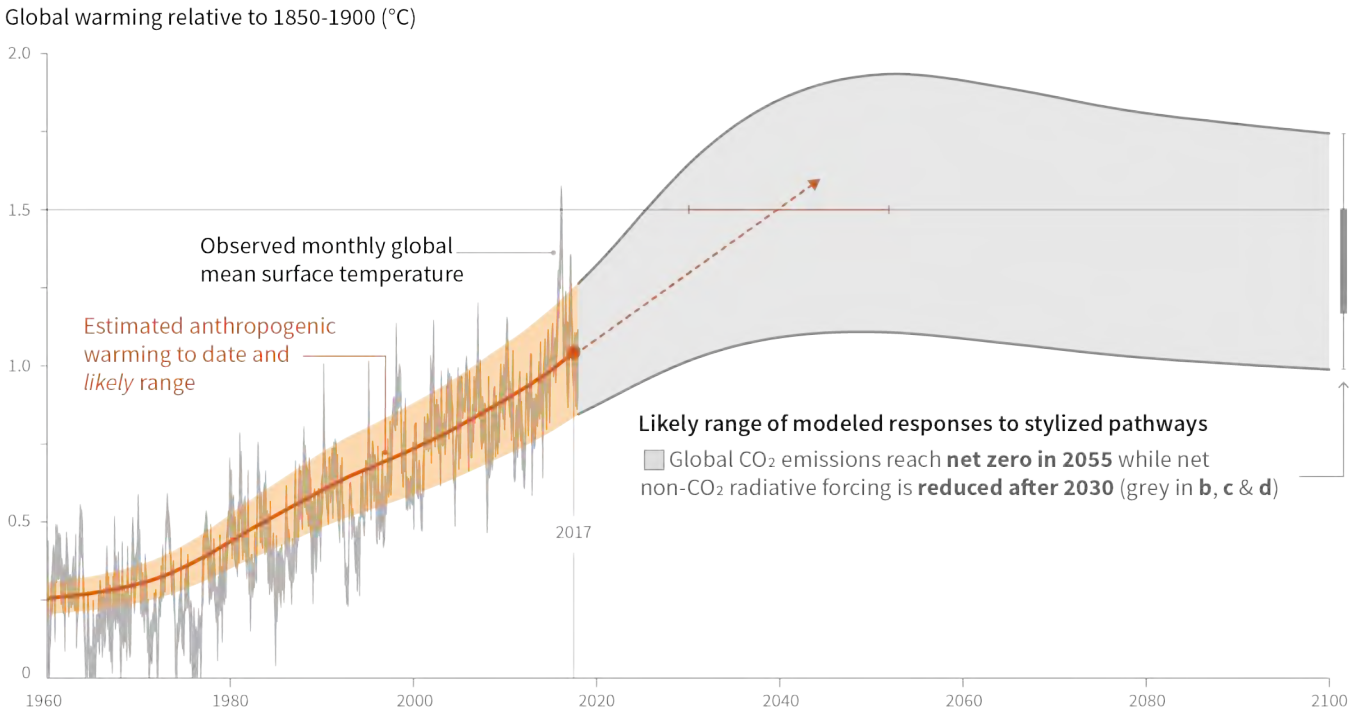

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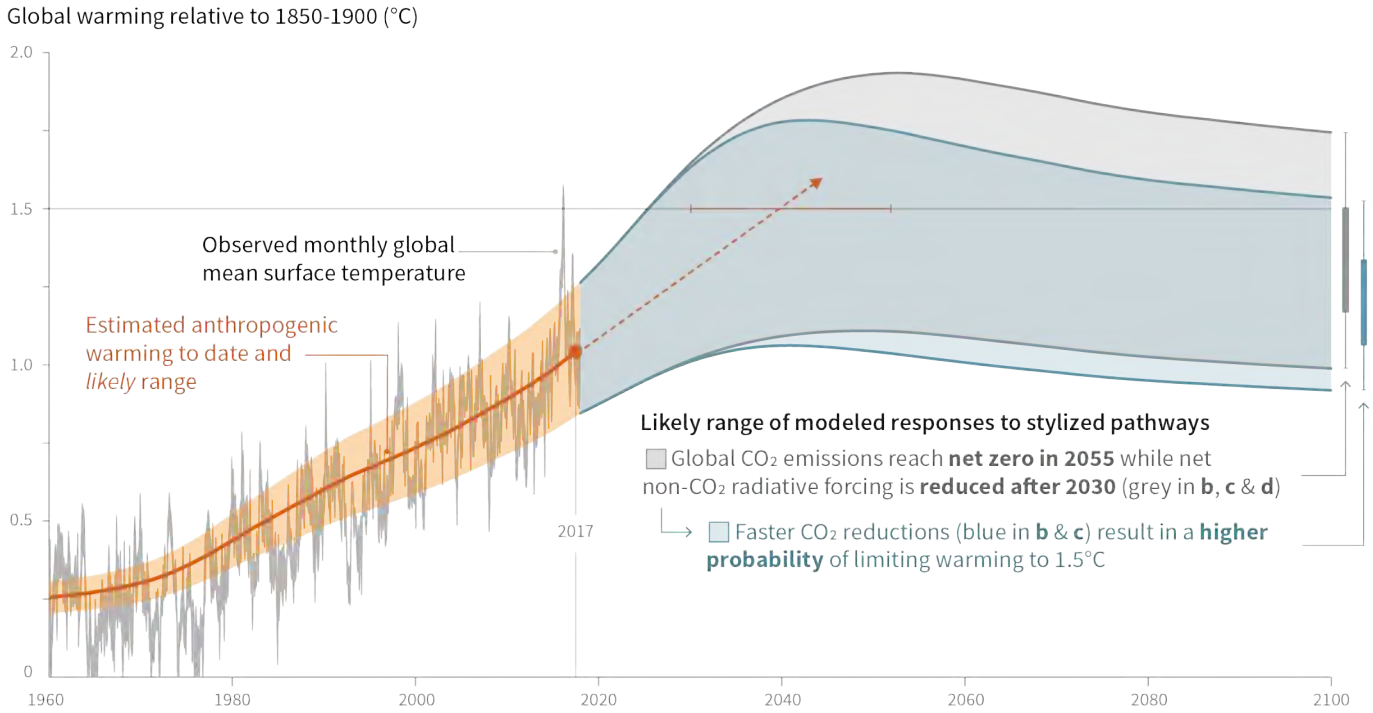

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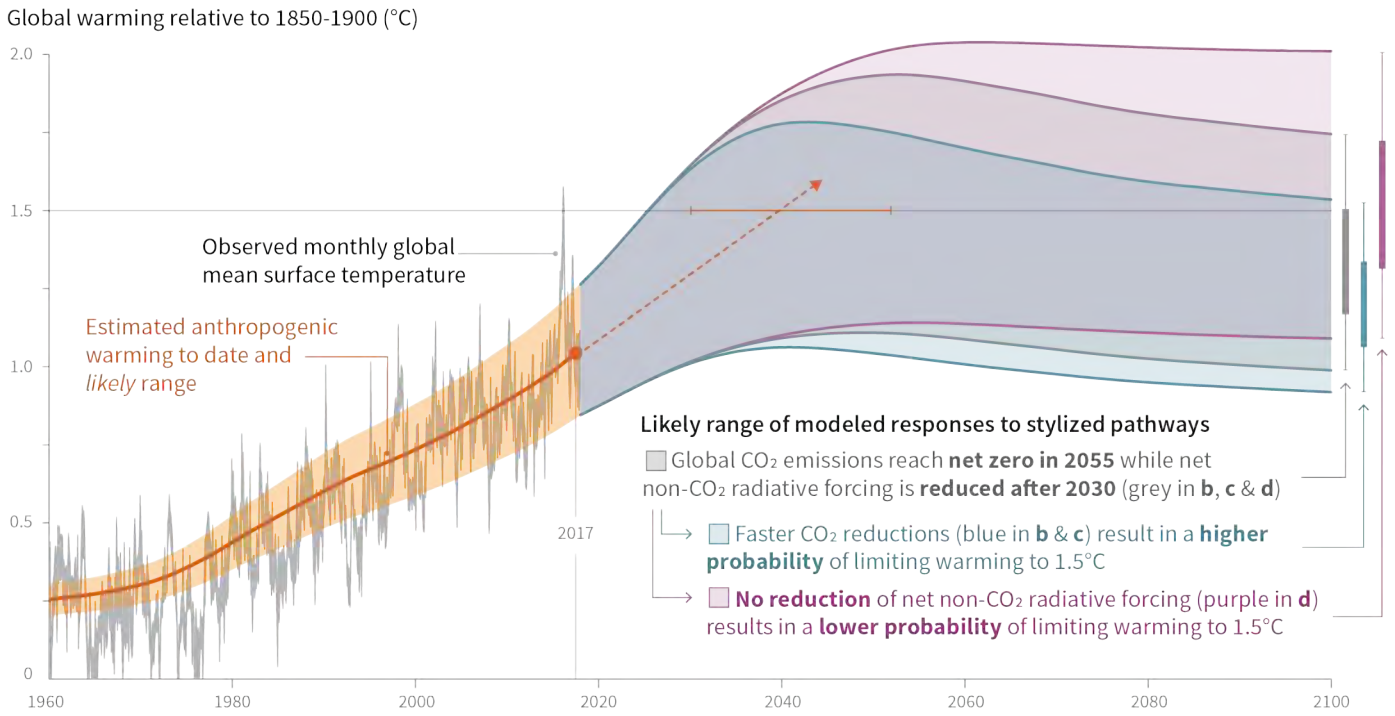

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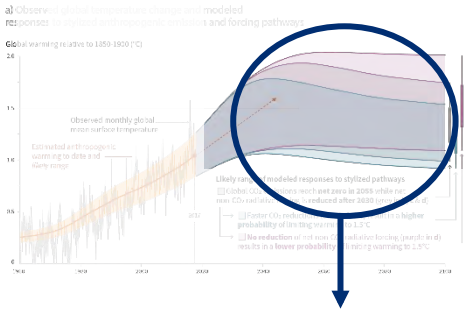
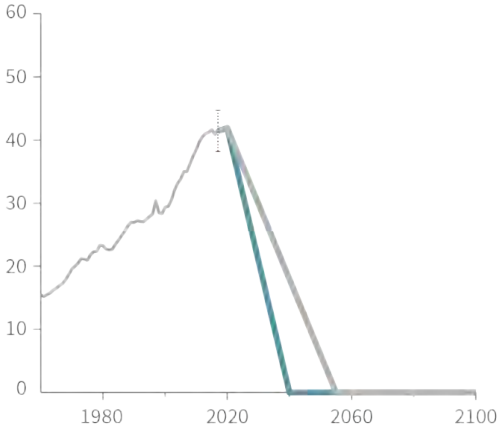


b) Stylized net global CO_2 emission pathways

Billion tonnes CO_2 per year ($GtCO_2$/yr)



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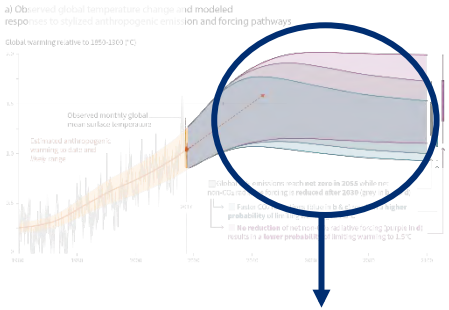

Faster immediate CO_2 emission reductions limit cumulative CO_2 emissions

b) Stylized net global CO_2 emission pathways

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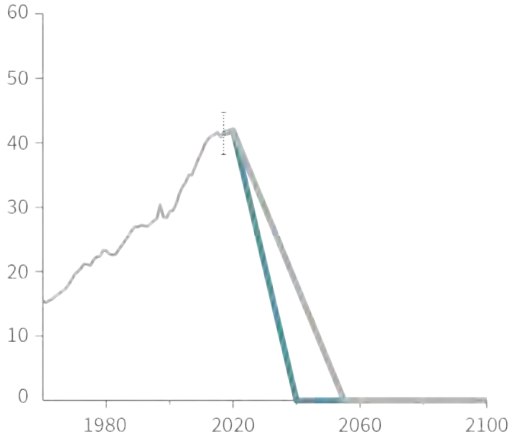
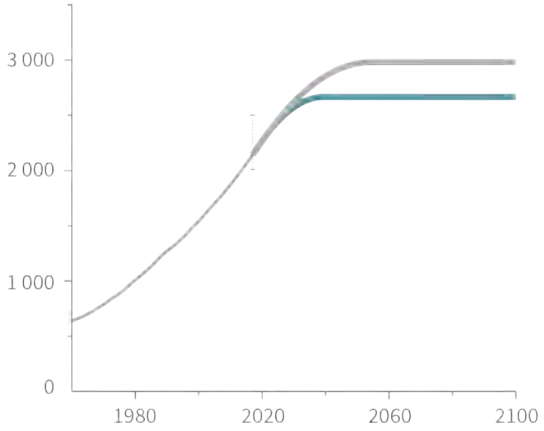


c) Cumulative net CO_2 emissions

Billion tonnes CO_2 ($GtCO_2$)



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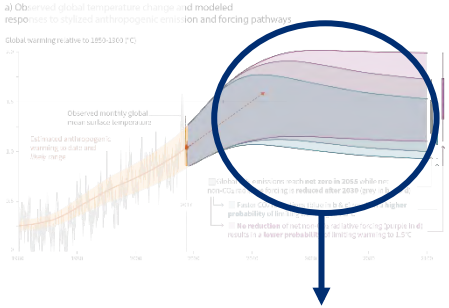
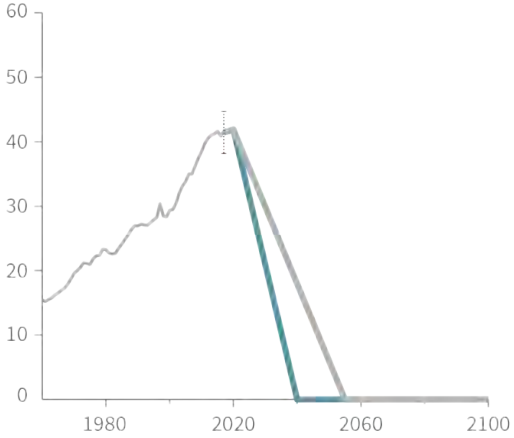


Maximum temperature rise is determined by cumulative net CO_2 emissions and net non-CO_2 radiative forcing due to methane, nitrous oxide, aerosols and other anthropogenic forcing agents.

b) Stylized net global CO_2 emission pathways
Billion tonnes CO_2 per year ($GtCO_2$/yr)



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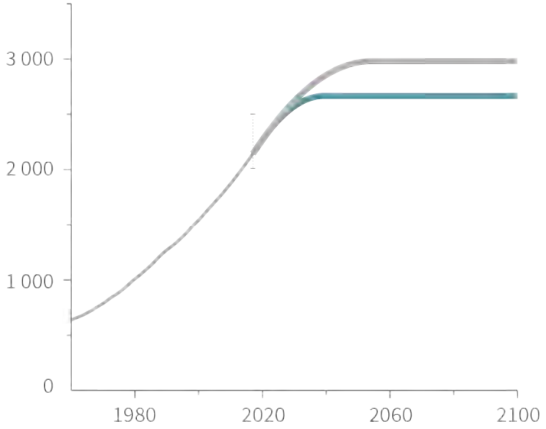
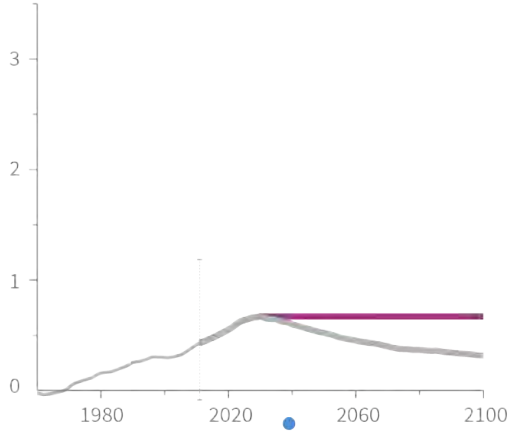


d) Non-CO_2 radiative forcing pathways
Watts per square metre (W/m^2)

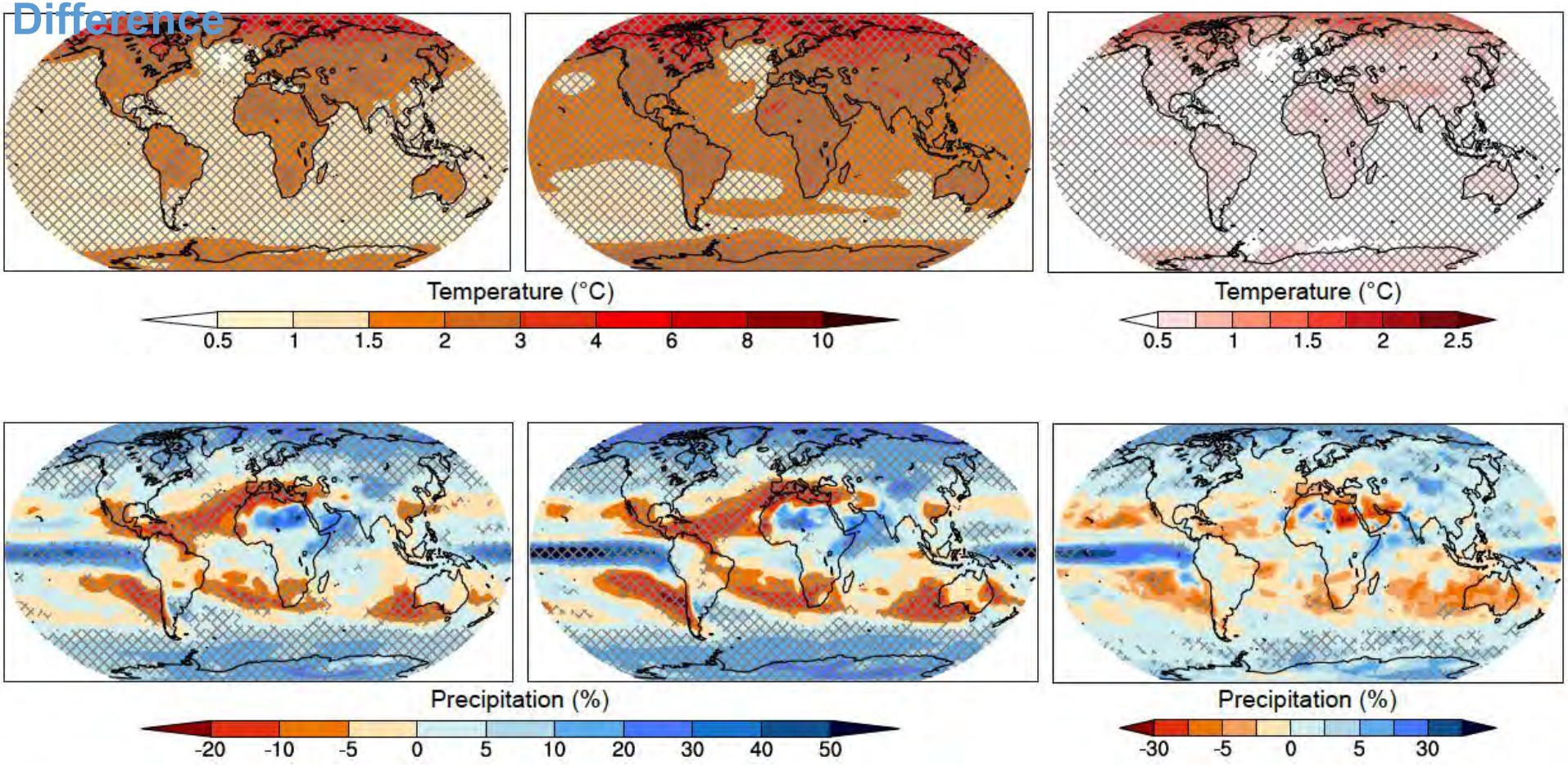


Spatial patterns of changes in mean temperature and precipitation

Global warming of 1.5°C

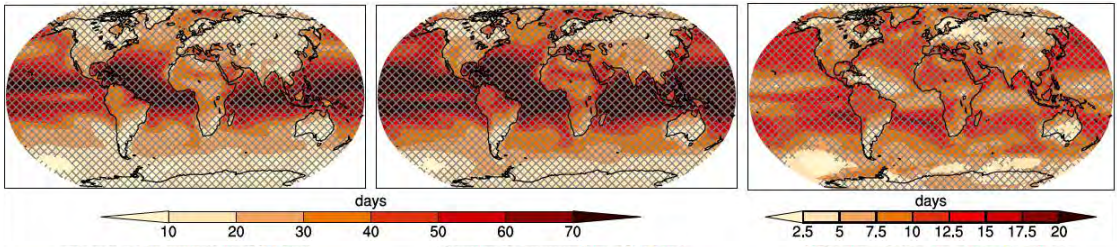
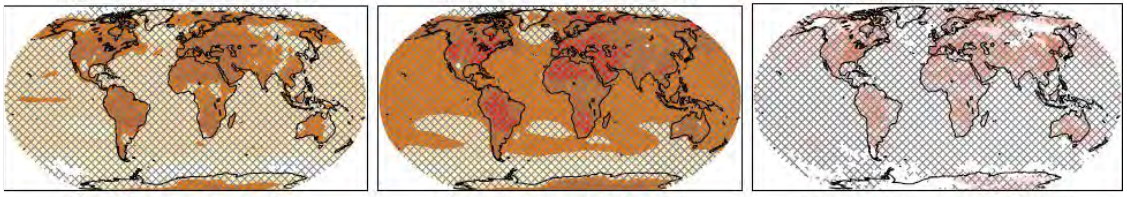
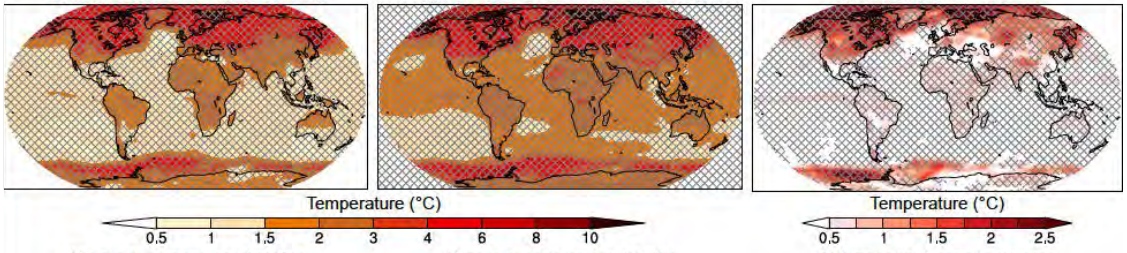
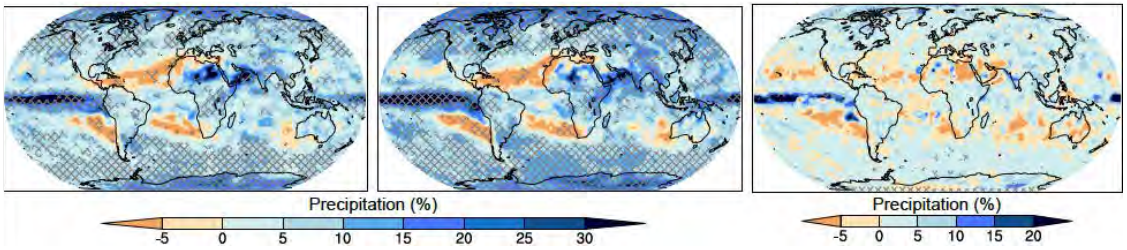
2°C

Difference

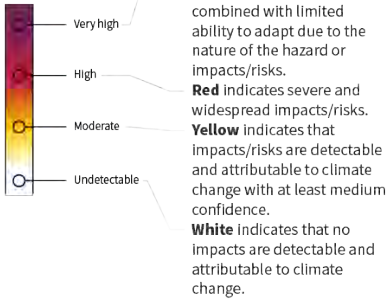


26 CMIP5 models; hatching : 66% model agreement

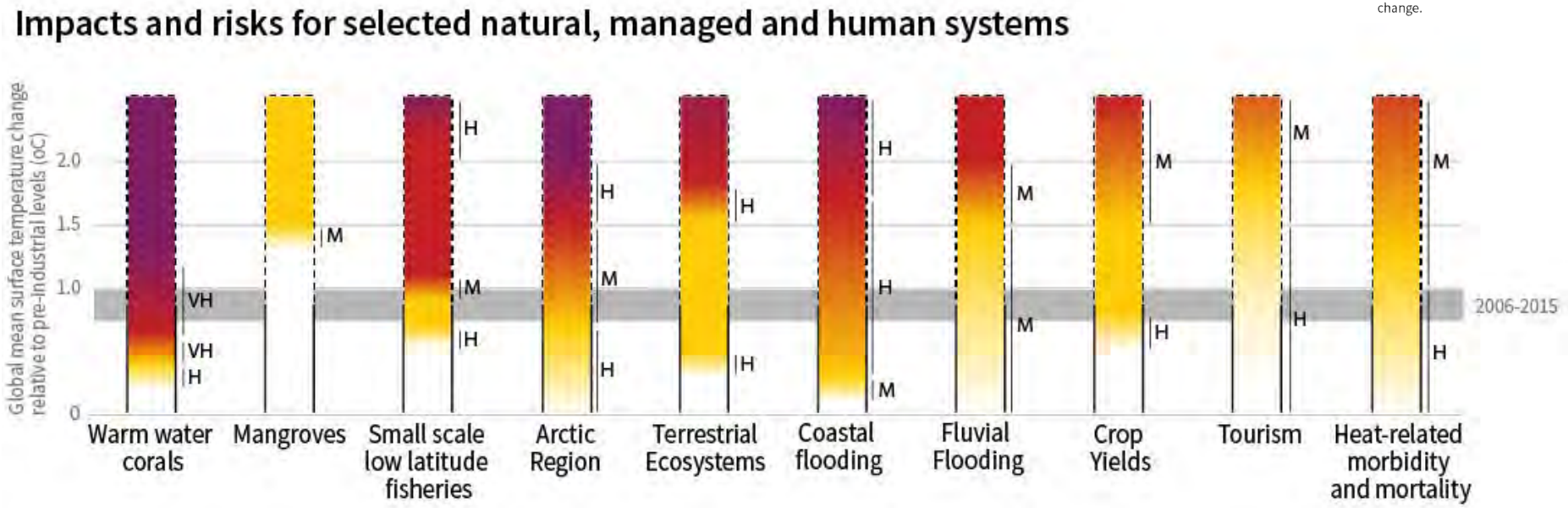
Spatial patterns of changes in extreme temperature and precipitation

	Global warming of 1.5°C	2°C	Difference
Number of hot days (days)			
Temperature of hottest days (°C)			
Temperature of coldest nights (°C)			
Extreme precipitation (%)			

How do climate-related risks change as a function of the level of global warming?

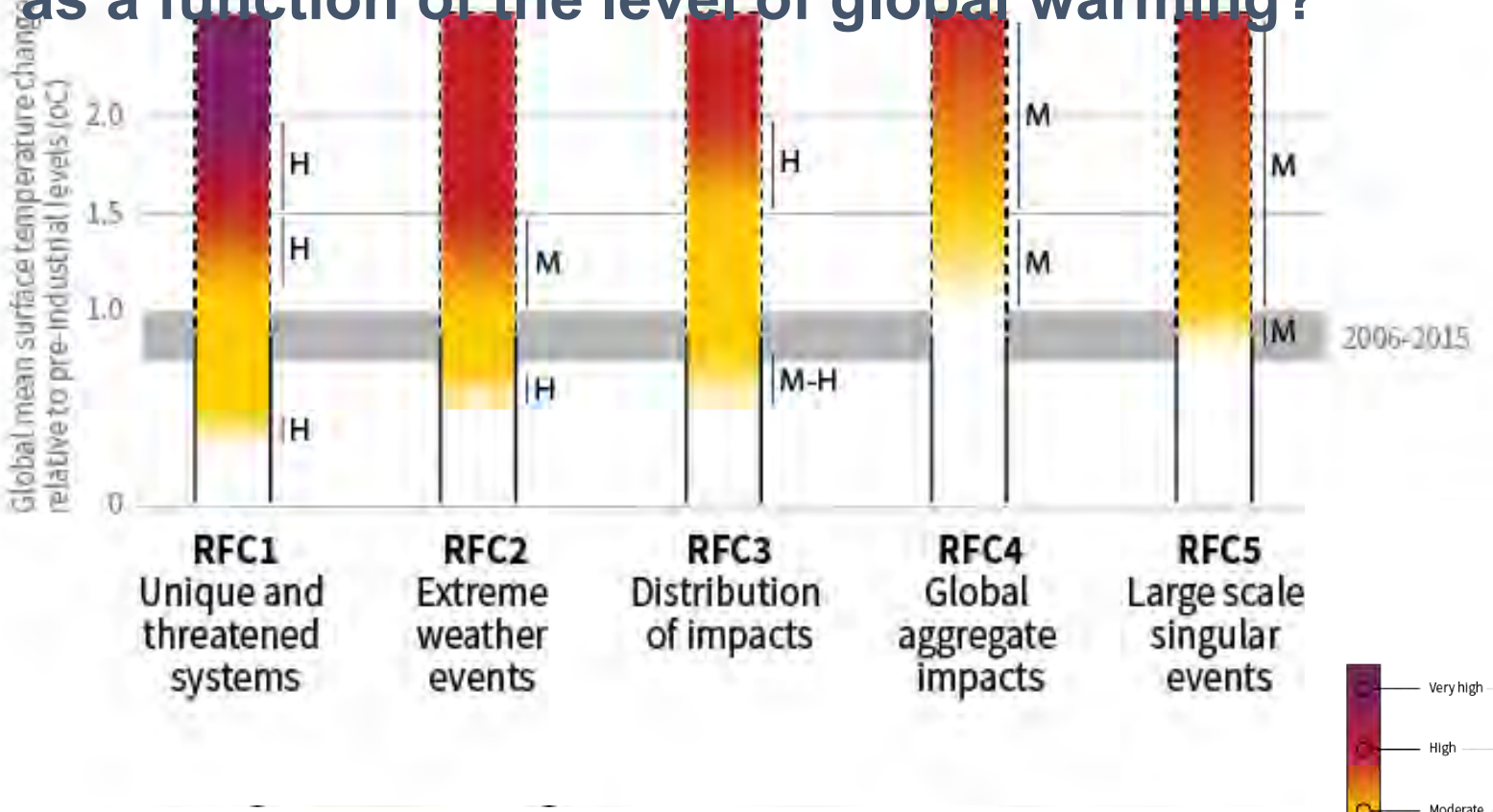


Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.
Red indicates severe and widespread impacts/risks.
Yellow indicates that impacts/risks are detectable and attributable to climate change with at least medium confidence.
White indicates that no impacts are detectable and attributable to climate change.



Confidence level : M, medium; H, high; VH; very high

How do climate-related risks for “Reasons For Concern” change as a function of the level of global warming?



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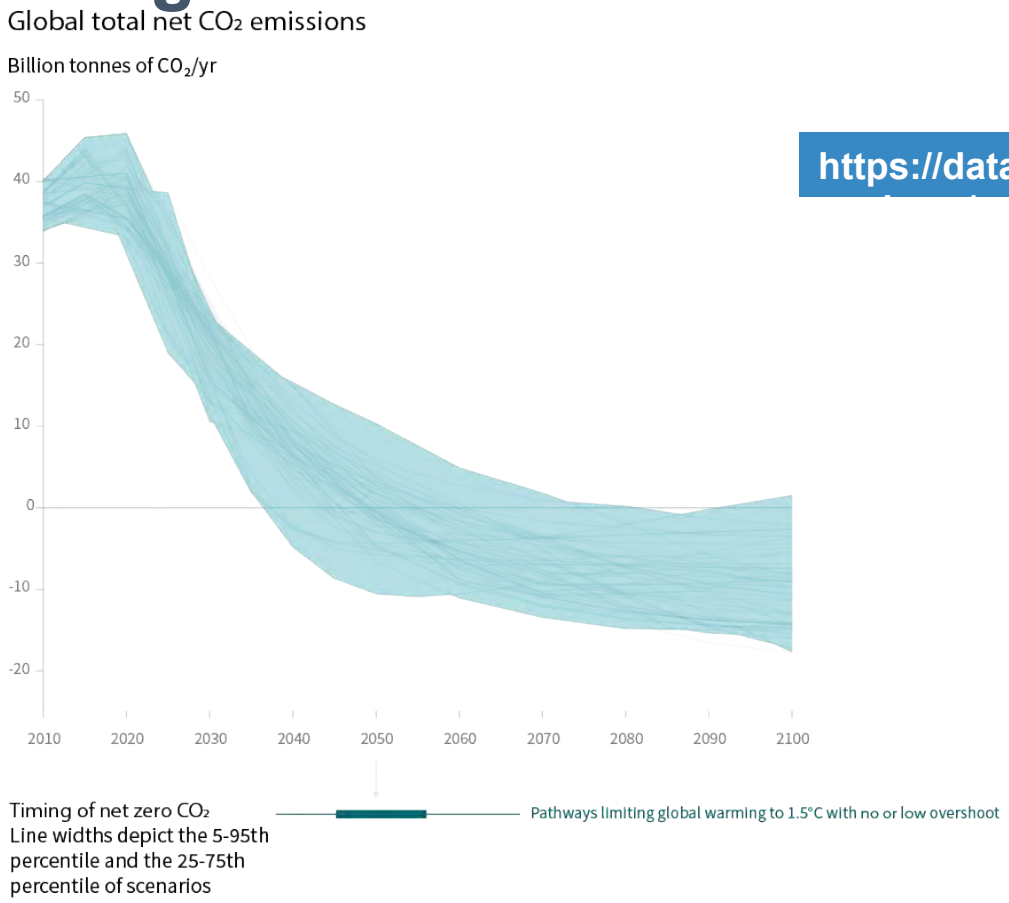
Jason Florio / Aurora Photos

At 1.5°C compared to 2°C

- Up to several hundred million fewer people exposed to climate-related risk and susceptible to poverty by 2050
- Disproportionately high risk for Arctic, dryland regions, small island developing states and least developed countries
- Lower risks for health, livelihoods, food security, water supply, human security and economic growth
- Wide range of adaptation options which can reduce climate risks; less adaptation needs at 1.5°C

What are greenhouse gas emission pathways compatible with limiting warming to 1.5°C?



https://data.ene.iiasa.ac.at/iamc-1.5c-

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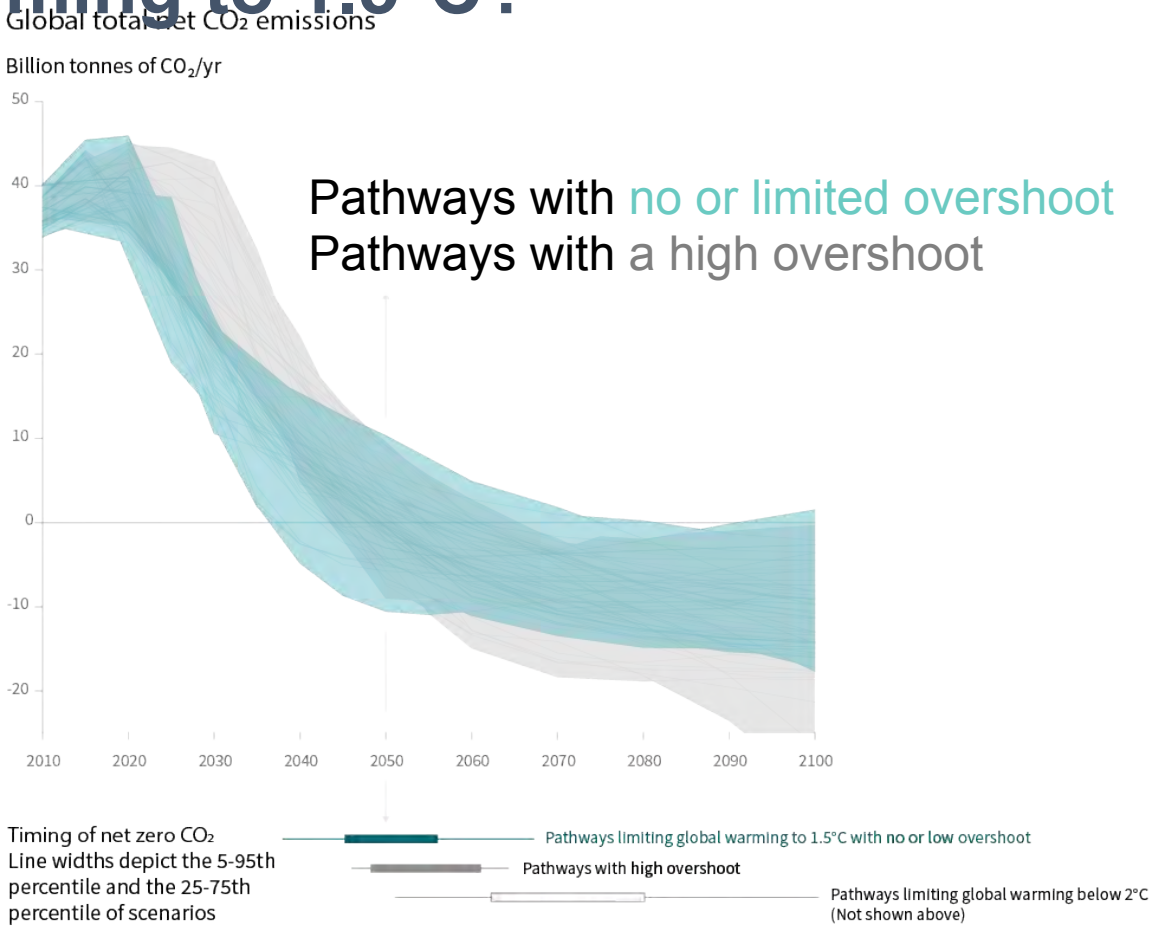

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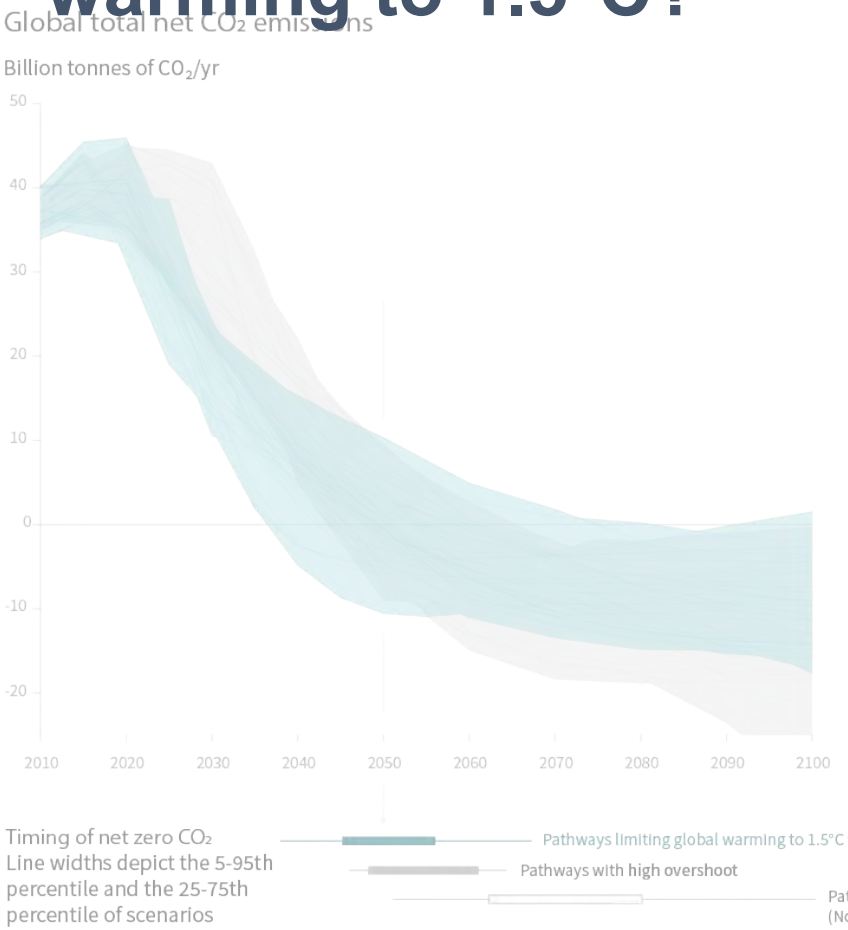
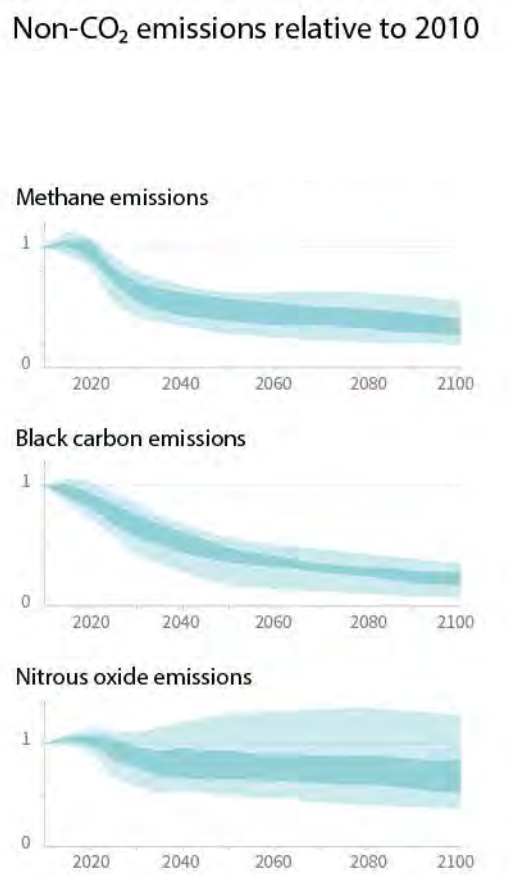
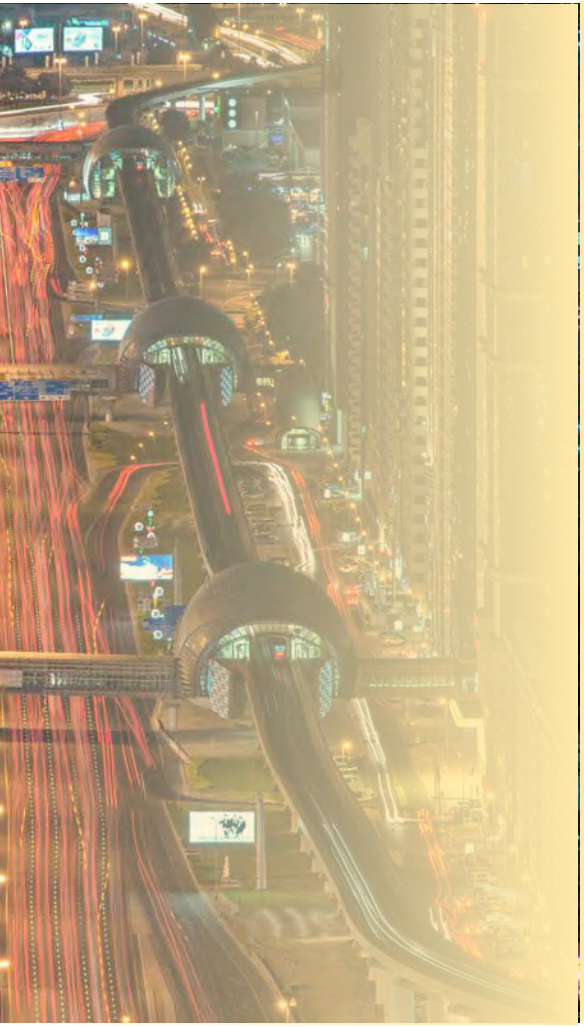






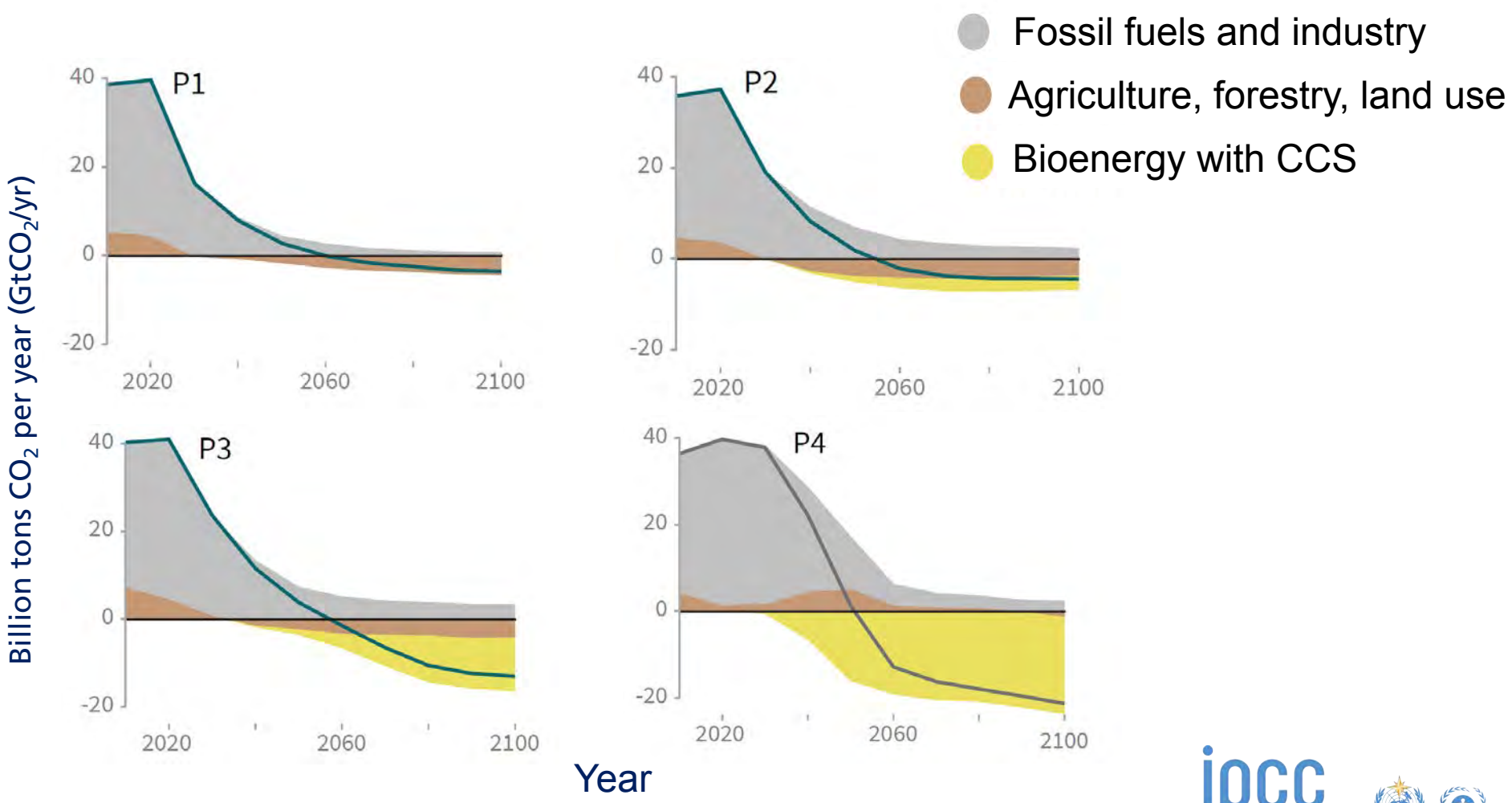
Mint Images / Aurora Photos

Limiting warming to 1.5°C

Would require rapid, far-reaching and unprecedented changes in all systems

- A range of technologies and behavioural changes
- Scale up in annual investment in low carbon energy and energy efficiency by factor of five by 2050
- Renewables supply 70-85% of electricity in 2050
- Coal declines steeply, ~zero in electricity by 2050
- Deep emissions cuts in transport and buildings
- Transitions in land use, scale depending on mitigation portfolio
- Urban and infrastructure system transitions, changes in urban planning practices

Four illustrative model pathways



Where are we?

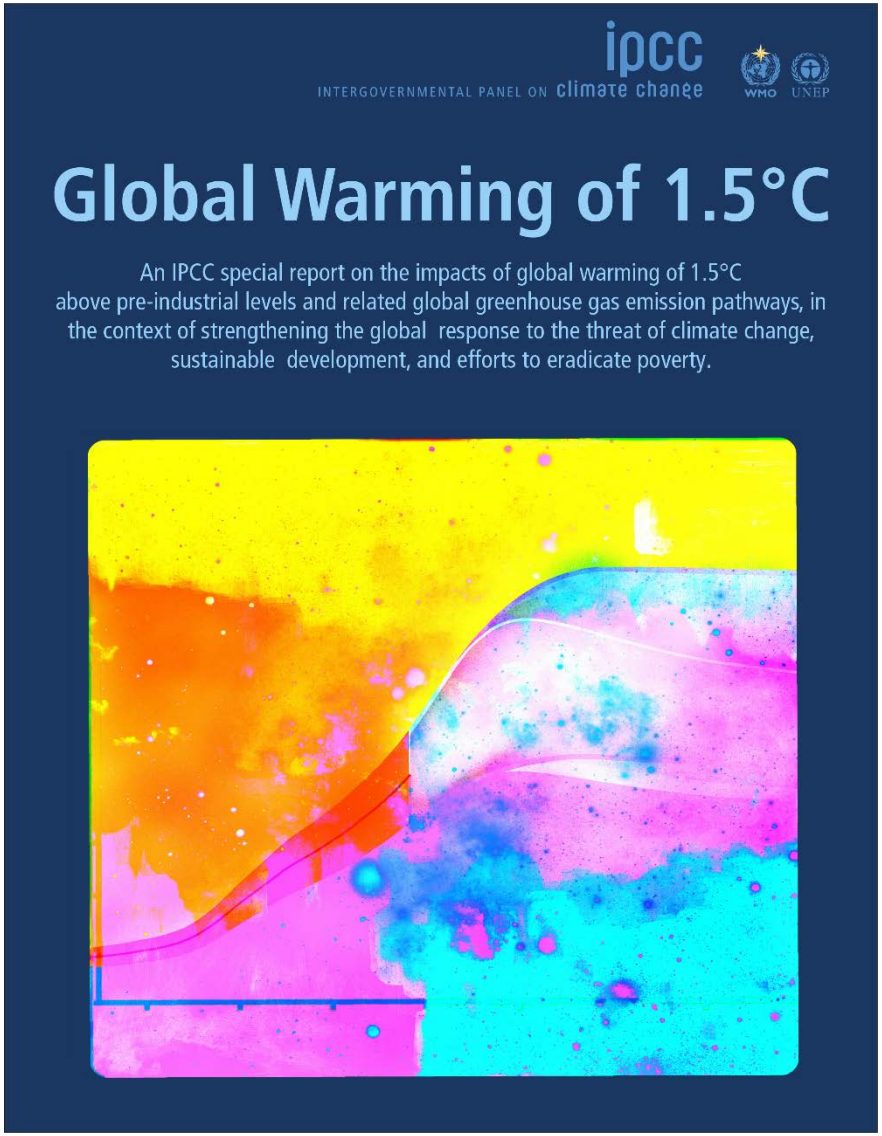
- National pledges are not enough to limit warming to 1.5°C
- Avoiding warming of more than 1.5°C would require carbon dioxide emissions to decline substantially before 2030

Peter Essick / Aurora Photos

Ashley Cooper/ Aurora Photos

Climate change and sustainability

- Ethical and fair transitions
- Different pathways have different synergies and trade-offs with UN Sustainable Development Goals (SDGs)
- Careful mix of measures to adapt to climate change and reduce emissions can help achieve SDGs
- Low energy demand, low material consumption and low carbon food carry highest benefits
- Cooperation, governance, innovation and mobilisation of finance key for feasibility



ipcc.ch/report/sr15 :

Summary for Policy Makers

10 Frequently Asked Questio

5 Chapters

Glossary