IPCC Fifth Assessment Report
The Role of Forests

Renate Christ - Kazan, 18 November 2014

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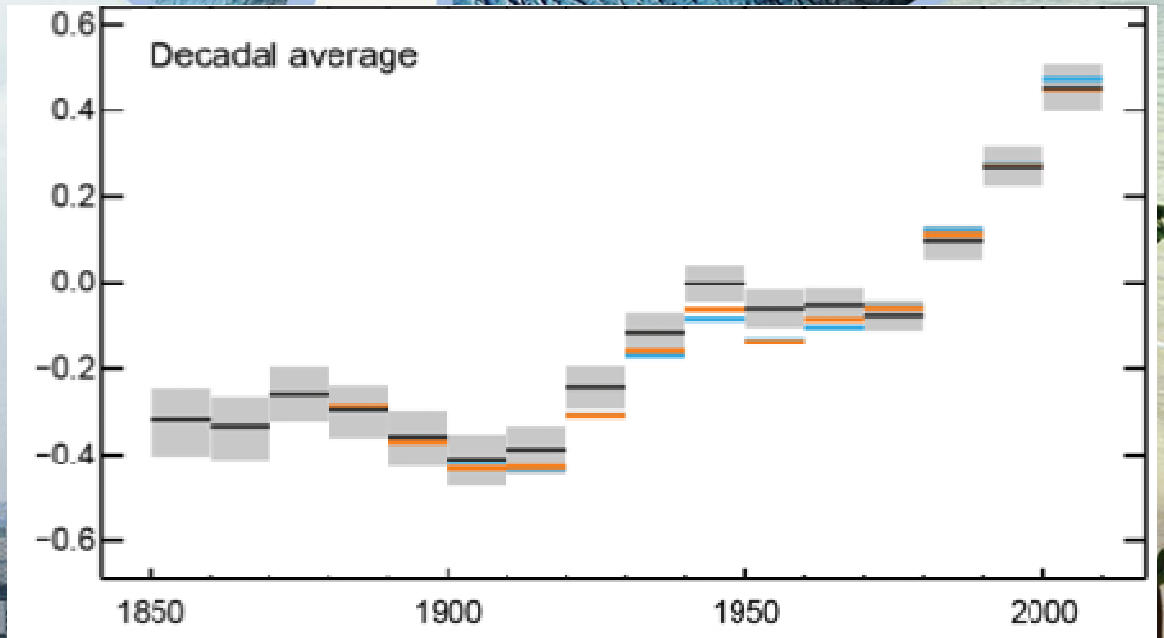
Key Messages

- → Human influence on the climate system is clear
- → The more we disrupt our climate, the more we risk severe, pervasive and irreversible impacts
- → We have the means to limit climate change and build a more prosperous, sustainable future

AR5 WGI SPM, AR5 WGII SPM, AR5 WGIII SPM

Humans are changing the climate

It is extremely likely that we are the dominant cause of warming since the mid-20th century



Globally averaged combined land and ocean surface temperatures

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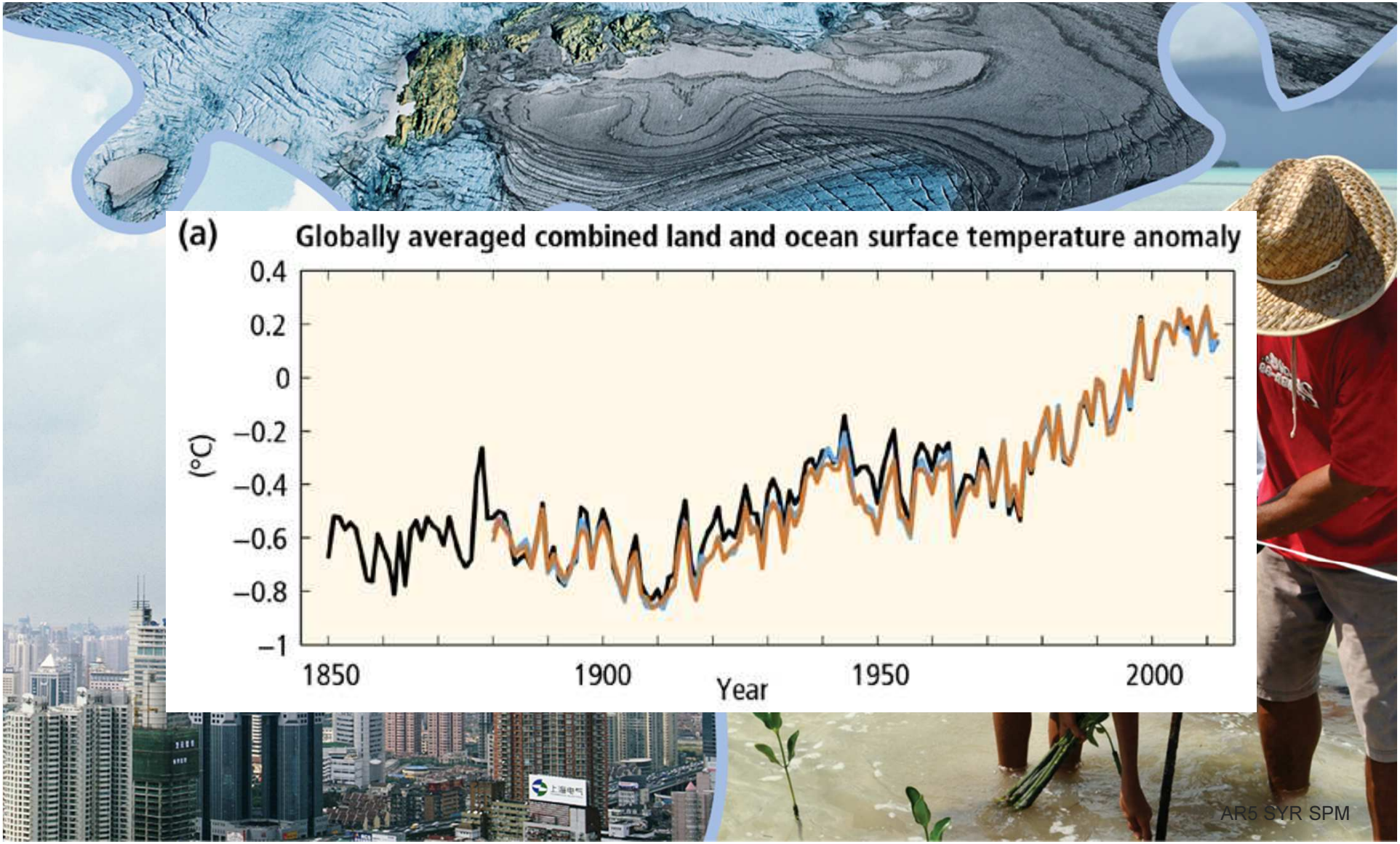

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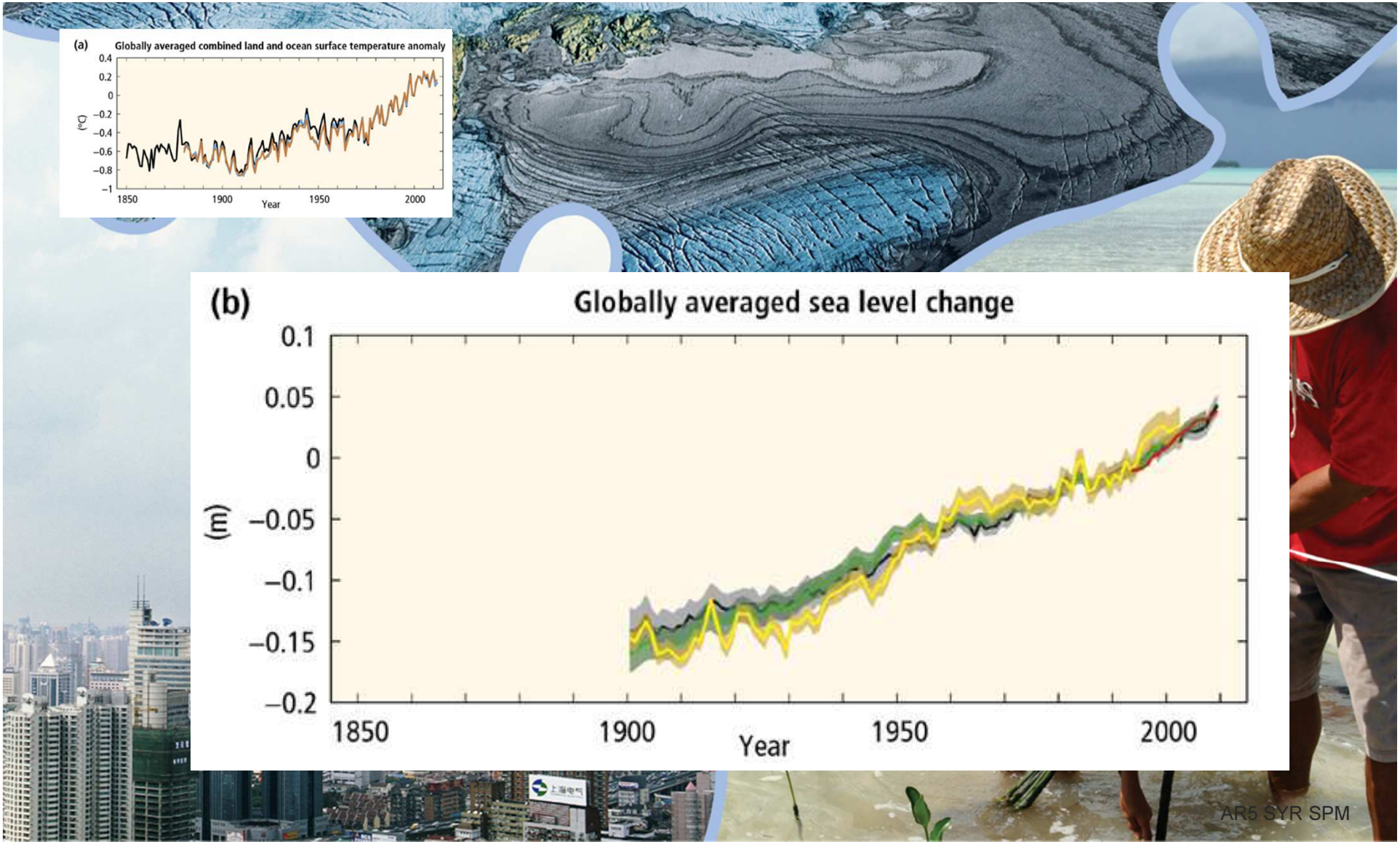

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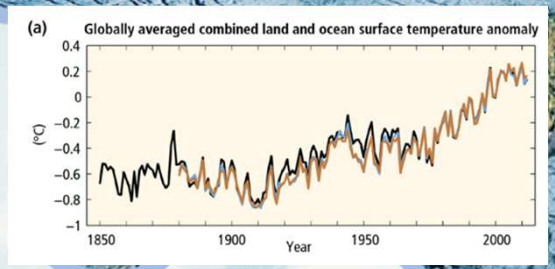

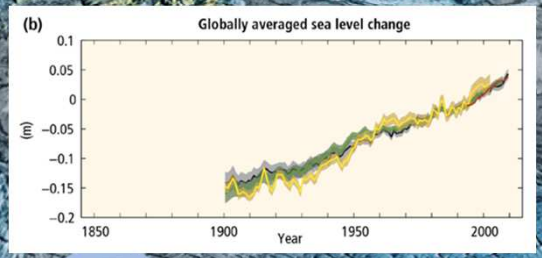

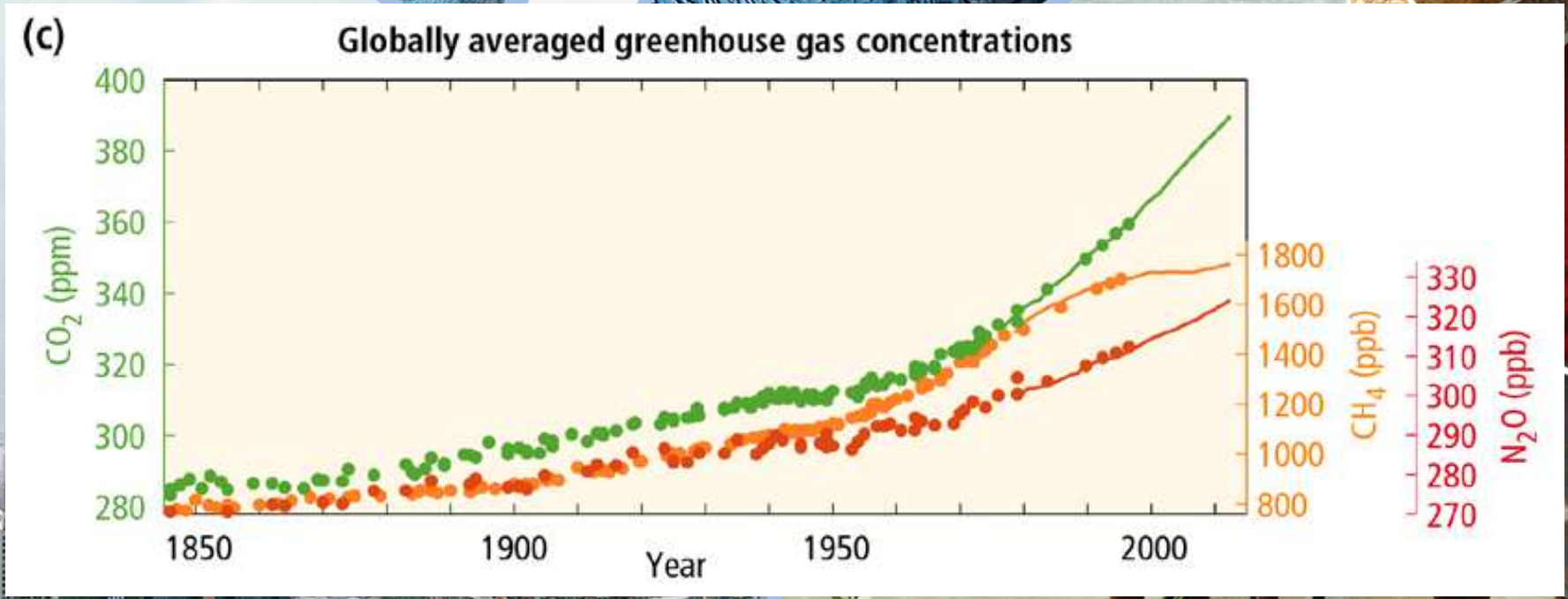

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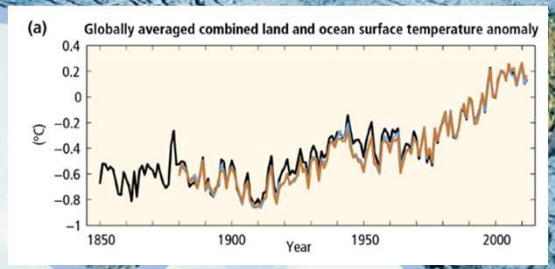

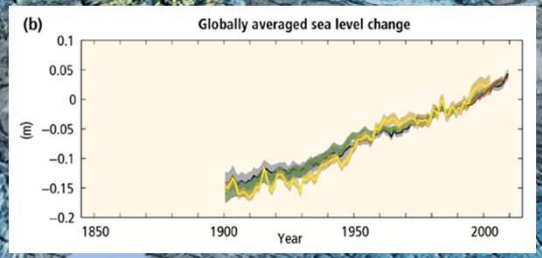

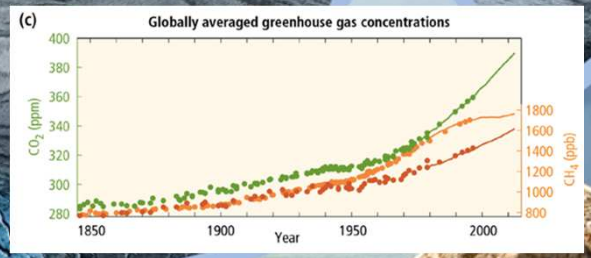

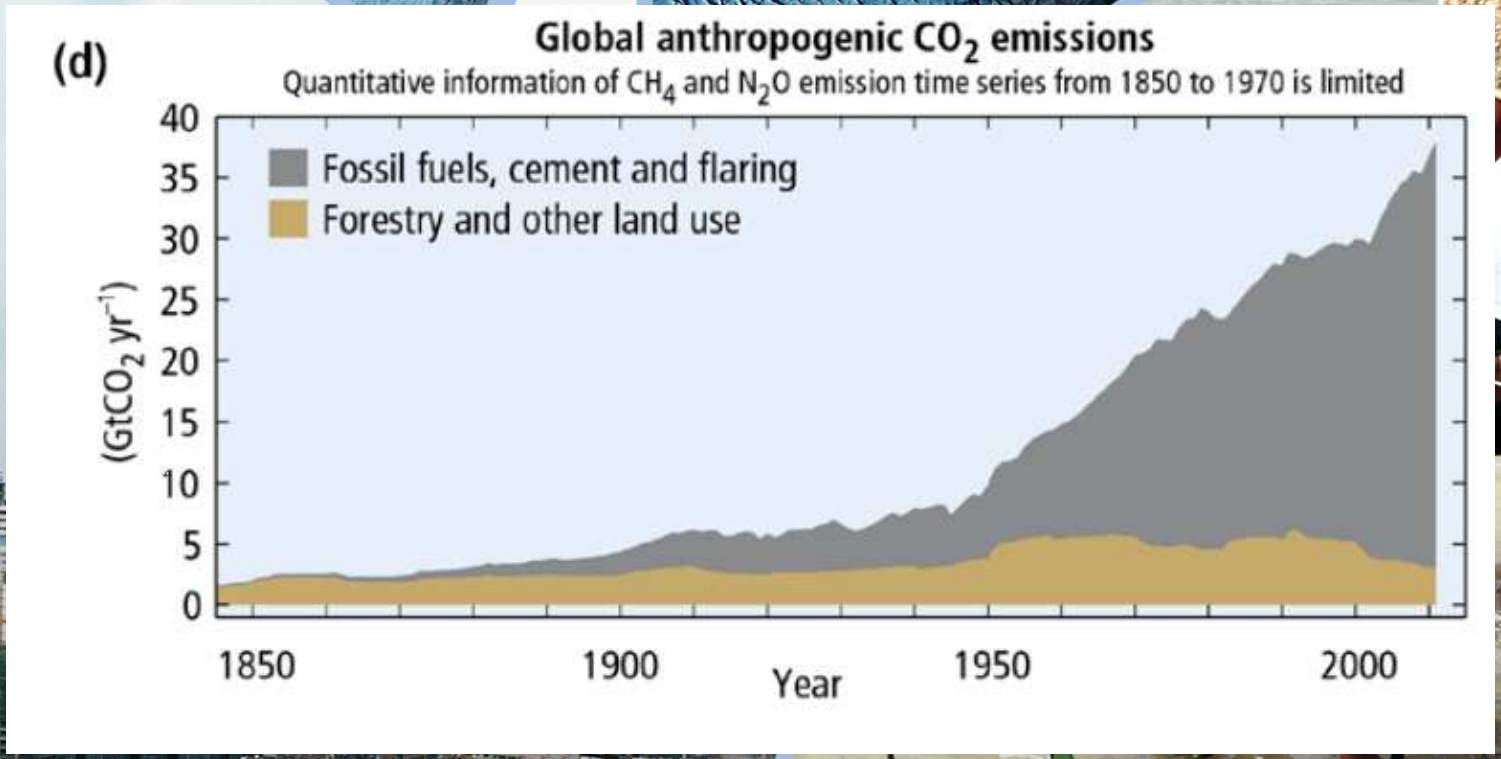

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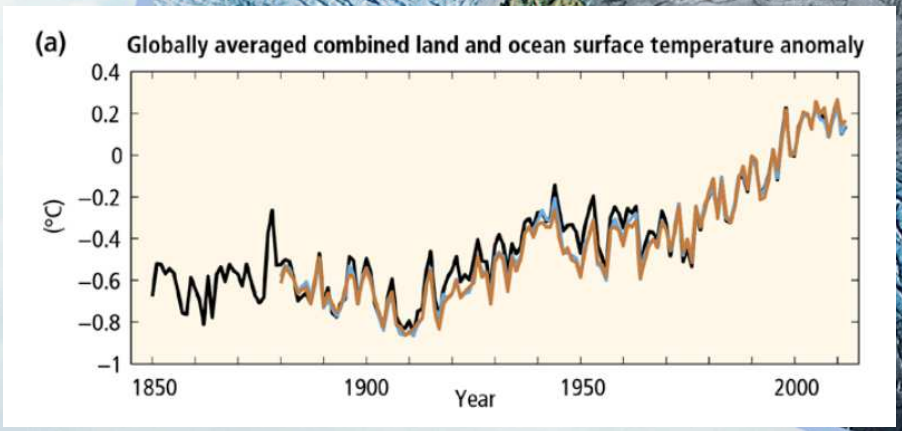

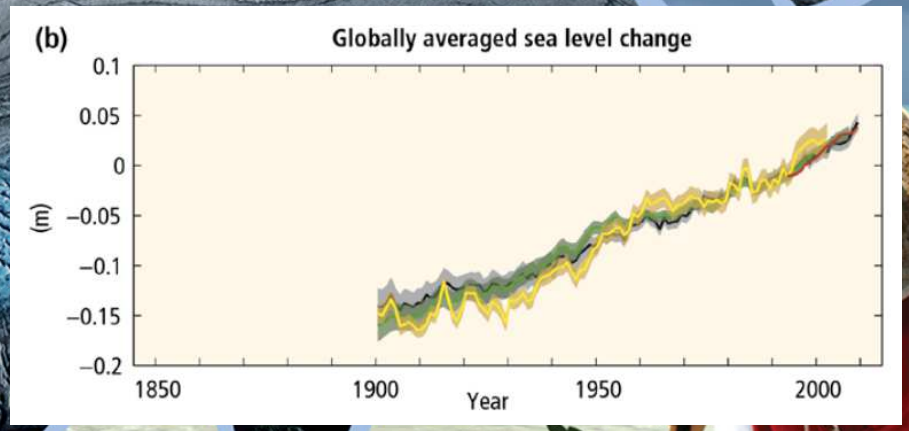

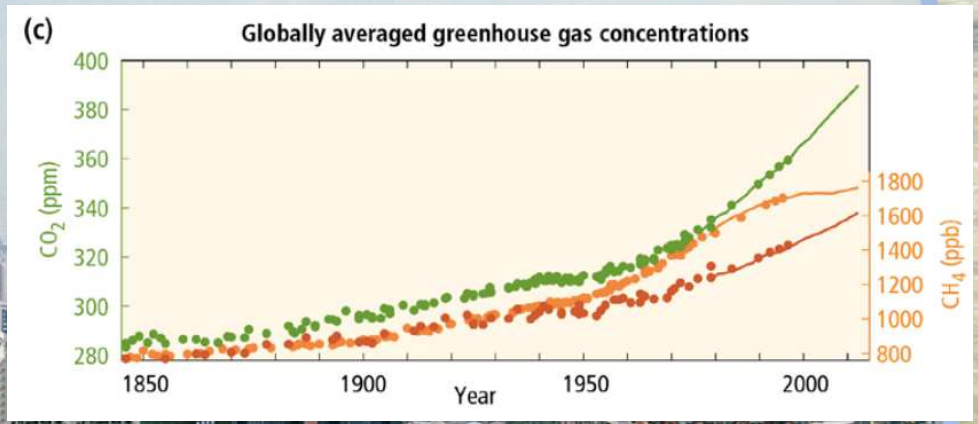

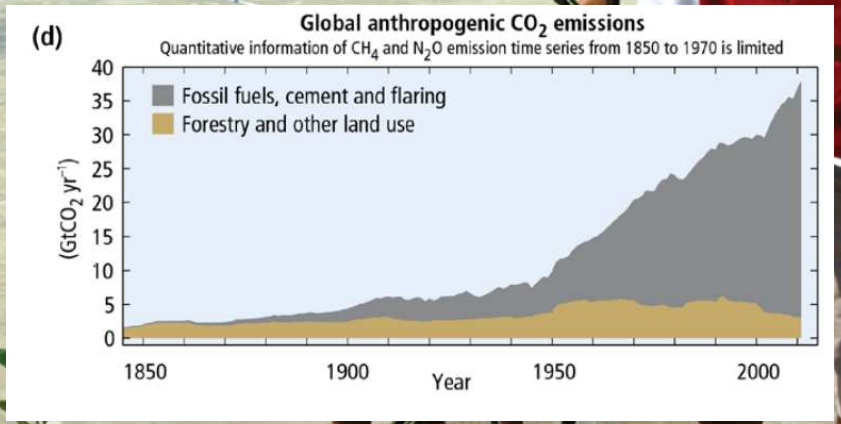

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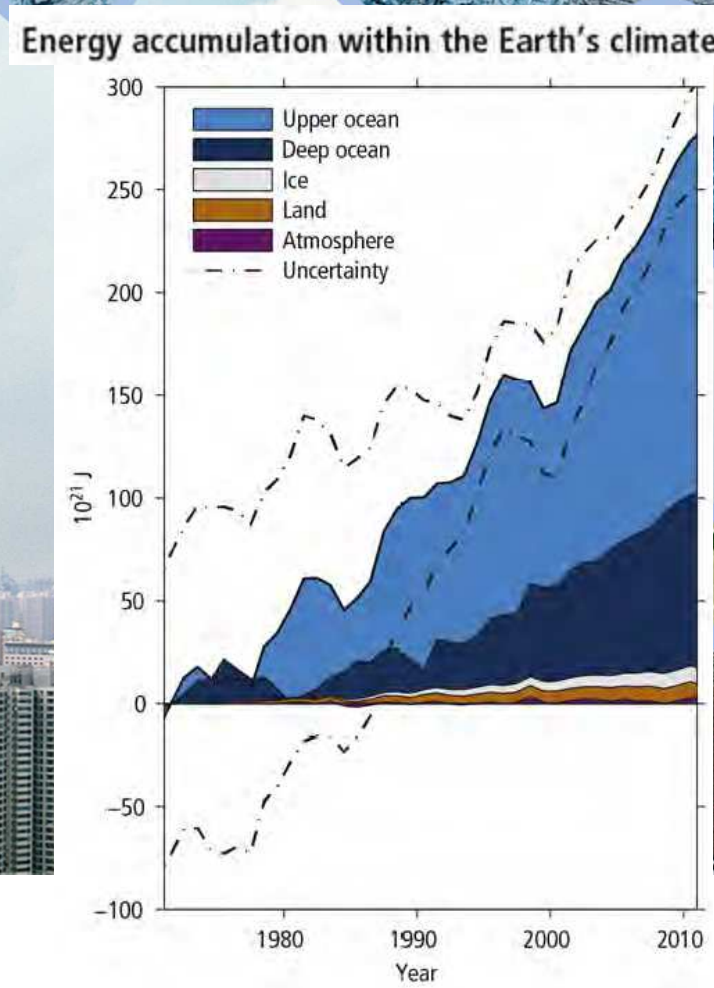
Oceans absorb most of the heat



→ More than 90% of the energy accumulating in the climate system between 1971 and 2010 has accumulated in the ocean

→ Land temperatures remain at historic highs while ocean temperatures continue to climb

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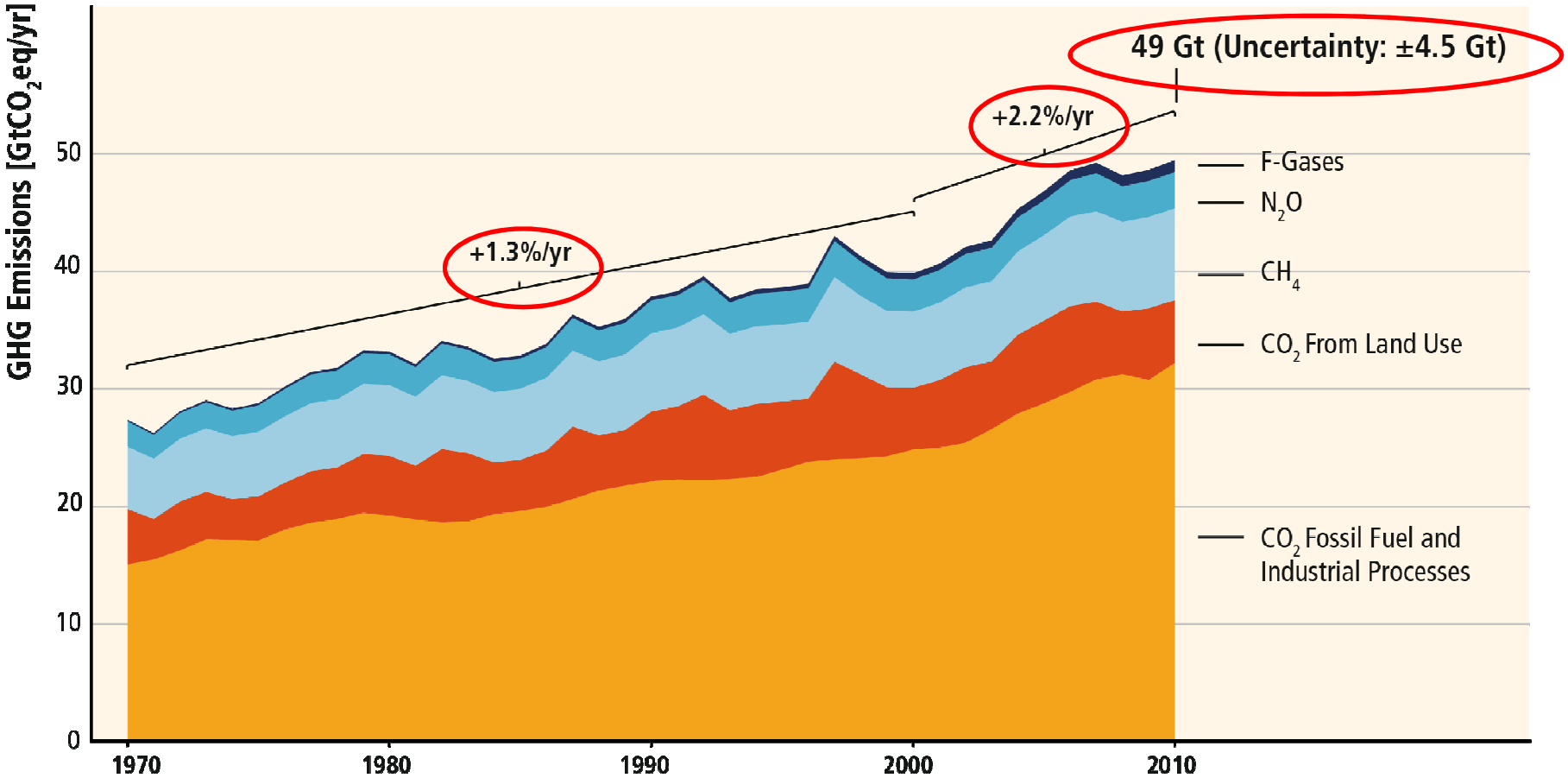
GHG emissions growth has accelerated despite reduction efforts



Based on Figure 1.3

AFOLU second largest emitting sector - 20-24% of total emissions

Emissions decreased in last decade

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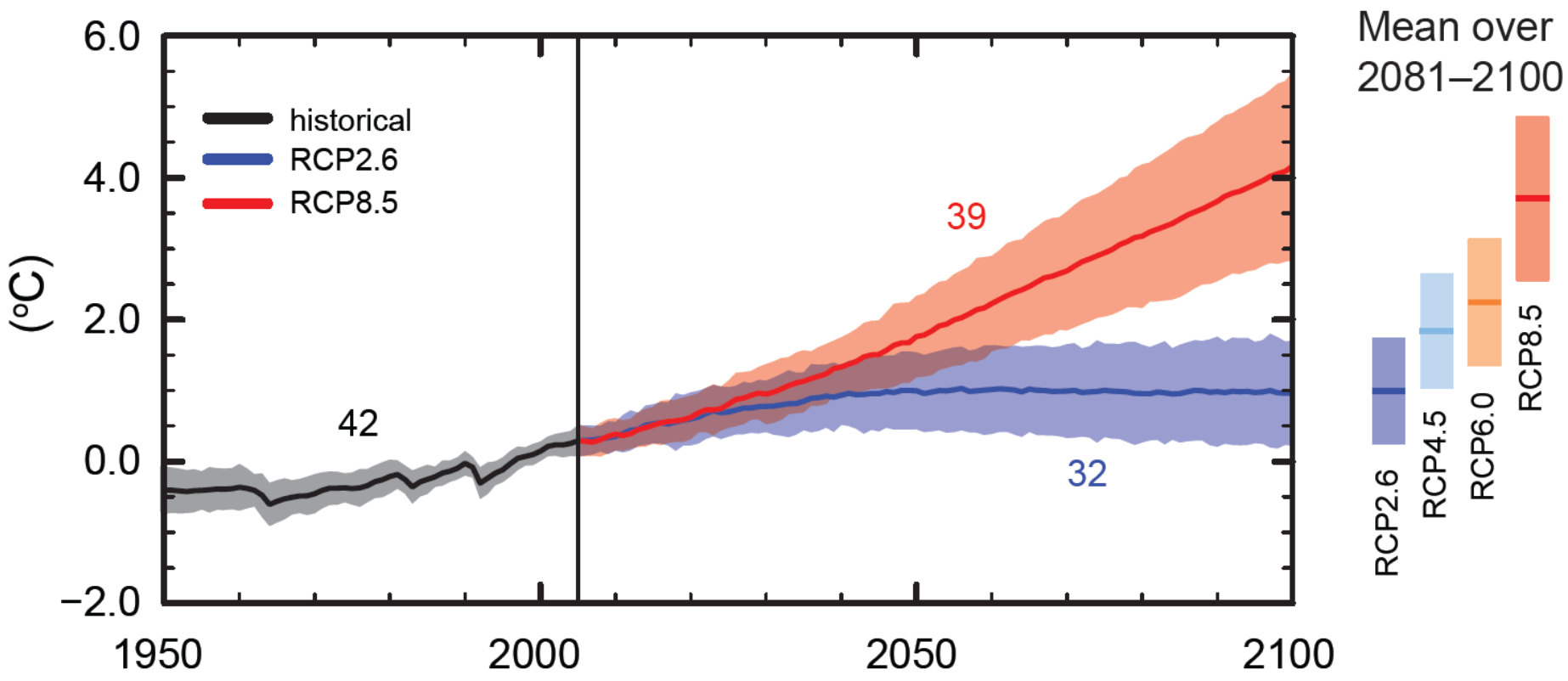
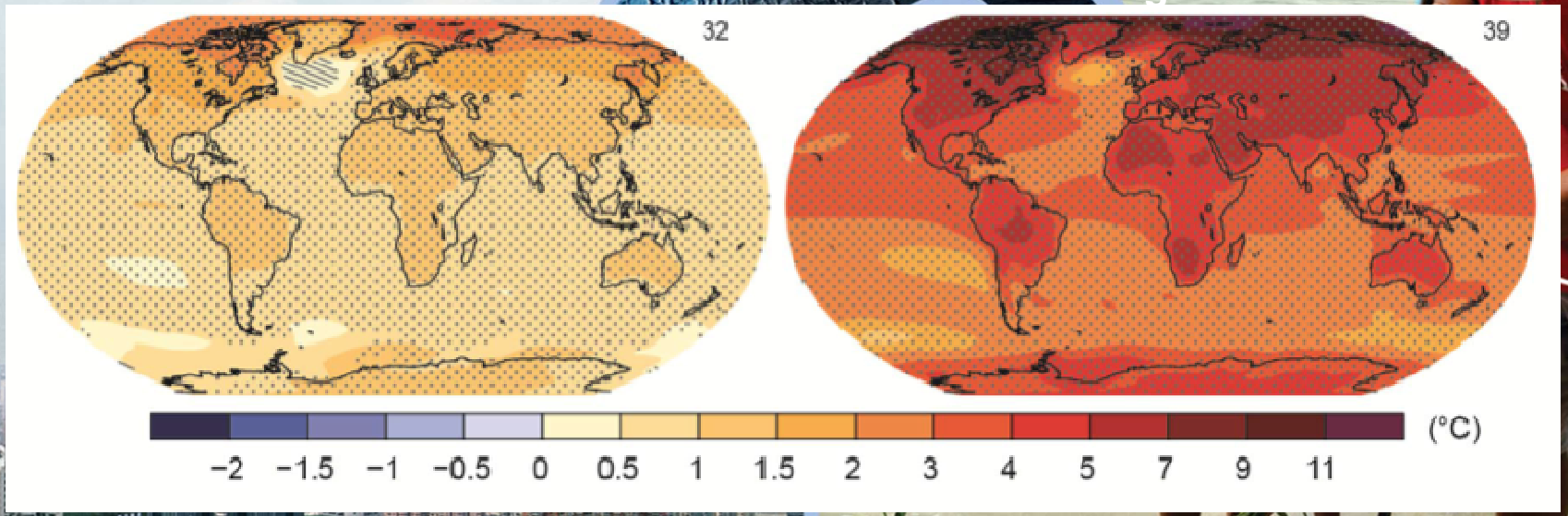
Projected global average surface temperature change



The Choices We Make Will Create Different Outcomes

With substantial mitigation

Without additional mitigation



Change in average surface temperature (1986–2005 to 2081–2100)

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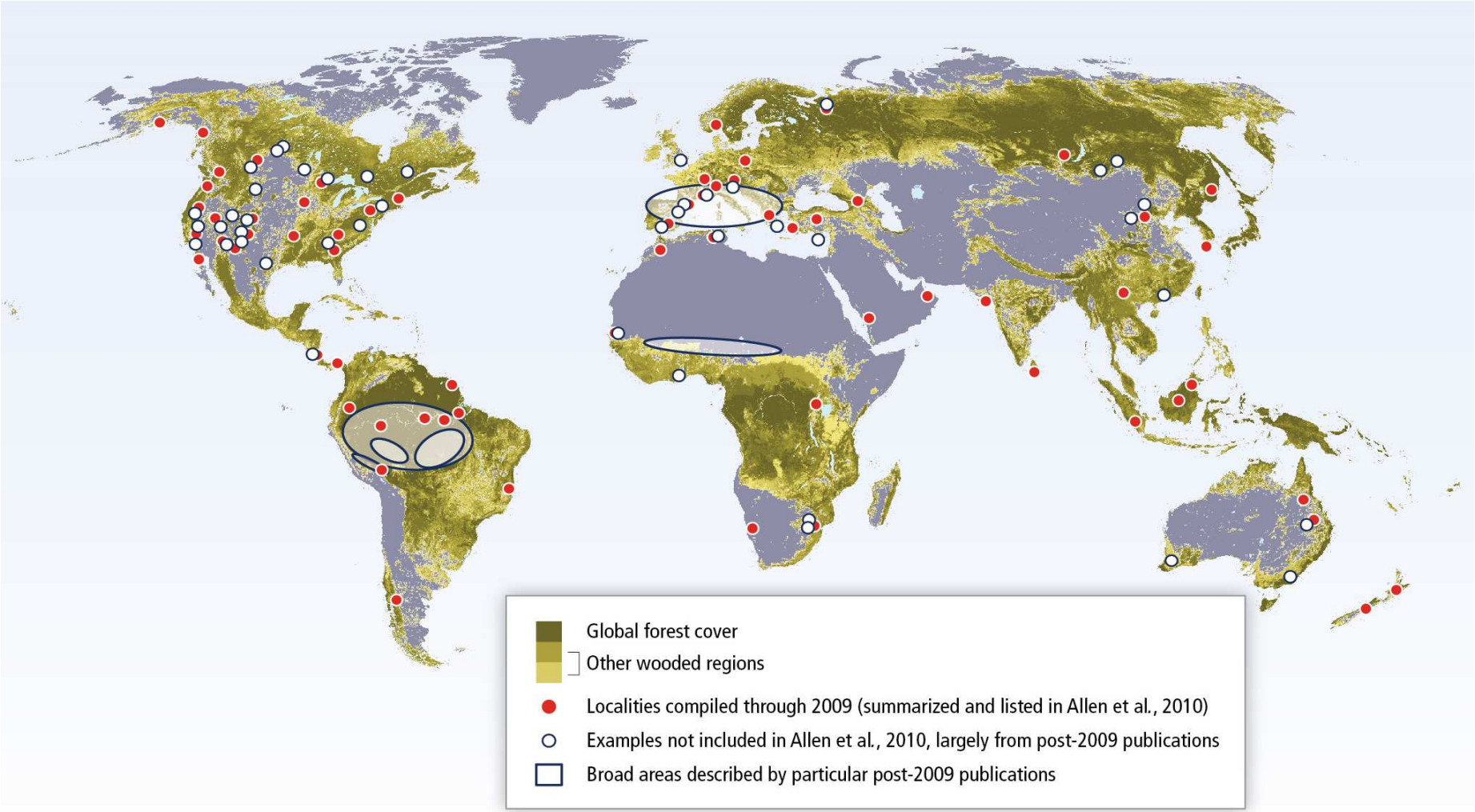
Locations of substantial drought- and heat-induced tree mortality around the globe since 1970



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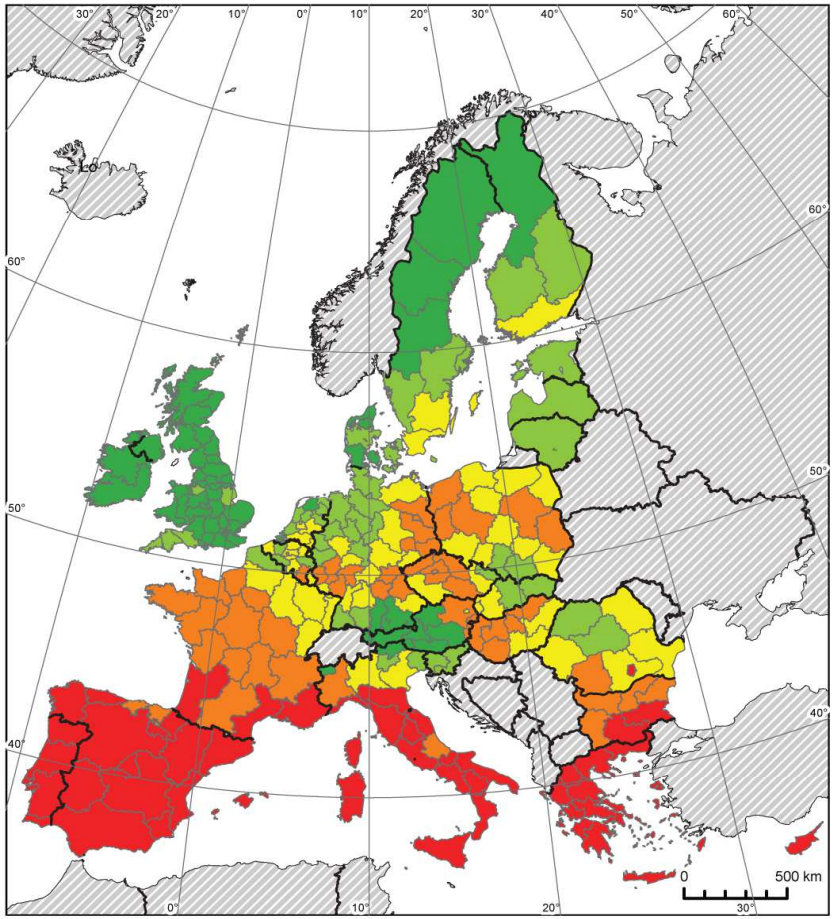
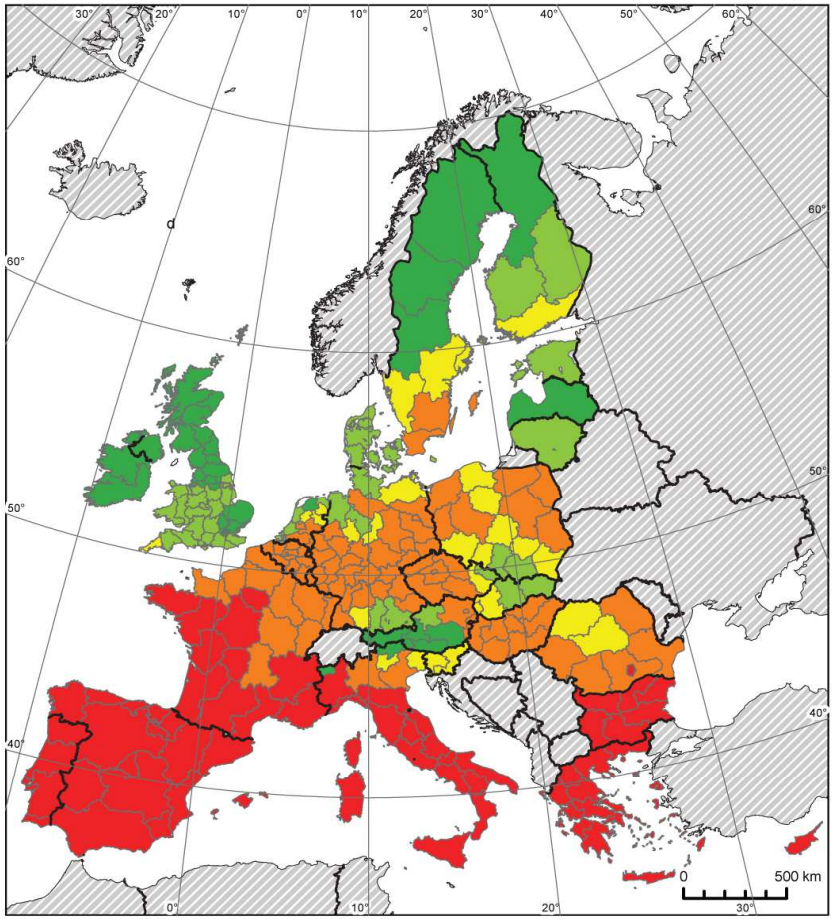
Forest Fire Risk

(a) Baseline climate (1961–1990)



(b) climate scenario 2041–2070 (A1B emission scenario)



Forest fire risk Very high | High | Medium | Low | Very low | Not assessed

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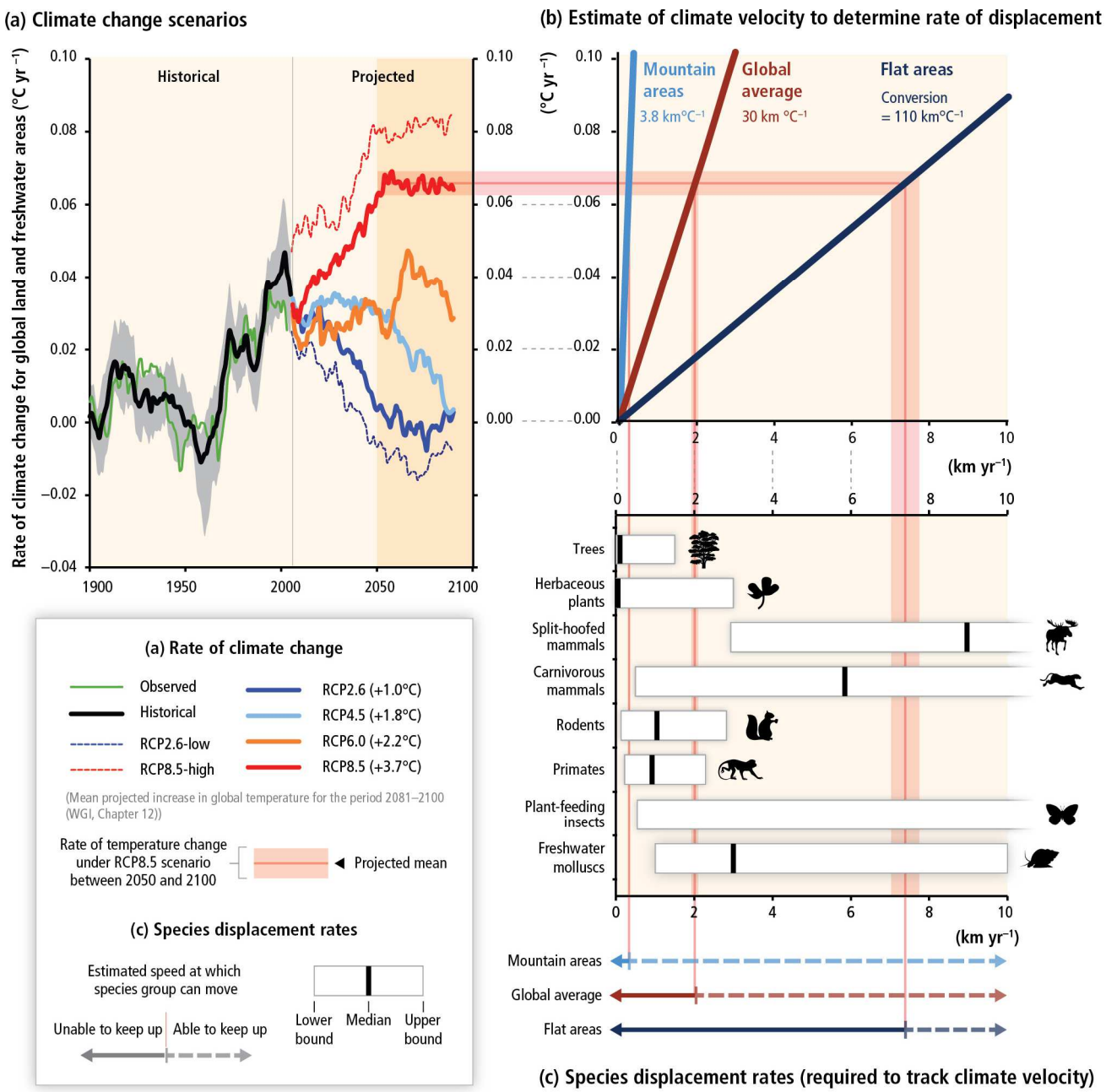

Species displacement rate

(a) Rates of climate change

(b) corresponding climate velocities

(c) rates of displacement in the absence of human intervention.

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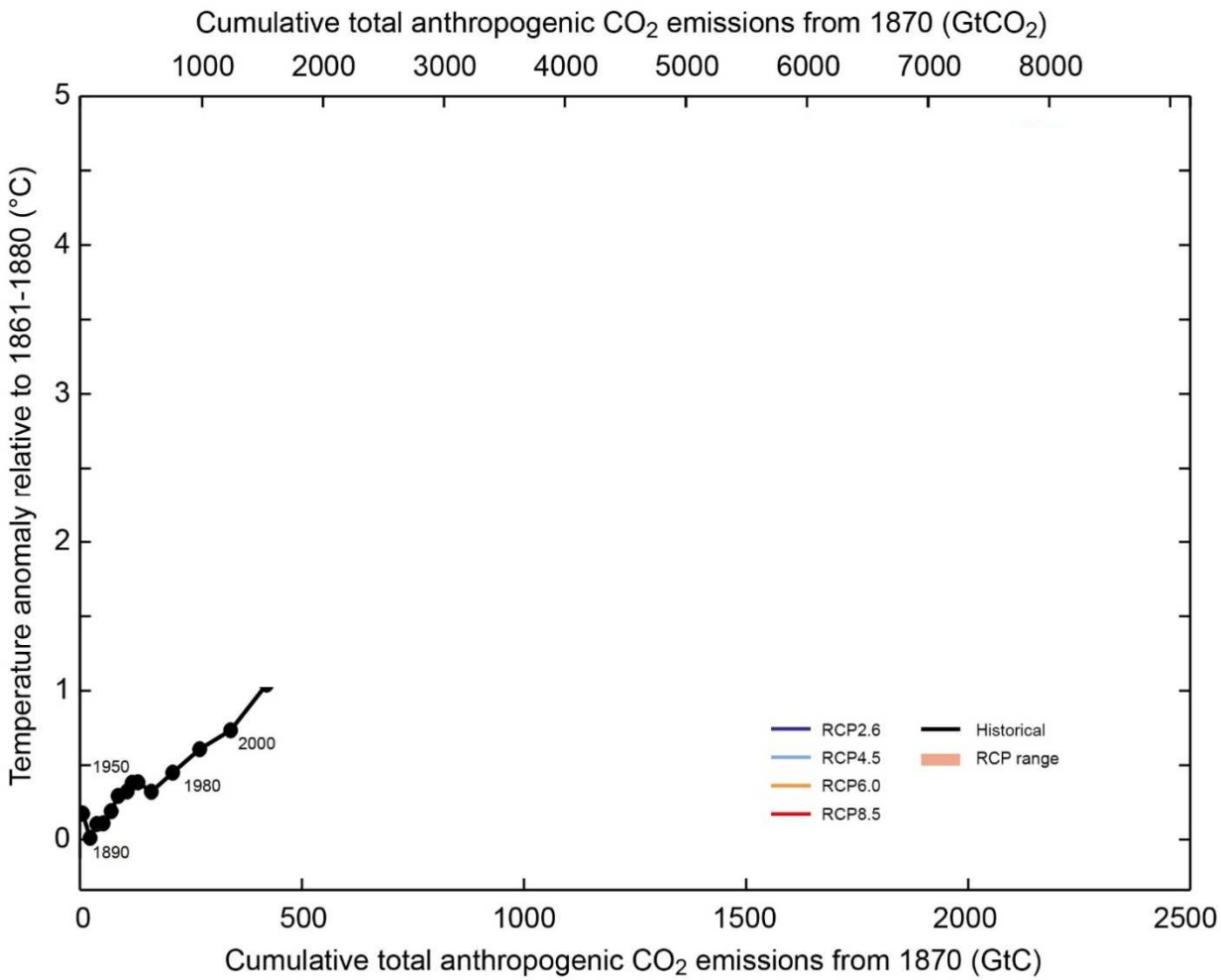
Key risks from climate change and the potential for reducing risk through mitigation and adaptation.

Key risk	Adaptation issues & prospects	Climatic drivers	Timeframe	Risk & potential for adaptation
Reduction in terrestrial carbon sink: Carbon stored in terrestrial ecosystems is vulnerable to loss back into the atmosphere. Key mechanisms include an increase in fire frequency due to climate change and the sensitivity of ecosystem respiration to rising temperatures. (*medium confidence*) [4.2.4, 4.3.2, 4.3.3]	Adaptation prospects include managing land use (including deforestation), fire, and other disturbances and non-climatic stressors.		Present Near term (2030 – 2040) Long term (2080 – 2100) 2°C 4°C	Very low – Medium – Very high
Boreal tipping point: Arctic ecosystems are vulnerable to abrupt change related to the thawing of permafrost and spread of shrubs in tundra and increase in pests and fires in boreal forests. (*medium confidence*) [4.3.3.1.1, Box 4-4]	There are few adaptation options in the Arctic.		Present Near term (2030 – 2040) Long term (2080 – 2100) 2°C 4°C	Very low – Medium – Very high
Amazon tipping point: Moist Amazon forests could change abruptly to less carbon-dense drought and fire-adapted ecosystems. (*low confidence*) [4.3.3.1.3, Box 4-3]	Policy and market measures to reduce deforestation and fire.		Present Near term (2030 – 2040) Long term (2080 – 2100) 2°C 4°C	Very low – Medium – Very high

Temperature increase and cumulative carbon emissions



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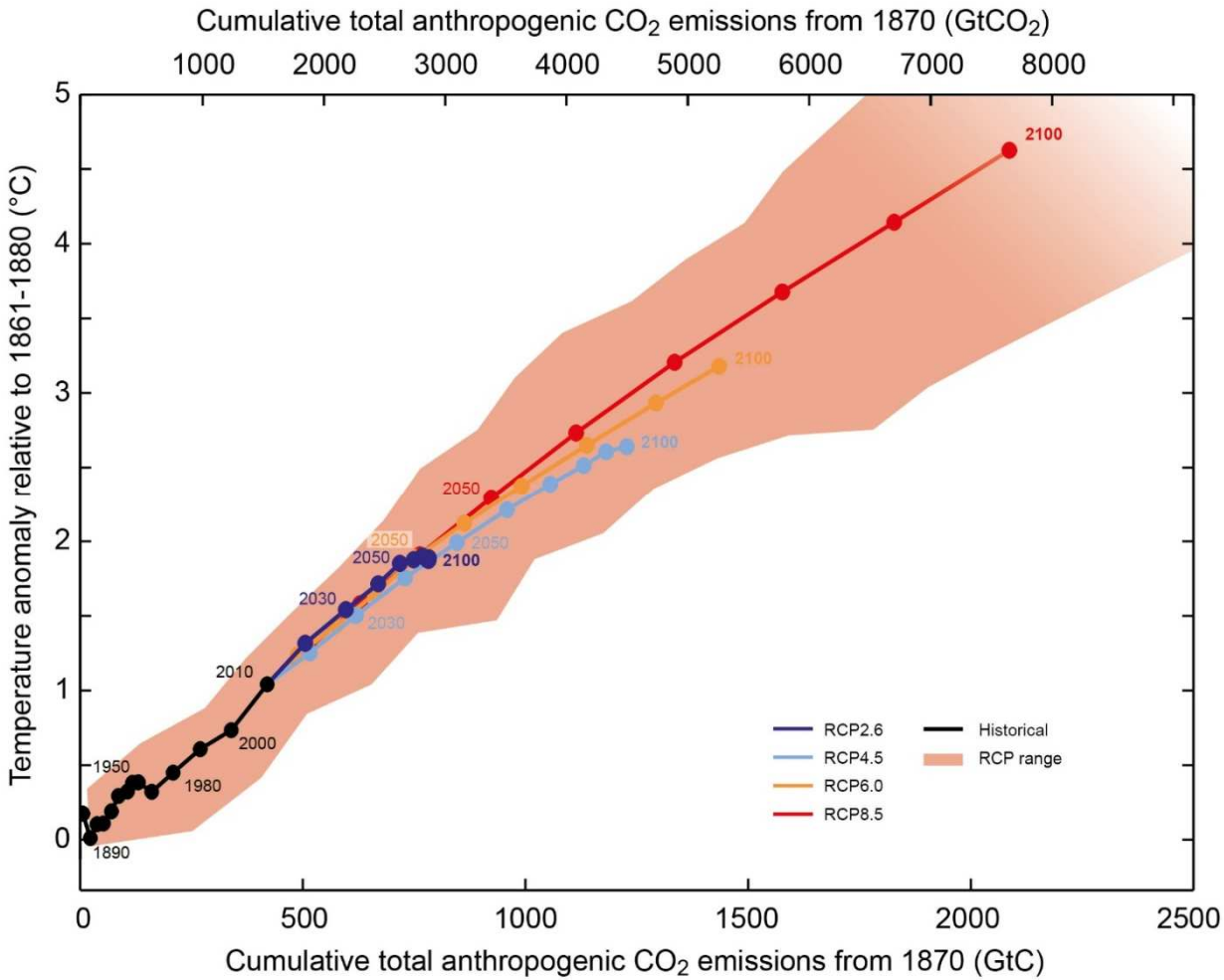

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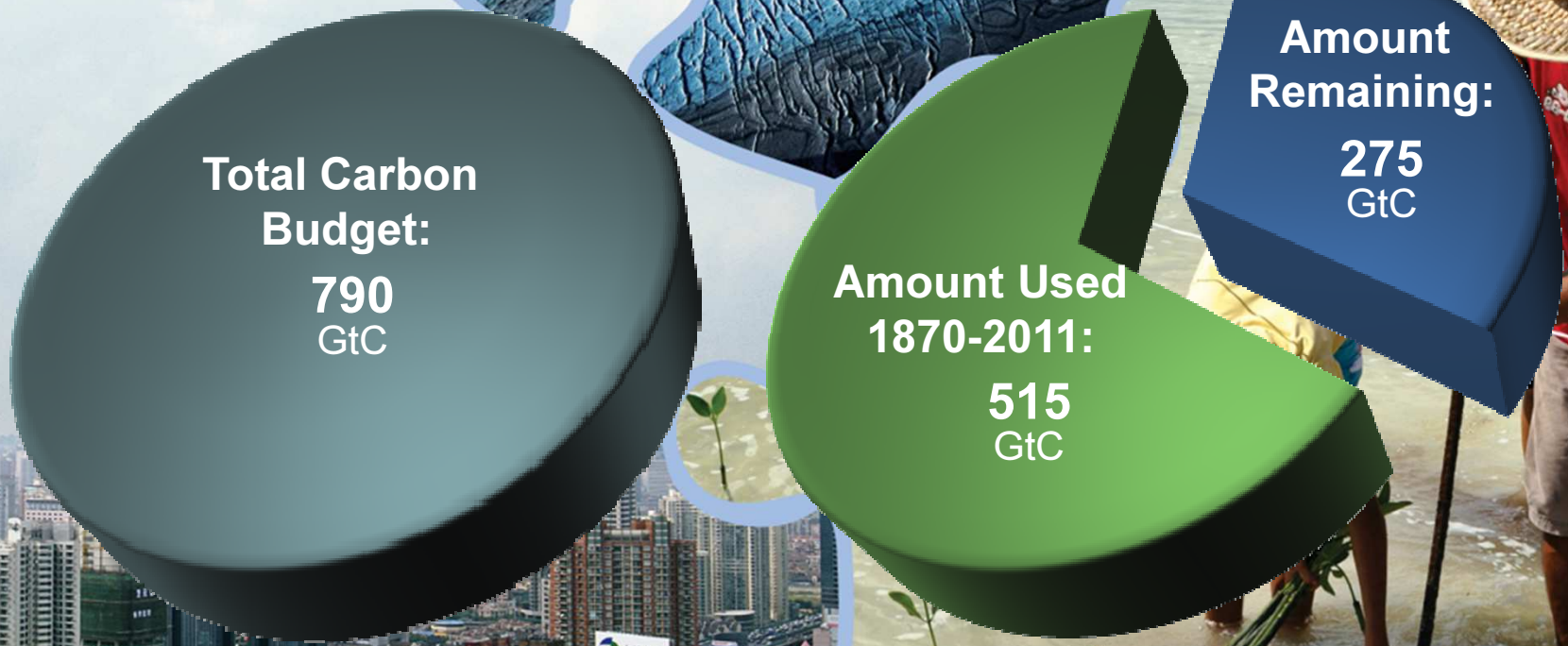
The window for action is rapidly closing

65% of our carbon budget compatible with a 2° C goal already used



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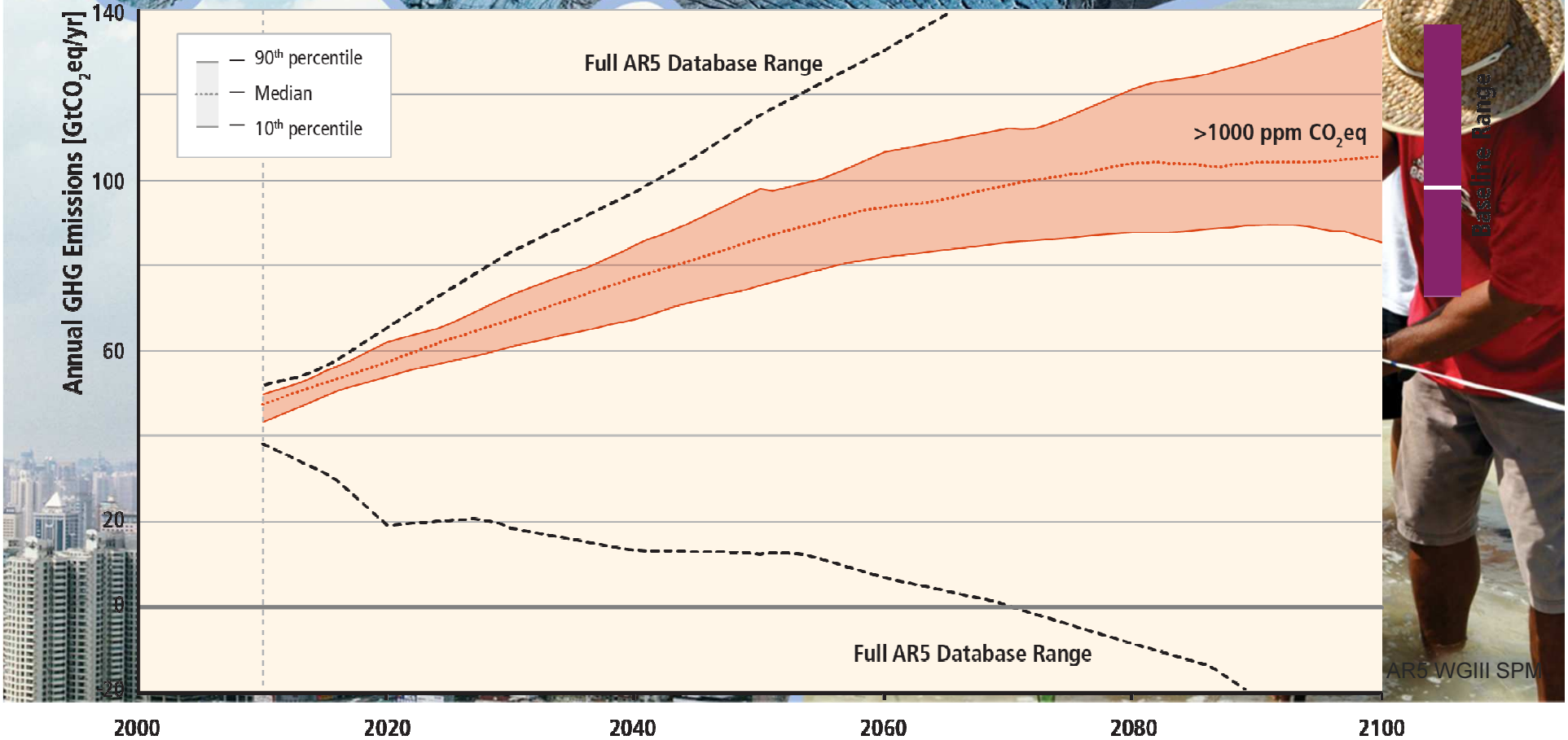
Stabilization of atmospheric concentrations requires moving away from the baseline – regardless of the mitigation goal.



AR5 WGIII SPM

Based on Figure 6.7

IPCC AR5 Synthesis Report

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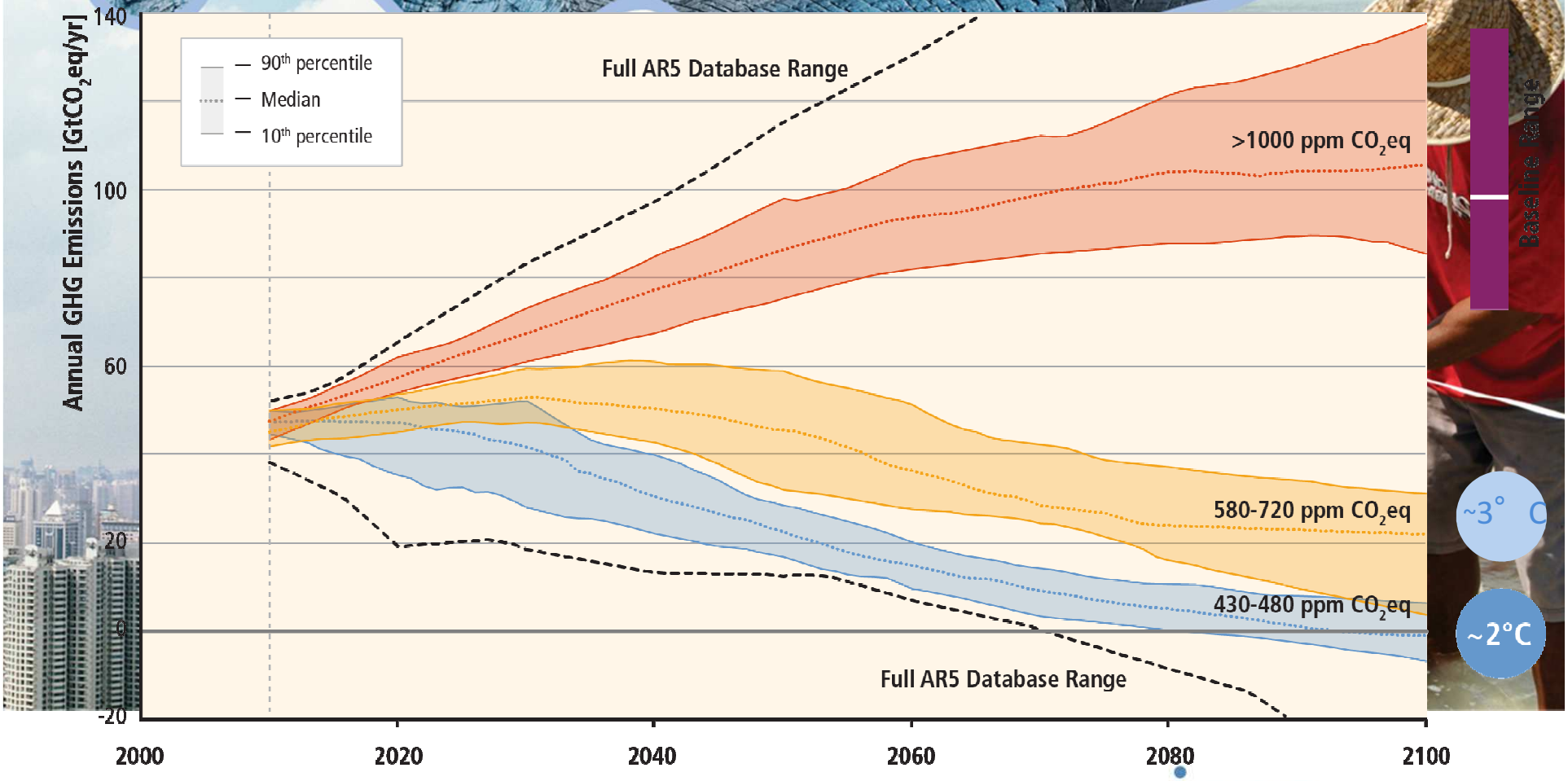

Based on Figure 6.7

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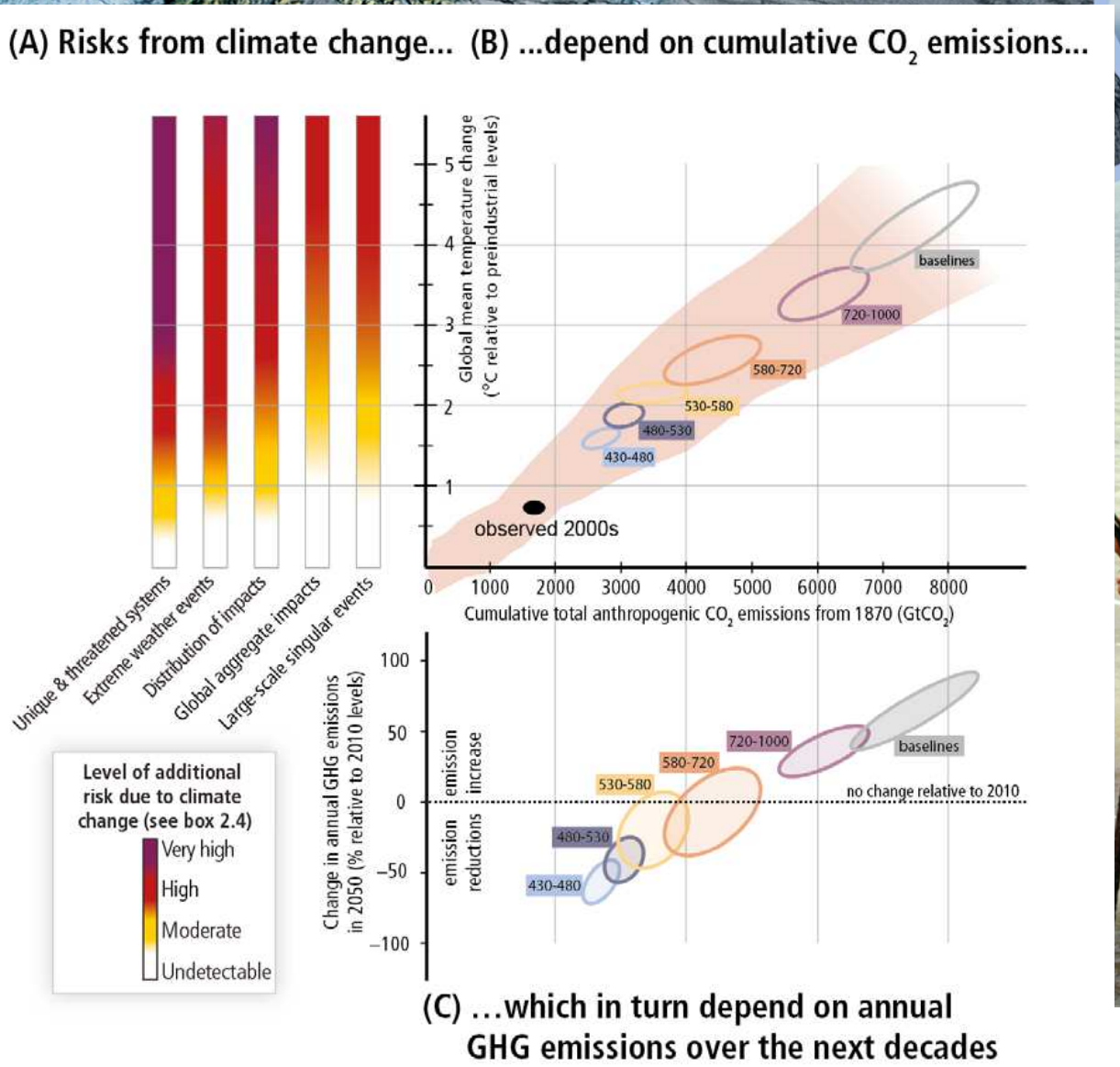
Figure SPM.10
A reader's guide

From climate change risks to GHG emissionse



Mitigation Measures

More efficient use of energy

Greater use of low-carbon and no-carbon energy

- Many of these technologies exist today

Improved carbon sinks

- Reduced deforestation and improved forest management and planting of new forests
- Bio-energy with carbon capture and storage

Lifestyle and behavioural changes

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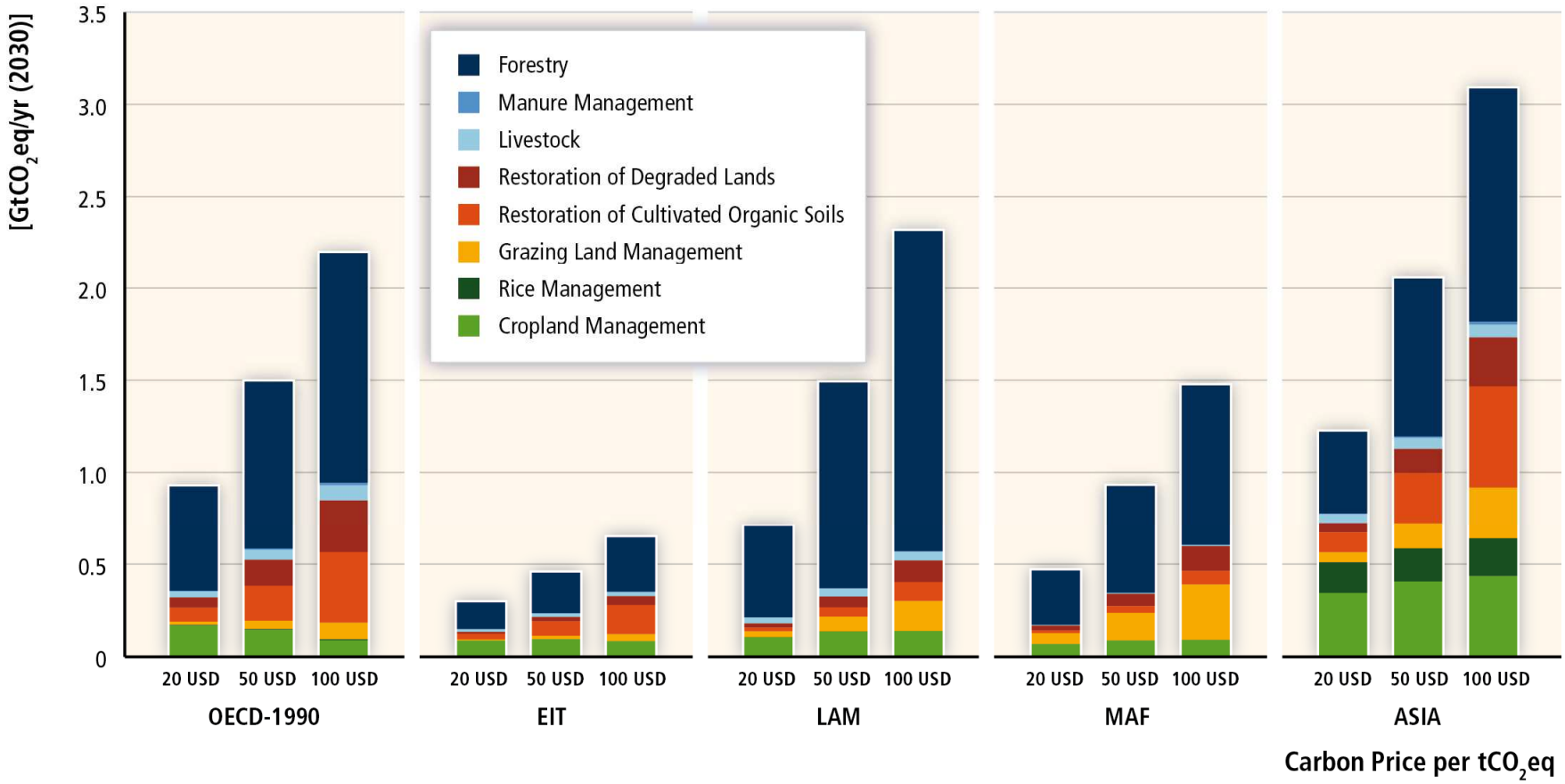
AFOLU Economic mitigation potential in 2030 by region



Supply side: economic potential 7.18-10.6 GtCO2e/y at carbon prices up to 100 USD/tCO2e. About one third at <20 USD/tCO2e

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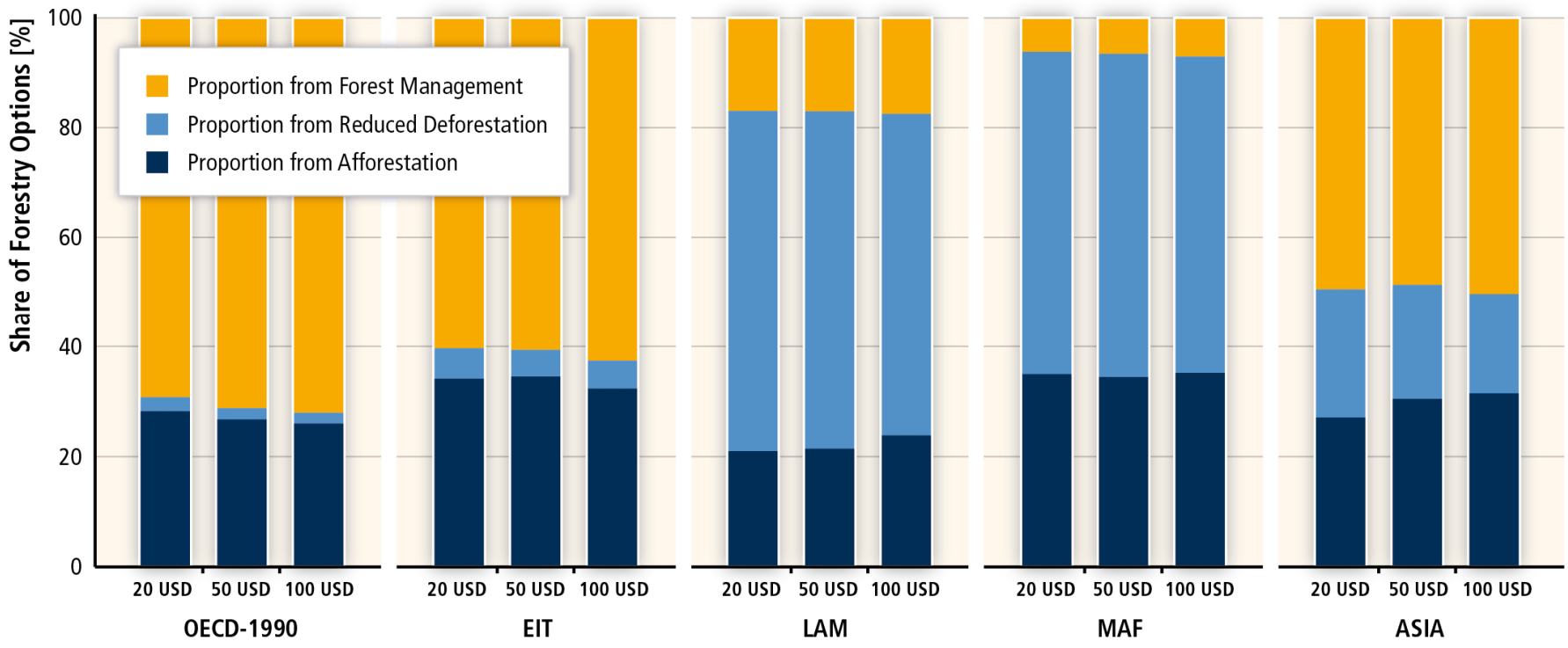
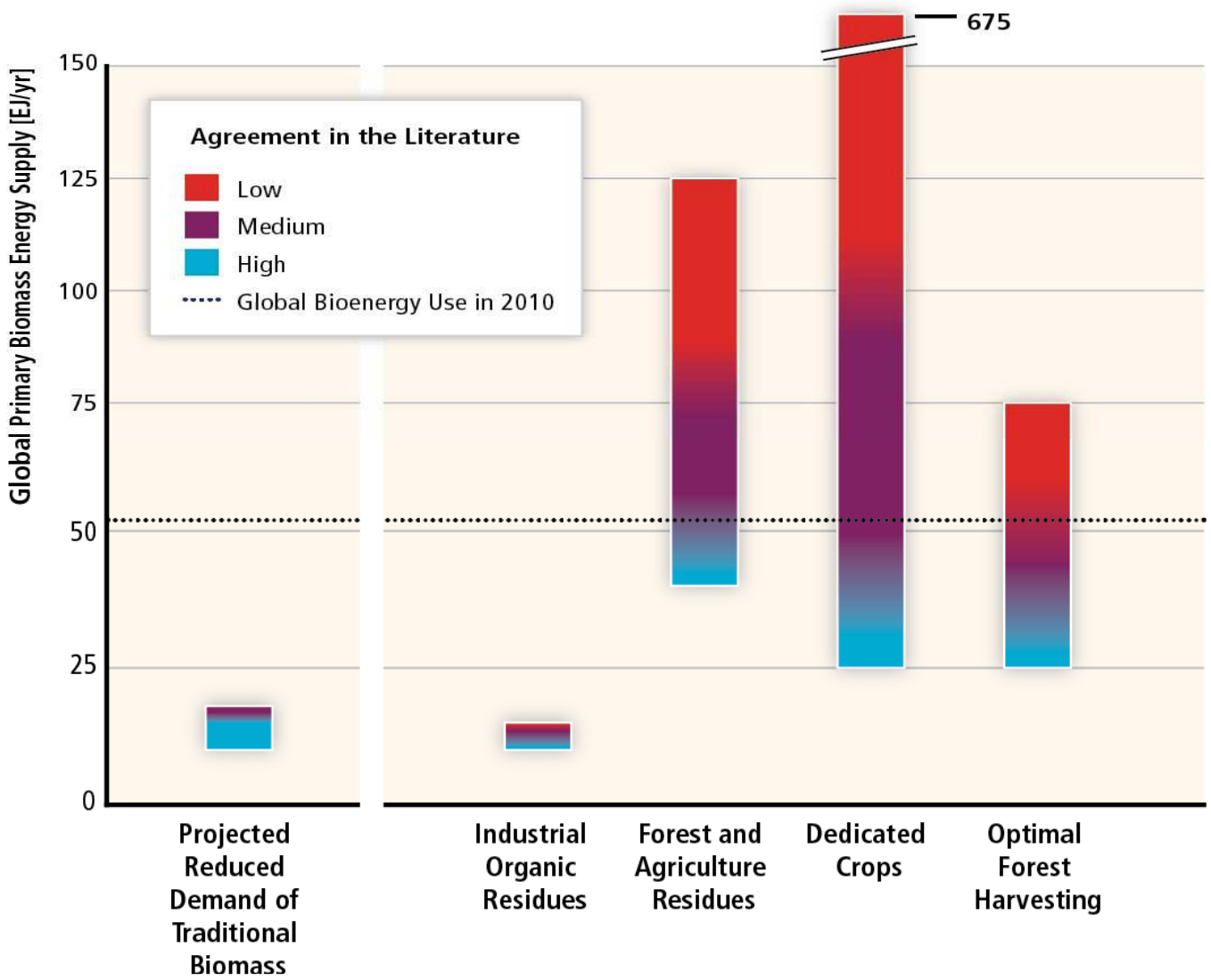
Regional differences in forestry options, shown as a proportion of total potential available in forestry



Global technical Bioenergy potential for 2050



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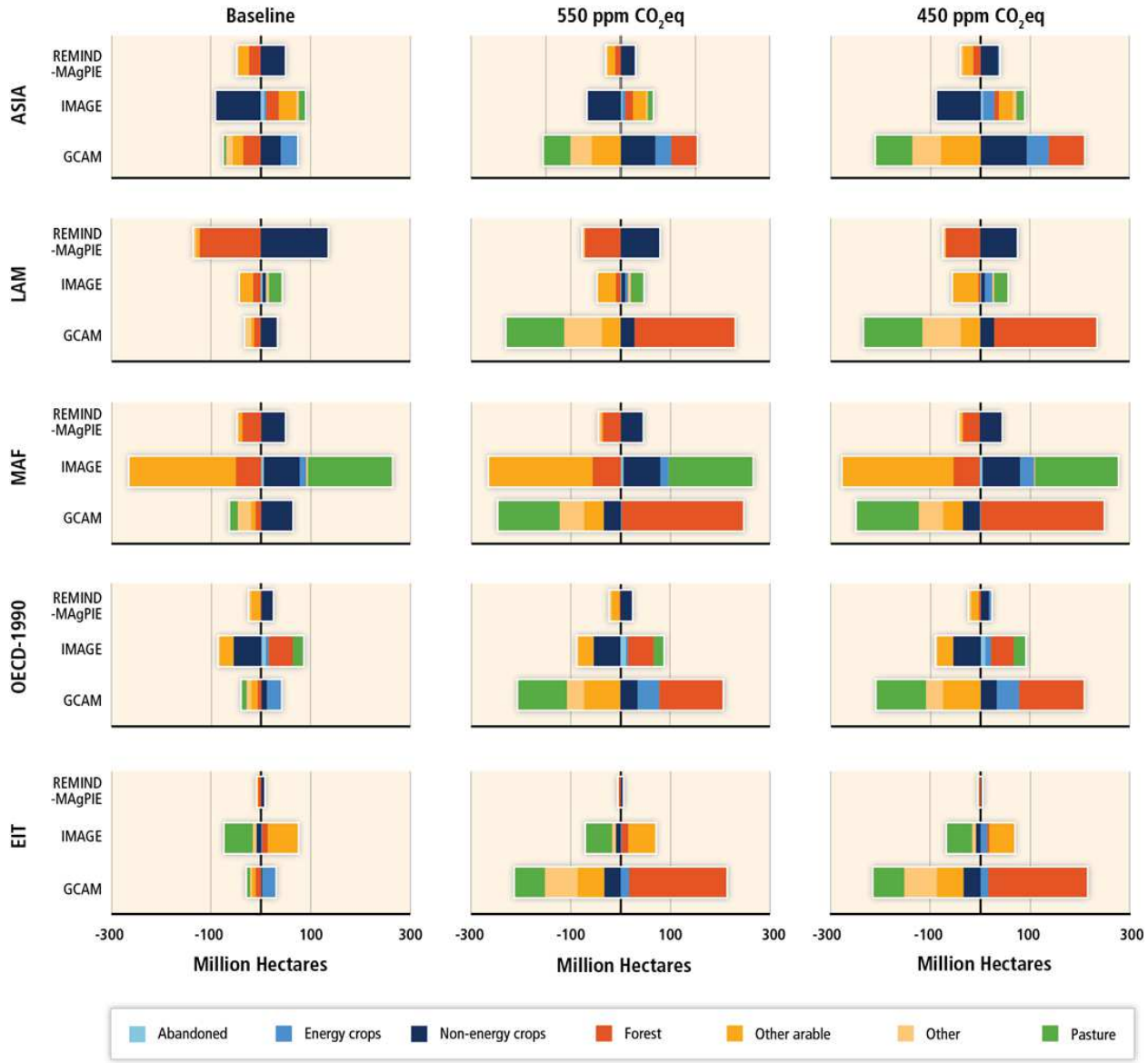
Regional land cover change by 2030 from 2005



Results from three models for baseline, and idealized policy implementation scenarios for 550ppm CO_2 eq and 450ppm CO_2 eq

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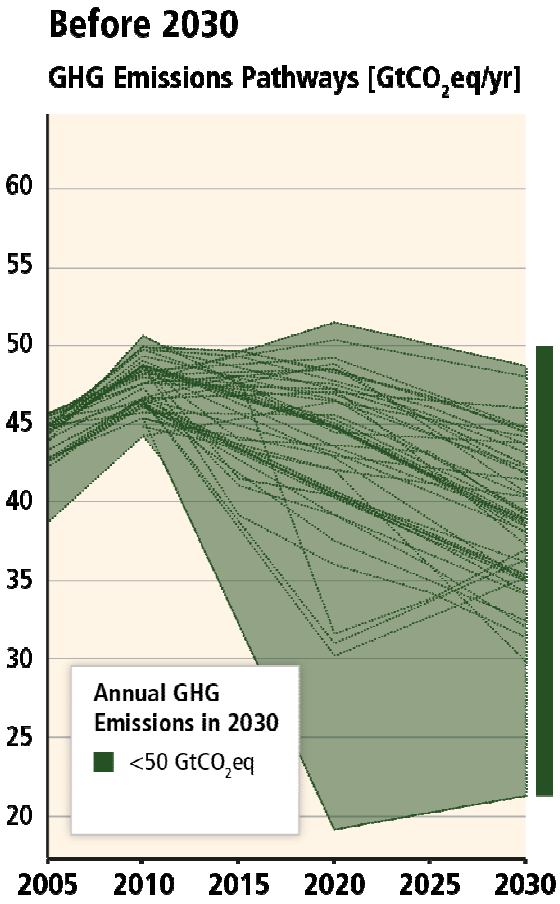
Summary – Role of AFOLU in climate change mitigation

- Net annual baseline CO_2 emissions projected to decline
- Could contribute 20-60% to mitigation in 2030; 15-40% in 2100
- Economic mitigation potential of supply-side options estimated to be 7.18-10.60 $GtCO_2eq/yr$
- AR5 transformation pathways suggest 5-95 EJ/yr primary energy from bioenergy in 2030 and 10-245 EJ/yr by 2050. Some models assume 35% in 2050 and up to 50% in 2100.
- BECCS features prominently in many mitigation scenarios

BUT

- If terrestrial land carbon stock remains unprotected large GHG emissions from bioenergy related LUC possible.

Delaying mitigation increases the difficulty and narrows the options for limiting warming to 2°C.



„immediate action“

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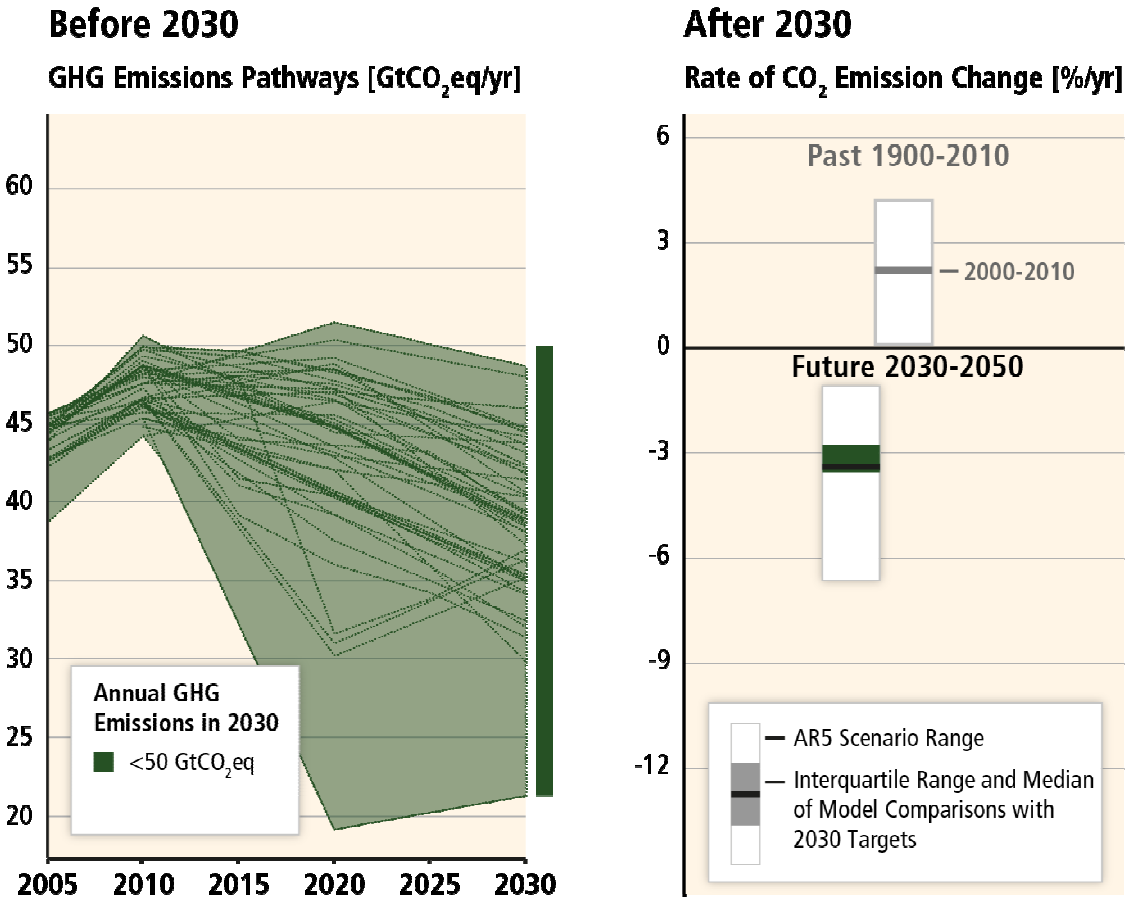

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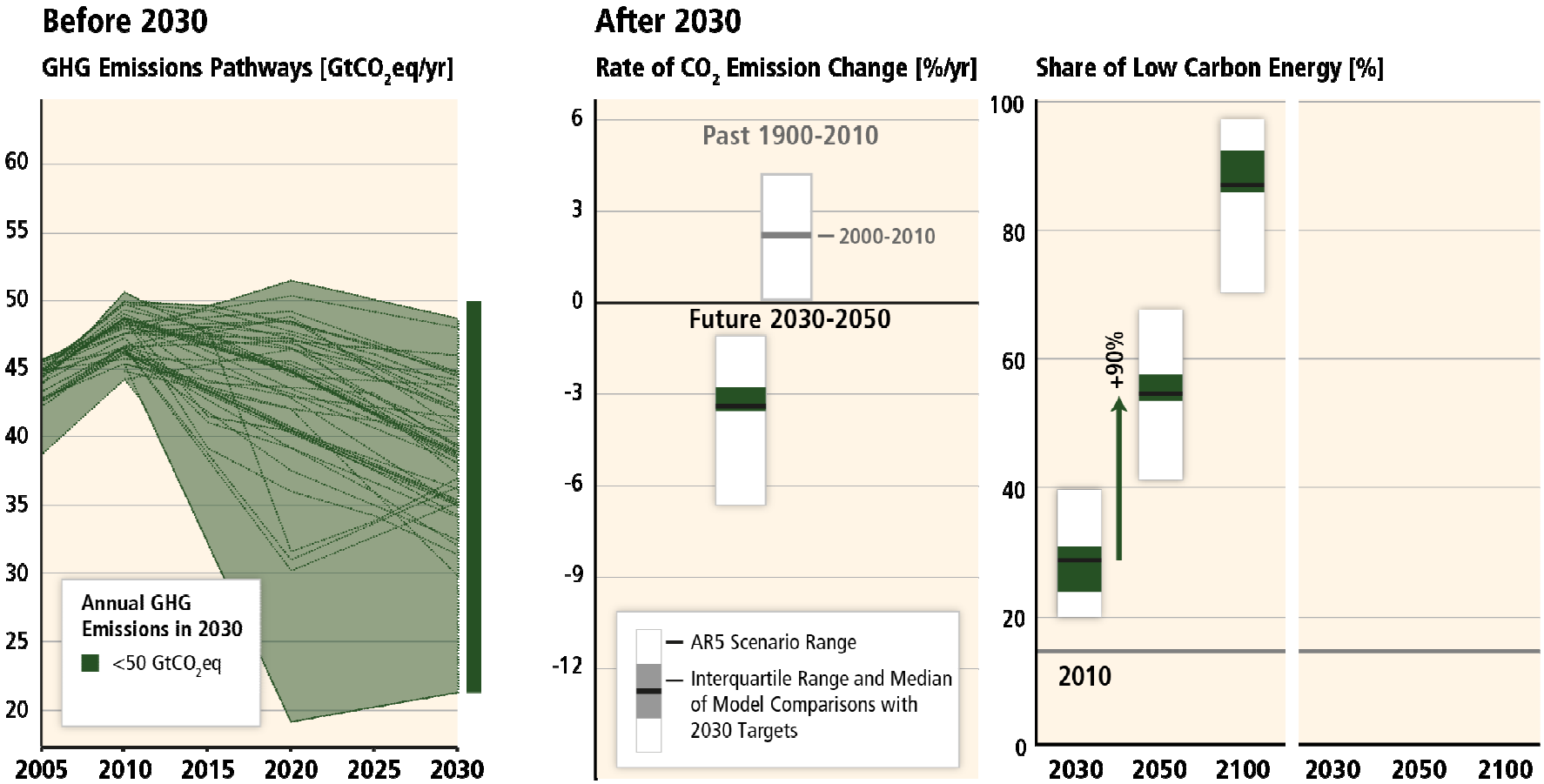

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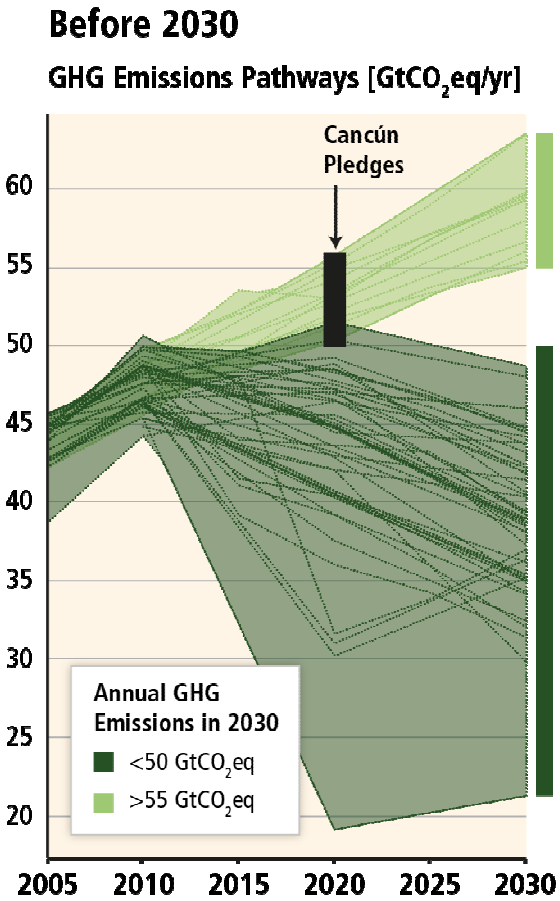
Delaying mitigation is estimated to increase the difficulty and narrow the options for limiting warming to 2°C.



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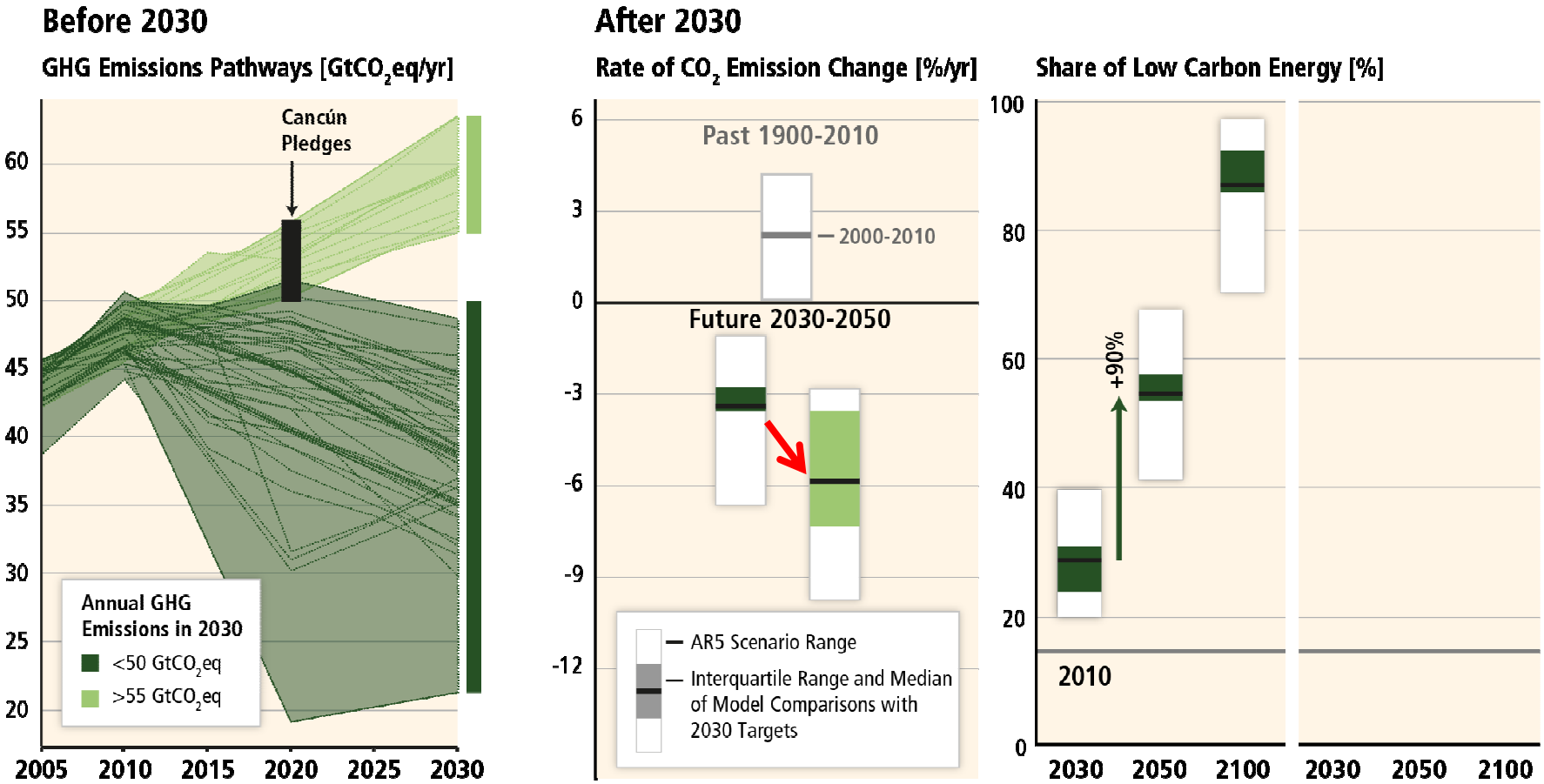

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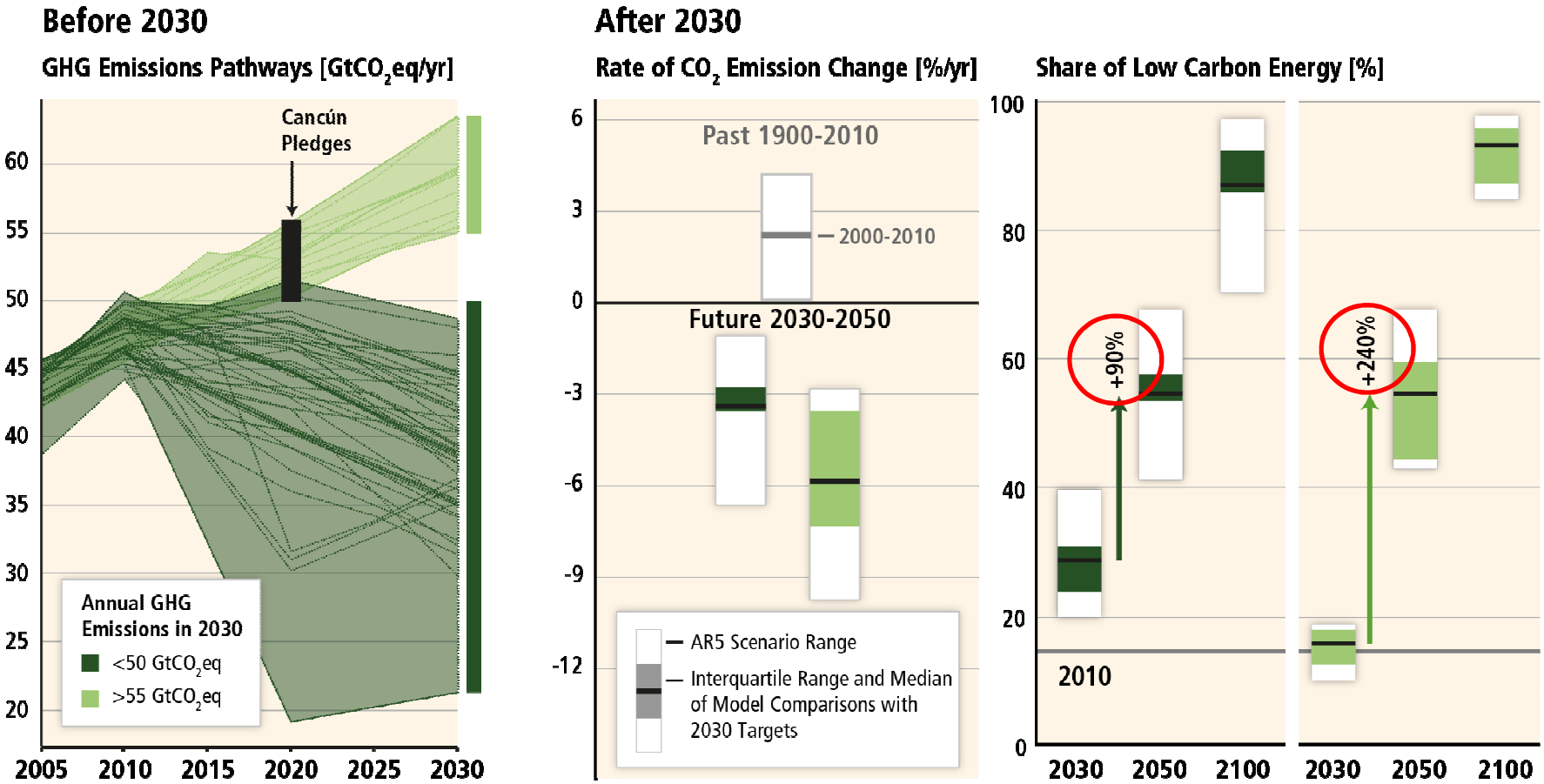

Based on Figures 6.32 and 7.16

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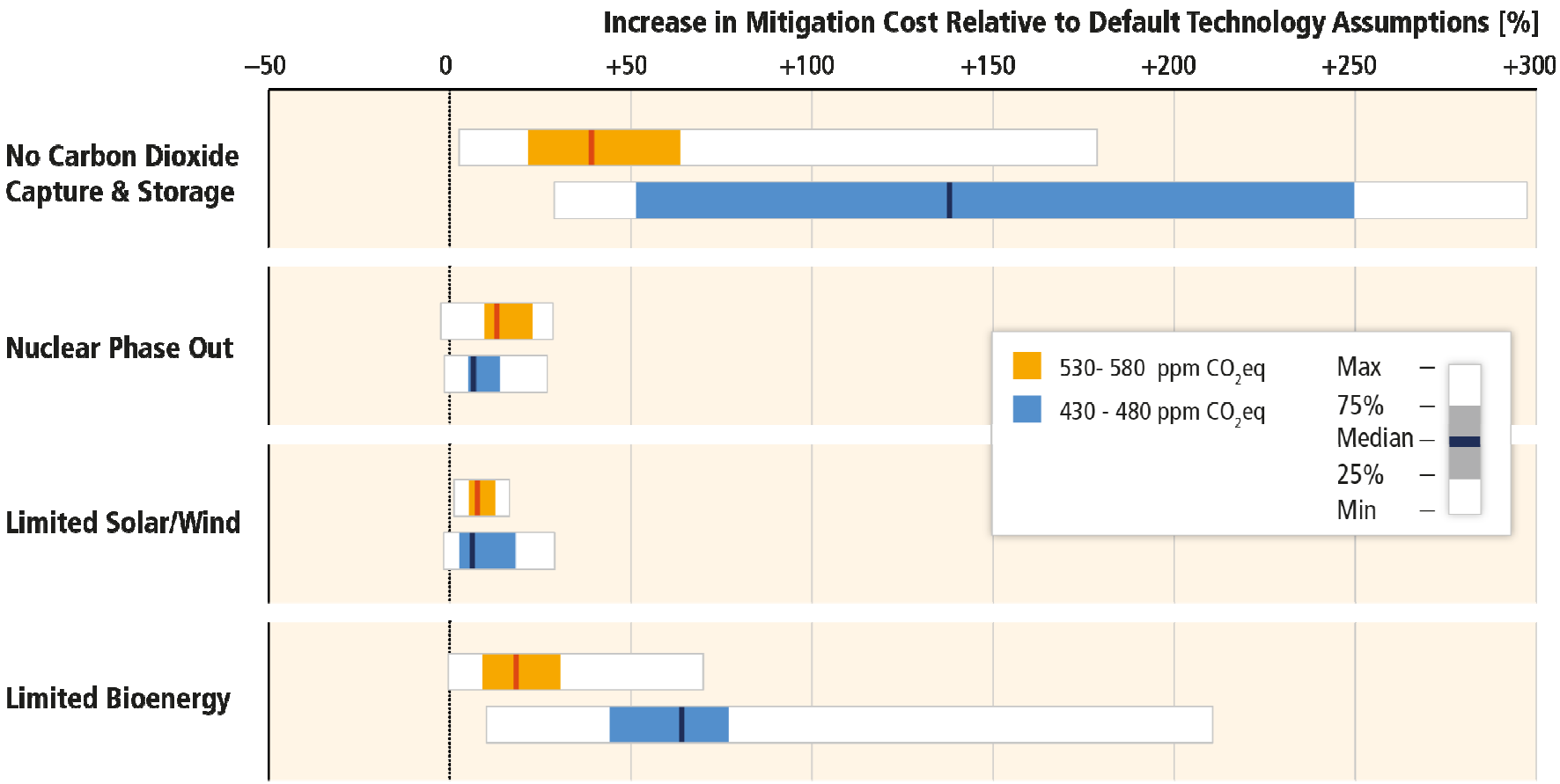
Availability of technology can greatly influence mitigation costs.



Based on Figure 6.24

Ambitious Mitigation Is Affordable

- ➔ Economic growth reduced by ~ 0.06% (BAU growth 1.6 - 3%)
- ➔ This translates into delayed and not forgone growth
- ➔ Estimated cost does not account for the benefits of reduced climate change
- ➔ Unmitigated climate change would create increasing risks to economic growth

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