Dr Valérie Masson-Delmotte @valmasdel

Jun 2 • 44 tweets • valmasdel/status/1664557978895237120

@AntarcticTreaty is hosting its first Climate Day today at its 45th meeting in Helsinki - and I was invited to give a keynote presentation.
The event is not public, but for transparency, I have decided to share my slides in this thread, 🧵⬇️
#seriousness #urgency #action
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This presentation builds upon the @IPCC_CH Sixth Assessment (AR6) reports, which I describe as a co-production, and which are the most reviewed scientific assessments, providing a robust assessment of the state of scientific knowledge, endorsed by all governments.
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Antarctica is an increased focus of the @IPCC_CH assessments, in particular related to ice sheet and global sea level rise, ocean circulation, as well as unique ecosystems and biodiversity.

Reports reflect science advances, and knowledge gaps
ipcc.ch
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Where are we now, both in terms of human influence on climate, observed changes at the global scale and in the Antarctic region?
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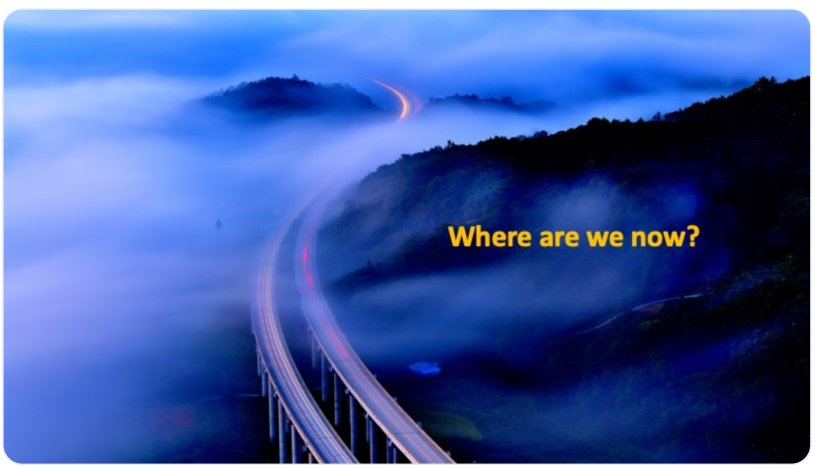

While climate action is gaining momentum, the pace and scale of what has been done so far, and current plans, is not sufficient to tackle climate change, and avoid the escalation of climate-related risks.

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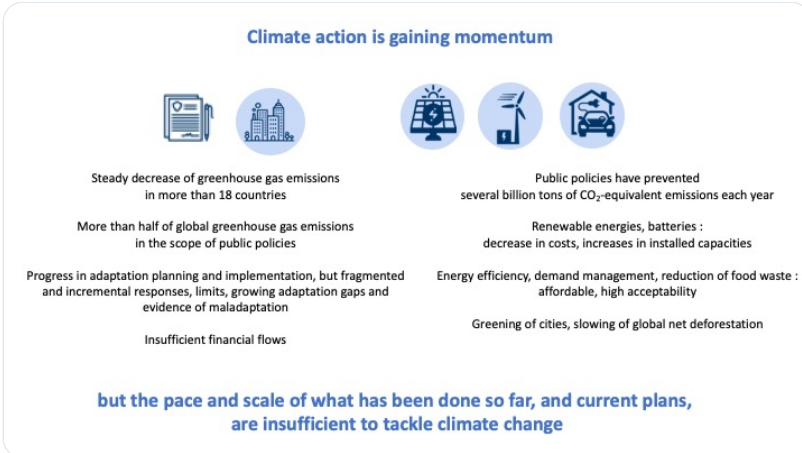

Global emissions of heat-trapping gases continue to increase, with unequal historical and ongoing contributions.

Antarctic tourism is associated with very high carbon footprints.

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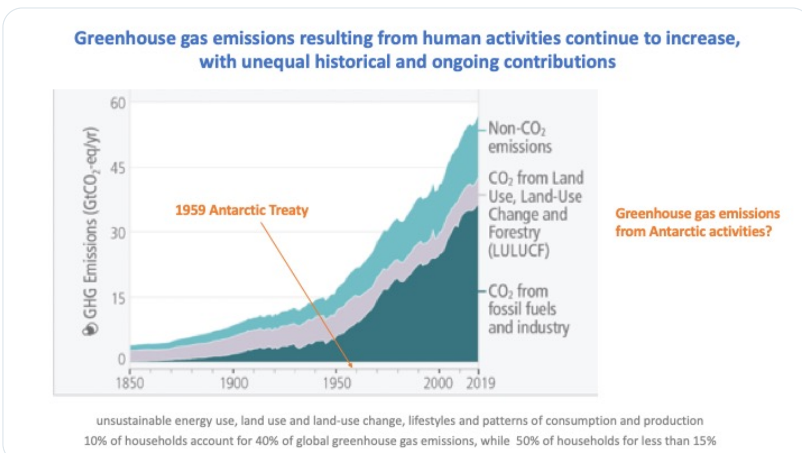

Antarctic ice core records show how abrupt and unprecedented is the human-caused increase in atmospheric greenhouse gas concentrations.

The Southern Ocean plays a key role in the ocean carbon sink afffecting atmospheric CO2 concentration variability.

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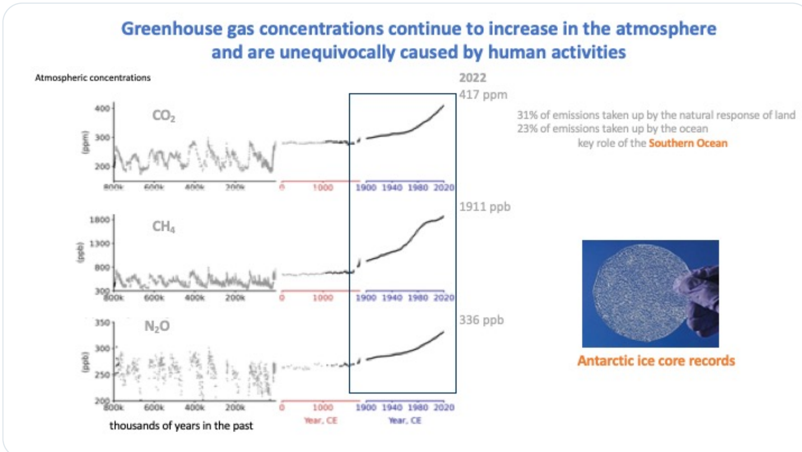

Emissions of greenhouse gases cause an imbalance of the Earth's energy budget, and heating of the climate system, leading to ice loss.

Ocean warming is irreversible on hundreds of years - heat is primarily accumulated in Southern Ocean water masses. We can't go back.

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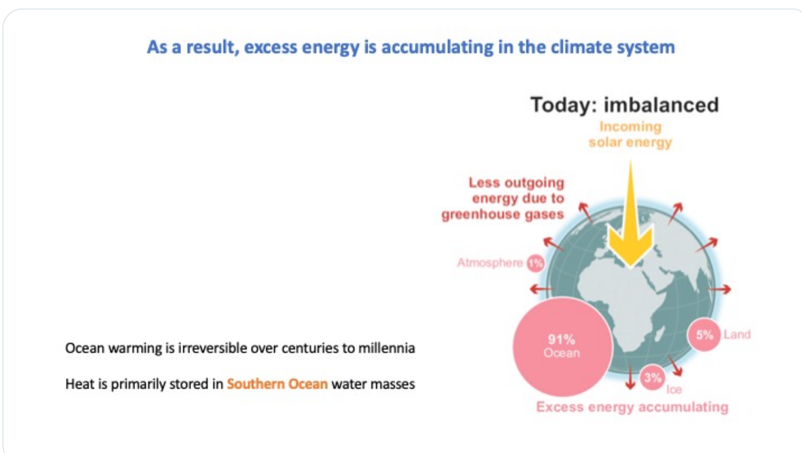

Human activities have unequivocally caused global warming.
In the last decade, warming effects have resulting from both the increase in greenhouse gas concentrations and the decrease of the cooling effect of pollution aerosols.
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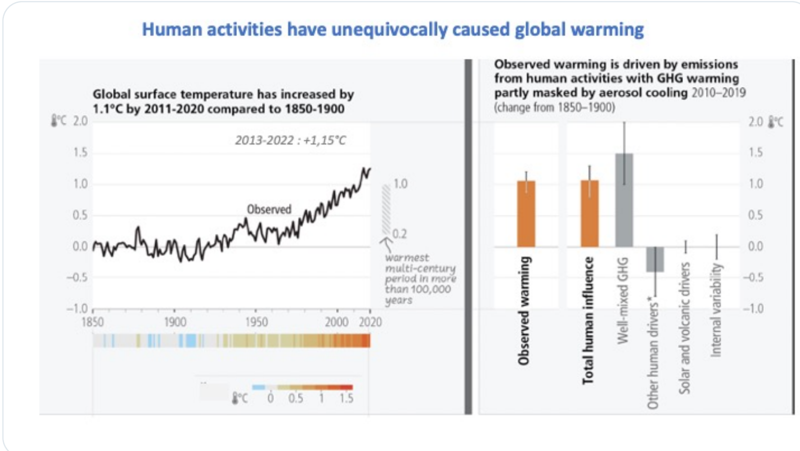

Surface warming is larger over land (where we live), particularly strong in the Arctic and Antarctic Peninsula, but the human-driven trend has emerged earlier from natural variability is the tropics, where inter-annual temperature variability is lower.
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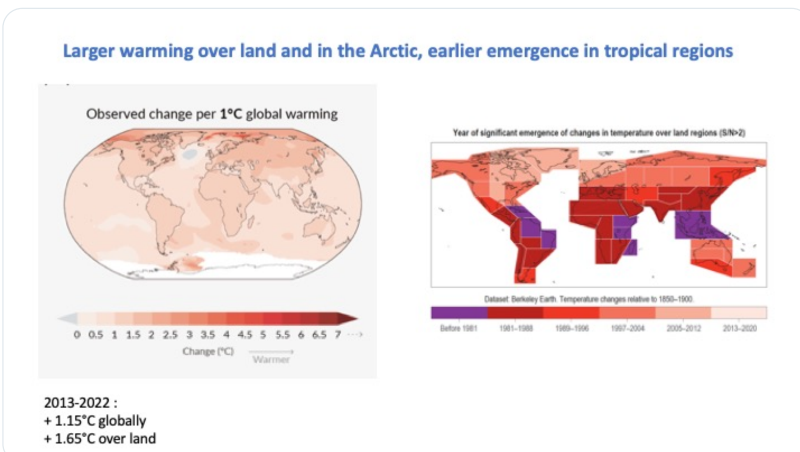

Widespread, rapid and intensifying changes are observed in each component of the climate system, and unprecedented in thousands (e.g. sea level rise) to millions of years (atmospheric CO_2, ocean acidification).
They are increasingly attributed to human influence

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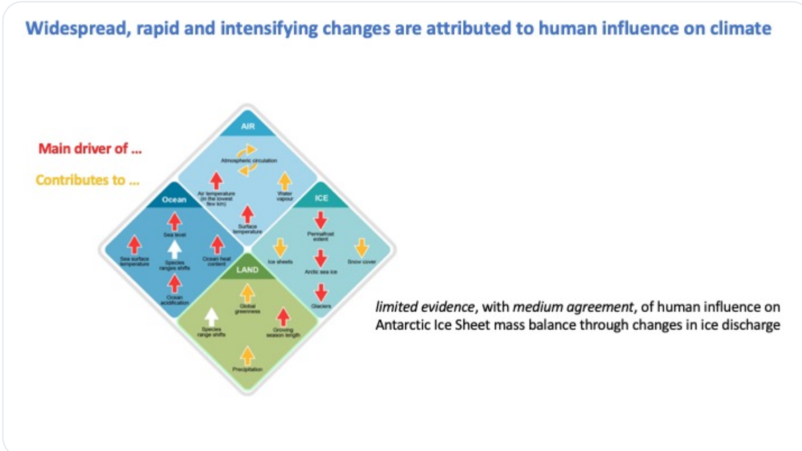

Human-caused climate change increases the frequency and severity of hot extremes (including marine heatwaves even in the Southern Ocean, and one heatwave event in Antarctica recently studied, heavy rainfall events (including from atmospheric rivers), agricultural drought.

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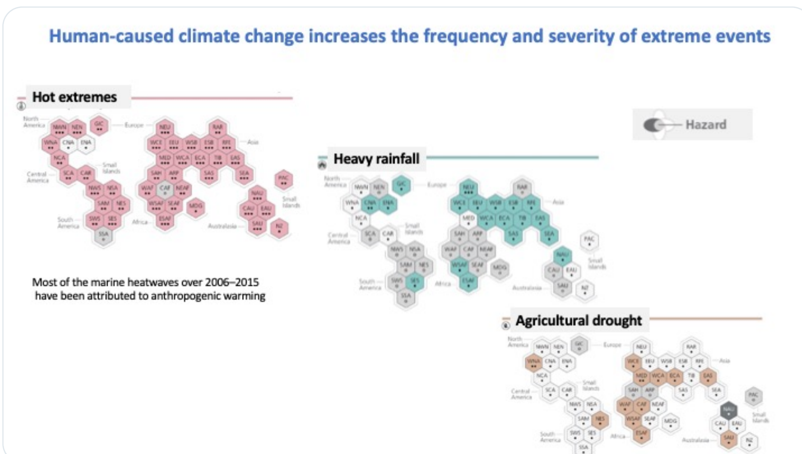

There have been advances in Antarctic observed changes in the Antarctic region, where temperature and sea ice trends are strongly affected by atmospheric circulation, with connections to low latitudes. Limitations arise from observations, large natural variability, models.

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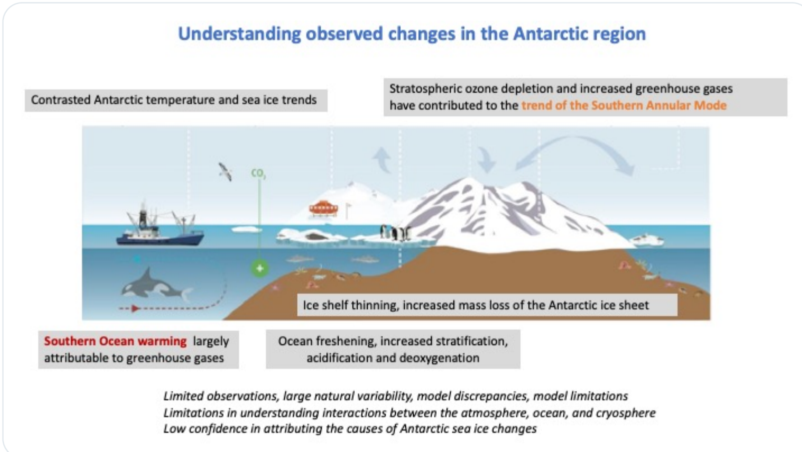

Heating of the climate system drives sea level rise, through ocean warming and the loss of land ice, now dominant. Mass loss of the Greenland and Antarctic ice sheets has been x 4 since the 1990s, and contribute to the observed acceleration of sea level rise.

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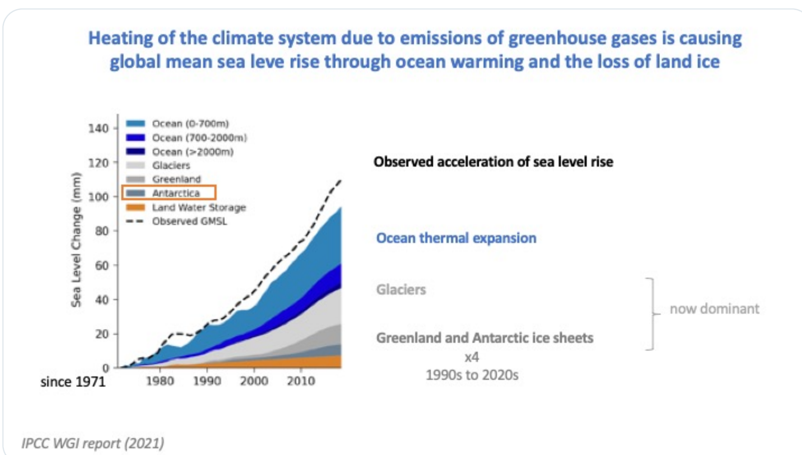

Human-caused climate change is affecting climate conditions in every region, and vulnerable communities who have least historically contributed to current climate change are disproportionately affected #climatejustice

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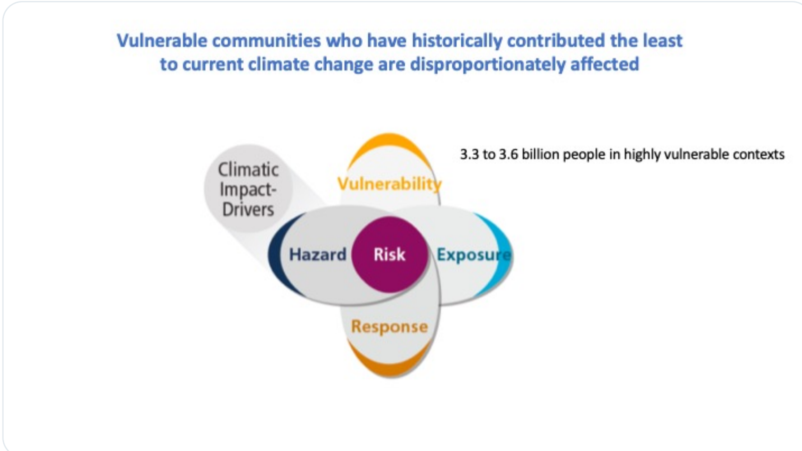

Widespread and substantial impacts and related losses and damages are attributed to climate change, including through the degradation of ecosystems, their functions and services (with mass mortality events over land and in the ocean).

Polar climate zones are contracting.

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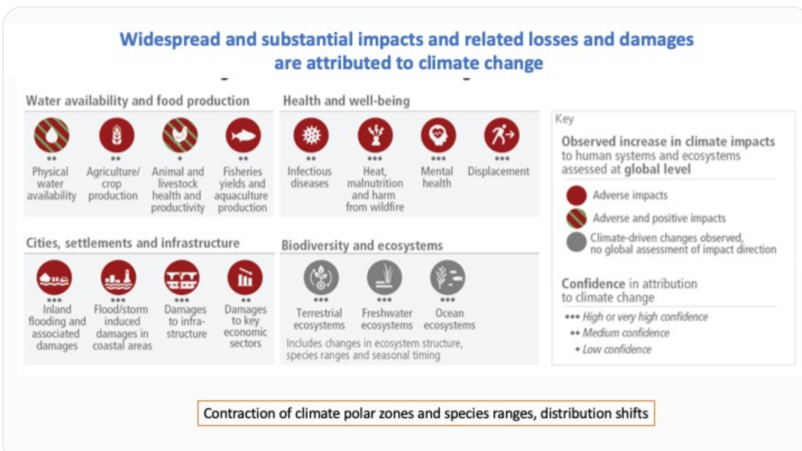

These impacts are caused by changes in physical climate conditions which will increase with every further increment of global warming - adverse impacts will continue to intensity, but will depend on our actions.

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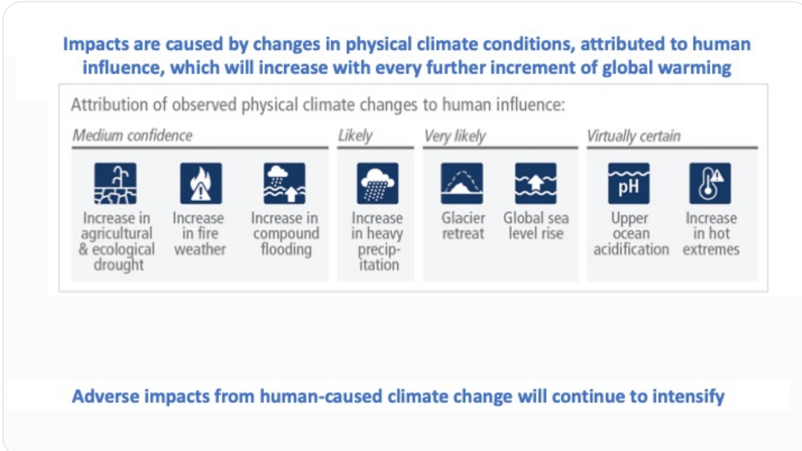

The extent to which current and future generations will experience a hotter and different world depends on choices now and in the near term.

The intermediate scenario is closest to the emissions implied by current implemented policies.

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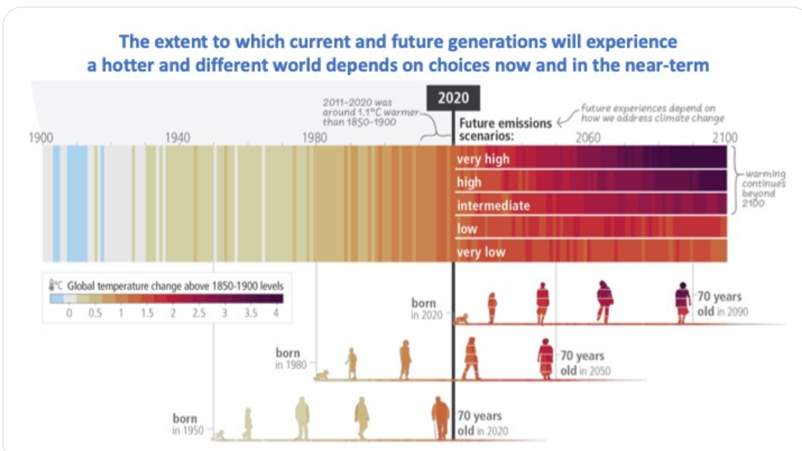

What are possible futures?

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Future warming depends on future cumulative CO2 emissions, and warming will continue until CO2 emissions reach net zero.
Uncertainty is higher beyond 2050 (not shown here) due to the expected loss of efficiency of the land and ocean sinks in a warmer climate.

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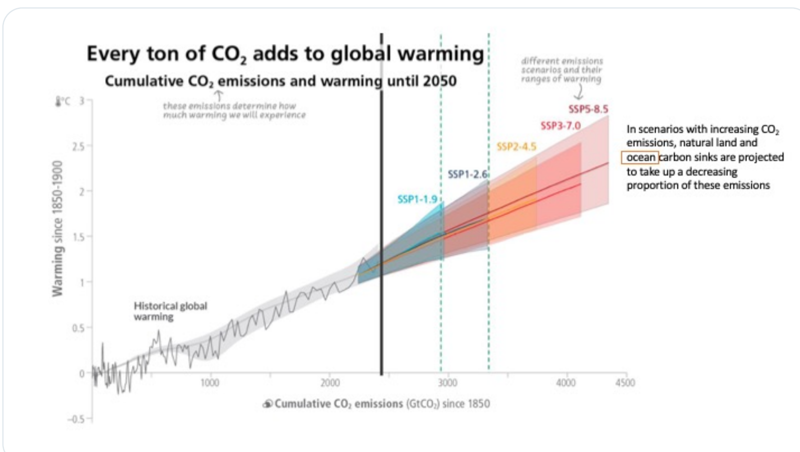

If emissions decrease strongly, the effects on global surface temperature would be discernable within 20 years. A level of global warming of 1.5°C will be reached in the 2030s. Human-caused trends will be modulated by natural variability, in particular at regional scales.

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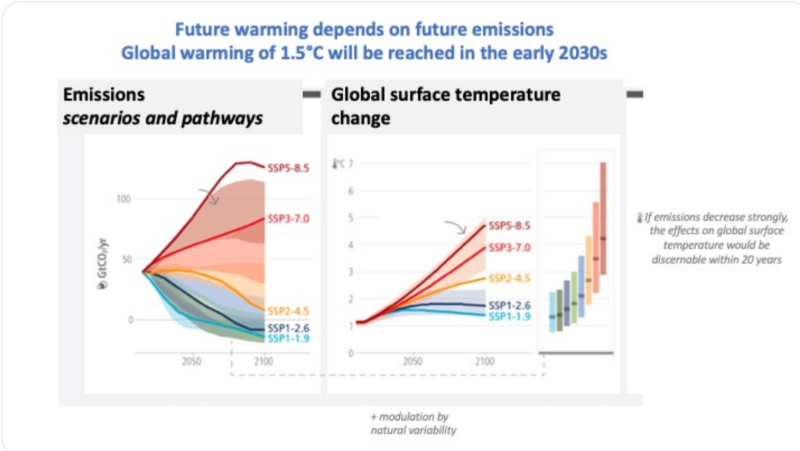

Current implemented policies would lead to exceed 2°C by the 2050s and close to 3°C by 2100 - but this can be avoided by stronger mitigation efforts.

The last time warming was >2.5°C was over 3 million years ago... (with much less ice in Antarctica)

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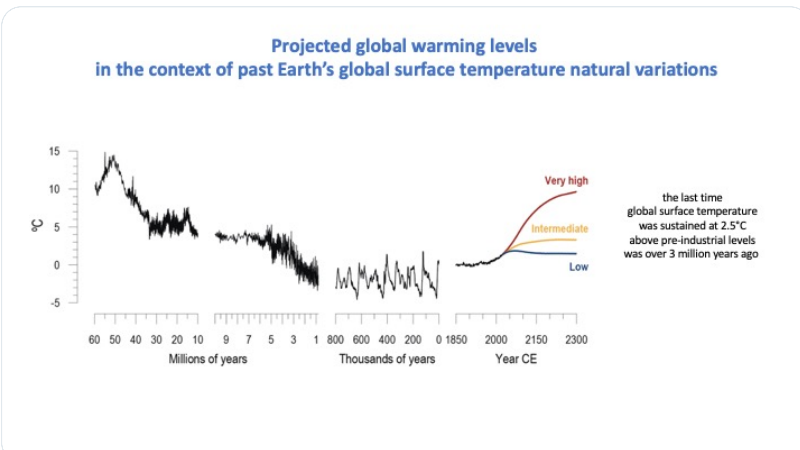

With every increment of global warming, regional changes in mean climate become more widespread and pronounced - with expected polar amplification in Antarctica (delayed by Southern Oean heat uptake) and an intensification of the hydrological cycle

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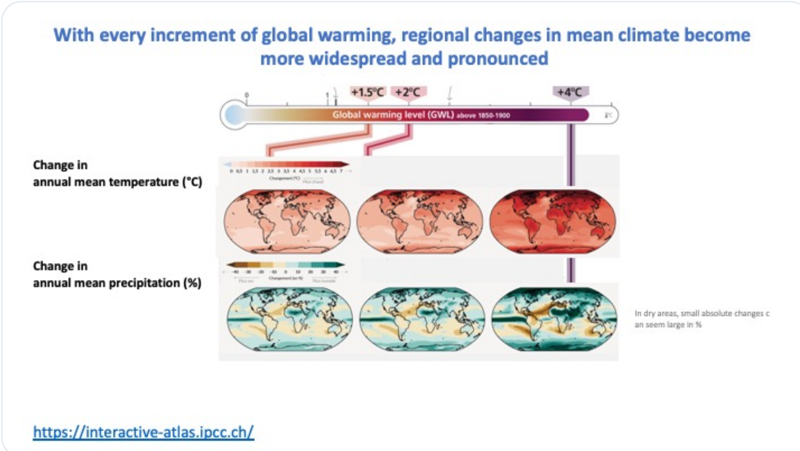

and an intensification of extreme events and the variability of the hydrological cycle (with large uncertainty for the Antarctic region)

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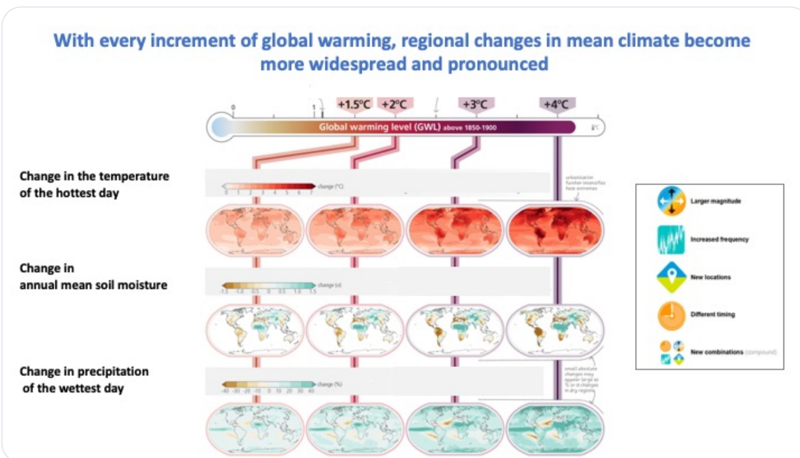

@IPCC_CH reports provide an assessment of climate-related risks across regions and sectors, including water and food security, depending on adaptation responses.
There are major implications for unique Antarctic ecosystems.
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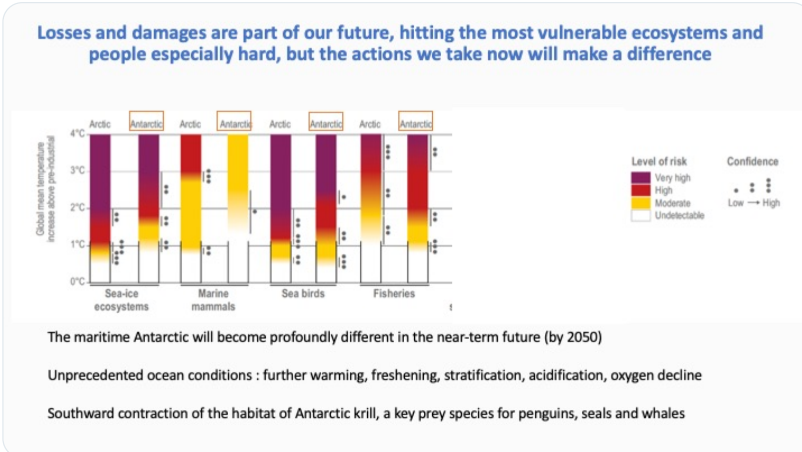

What happens in Antarctica does not stay in Antarctica.
There is medium confidence in a slowdown of the formation of Antarctic Bottom waters, with widespread implications for deep sea life.
Future changes in sea ice and Southern Ocean circulation remain very uncertain.
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The slow response of glaciers, the deep ocean, and ice sheets has already committed future sea level rise from past emissions to date.
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The magnitude and rate of future sea level rise depends on greenhouse gas emissions, as well as on the uncertain dynamical response of sectors of the Antarctic ice sheet, illustrated here with a dashed line showing a low likelihood, high impact storyline.
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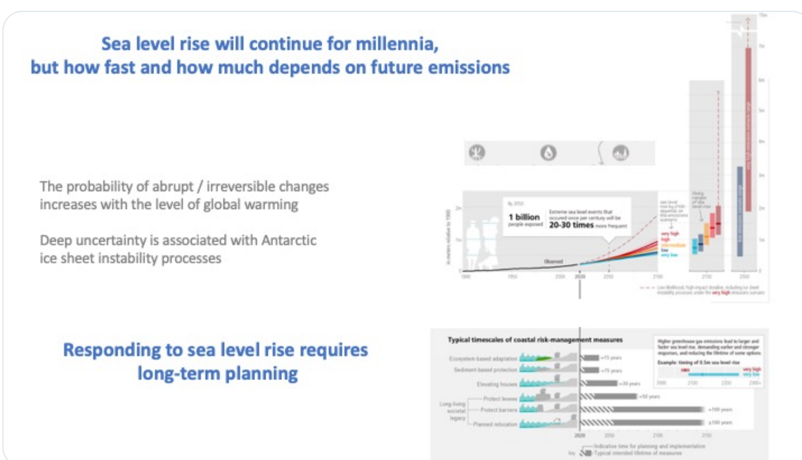

Advancing the understanding of Antarctic ice sheet instability processes currently associated with deep uncertainty is important to inform long-term coastal planning - around 1 billion persons exposed in low lying islands & coasts, agricultural deltas and coastal cities.
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Sea level rise will continue for millennia, but how fast and how much depends on future emissions and peak warming : + 2°C sustained warming mean +2 to +6 m over 2000 years. Confidence in long term estimates arises from insights from warm periods from the geological past.
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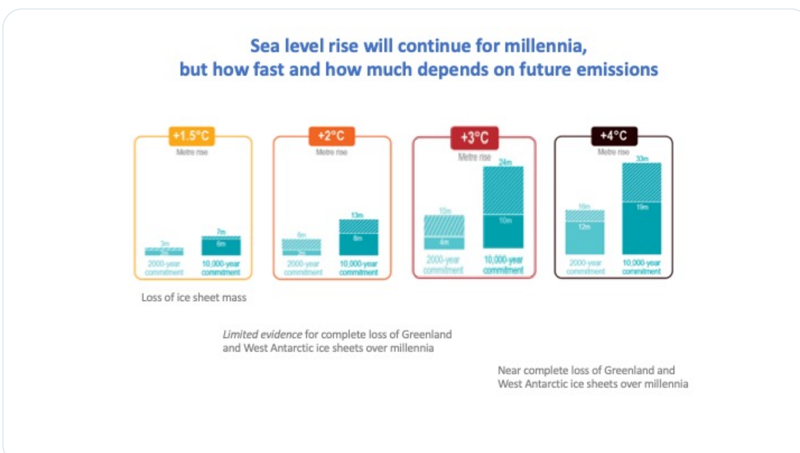

How to accelerate climate action?

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Remaining carbon budgets to limit warming to 1.5°C will be exhausted if emissions stay at 2019 level until 2030, or if current fossil fuel infrastructures are used without abatement for the initially planned lifetime.

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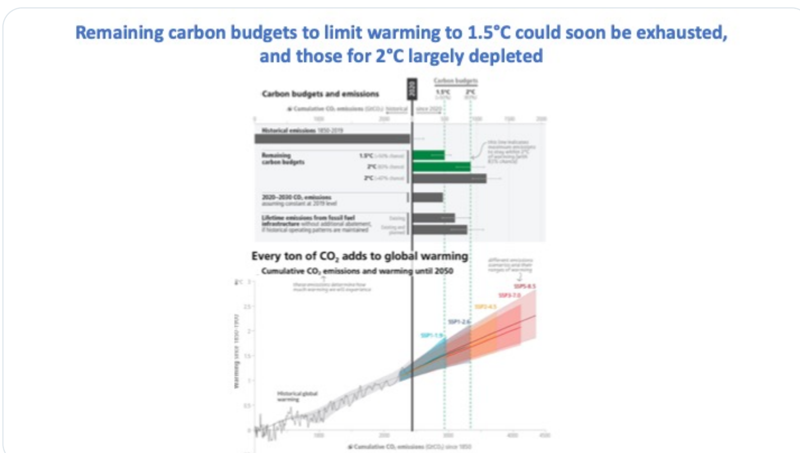

Limiting warming well below 2°C / close to 1.5°C involves immediate, deep and rapid emission reductions. There is a mitigation gap between pledges and such pathways, and an implementation gap between pledges and current policies.

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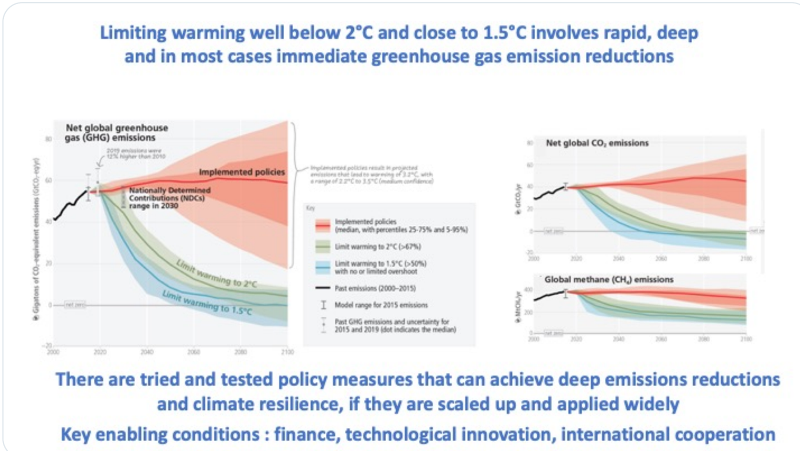

We know the tried and tested policy measures which can achieve deep emission reductions and climate resilience, if scaled up and applied widely - key enabling conditions in finance, innovation, cooperation.

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Scaling up finance is critical to allow for the deployment of options for adaptation and mitigation which are now available, feasible, and increasingly cost effective. If deployed in all sectors, they could halve global greenhouse gas emissions by 2030.

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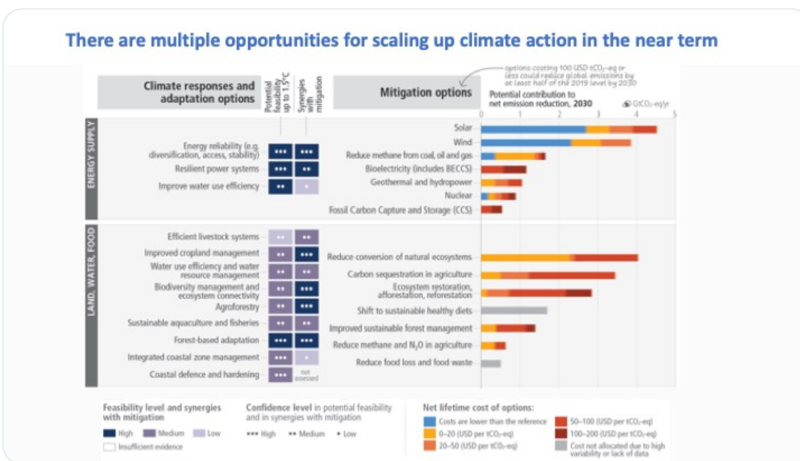

Some of these options provide opportunities for reducing the emissions from Antarctic activities (transport, research stations) and to strengthen the resilience of Antarctic ecosystems.
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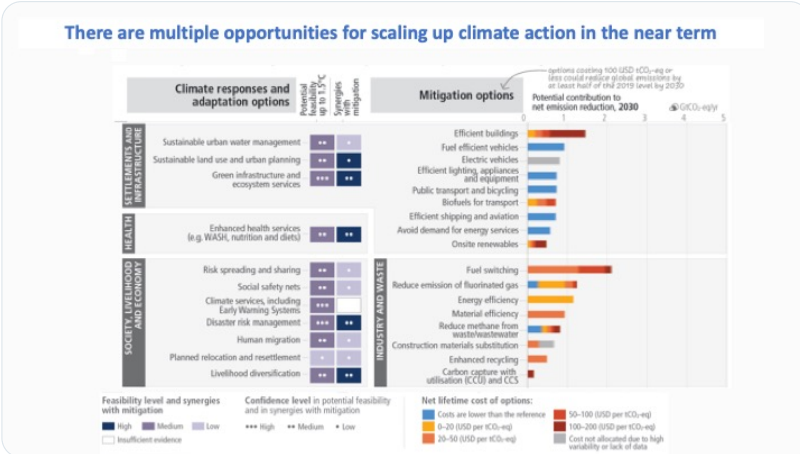

With rapid action, it is still possible to build a liveable and sustainable future through climate resilient development - a small window of opportunity, with major implications for threats on planetary health and human well being
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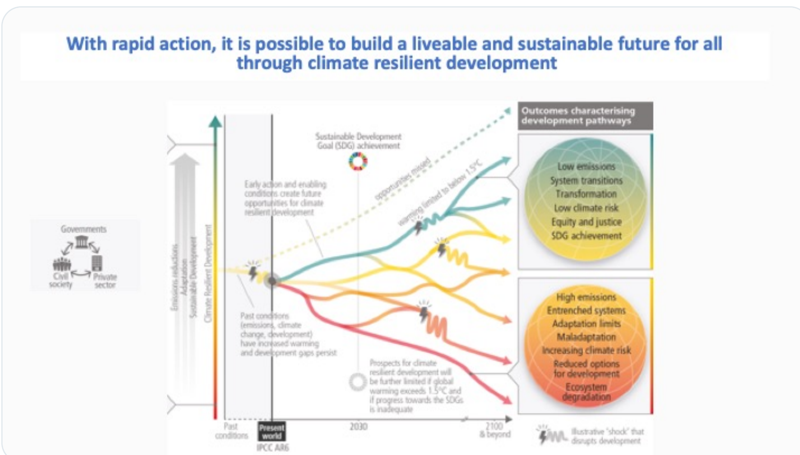

How can effective governance increase resilience in the Antarctic region?
Limiting warming by mitigation policies is important to increase the effectiveness of adaptation measures (avoiding hard limits on adaptation).
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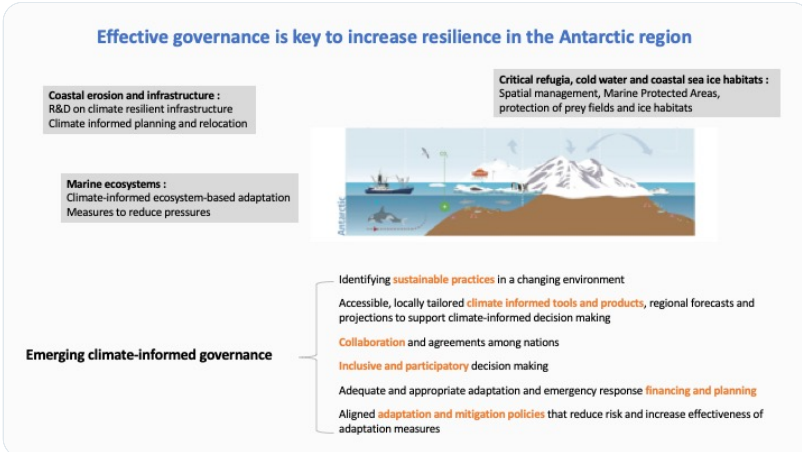

I have highlighted #seriousness #urgency and #action and the need for both rapid environmental governance responses in front of a changing environment, and research advances to inform decision making.
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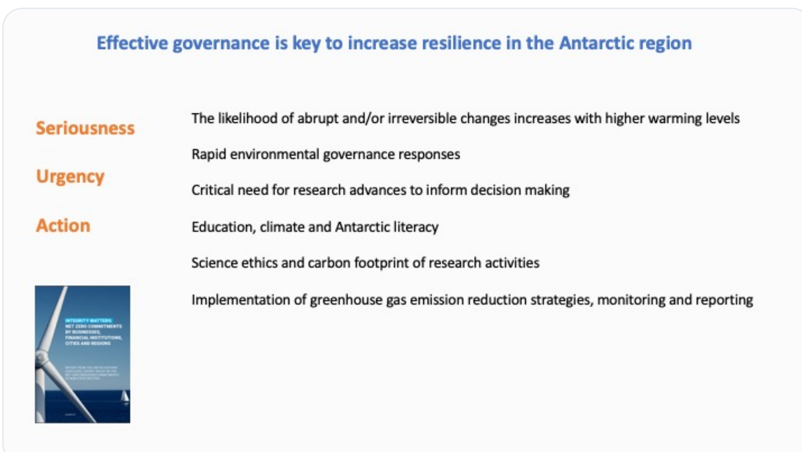

Parties to the @AntarcticTreaty can play a key role to enhance climate #literacy and Antarctic literacy.

I also conveyed the concerns from polar scientists who need help to reduce the carbon footprint of research activities, a matter of science ethics.
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And I highlighted the importance of the implementation of greenhouse gas emission reduction strategies, including monitoring and reporting,
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including using the stronger standards for net zero emissions commitments of non-state entities from the @UN high level expert group, which could be applied for Antarctic activities,

Credibility and Accountability of Net-Zero Emissions Commitments of …
The United Nations Secretary-General António Guterres, on 31 March 2022, established a High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities to develop stronge…
https://www.un.org/en/climatechange/high-level-expert-group

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In Antarctica, as well as globally, our choices will reverberate for hundreds, even thousands of years.

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The presentation is available for download here :

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AntarcticTreaty-2023.pptx is publicly shared
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Thanks for your attention - END.

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