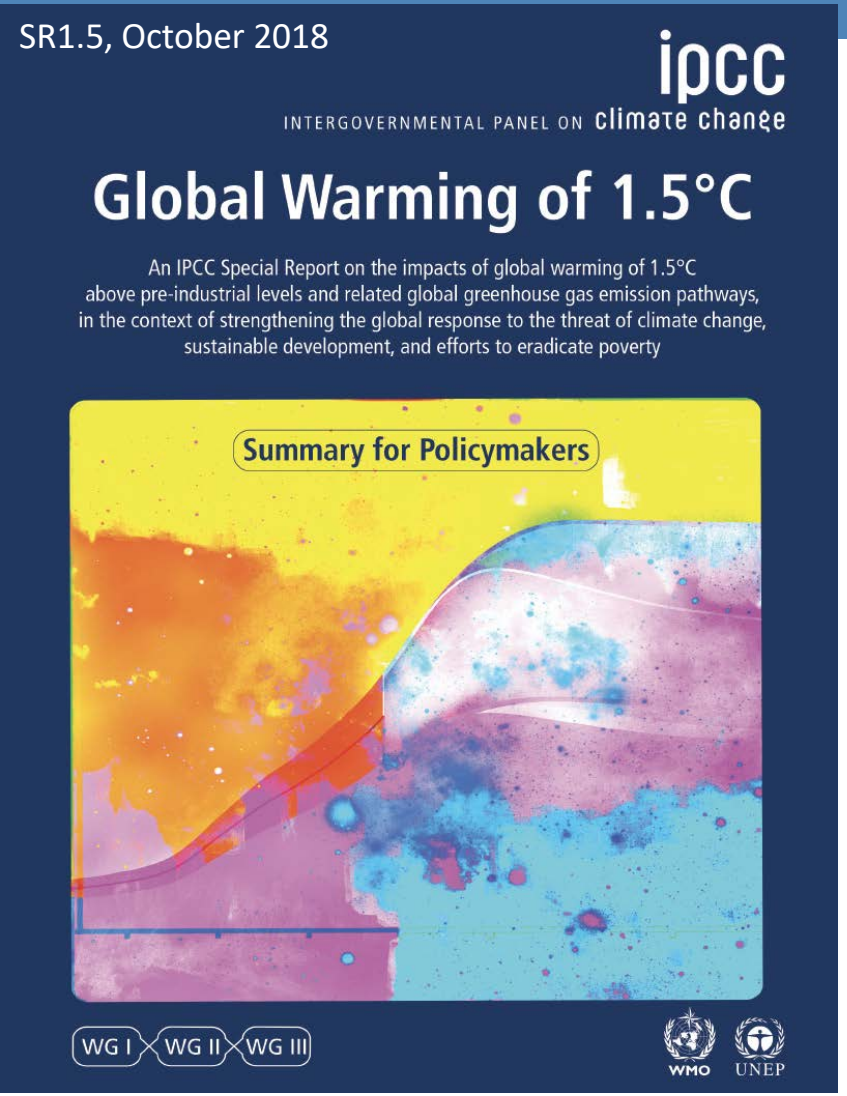
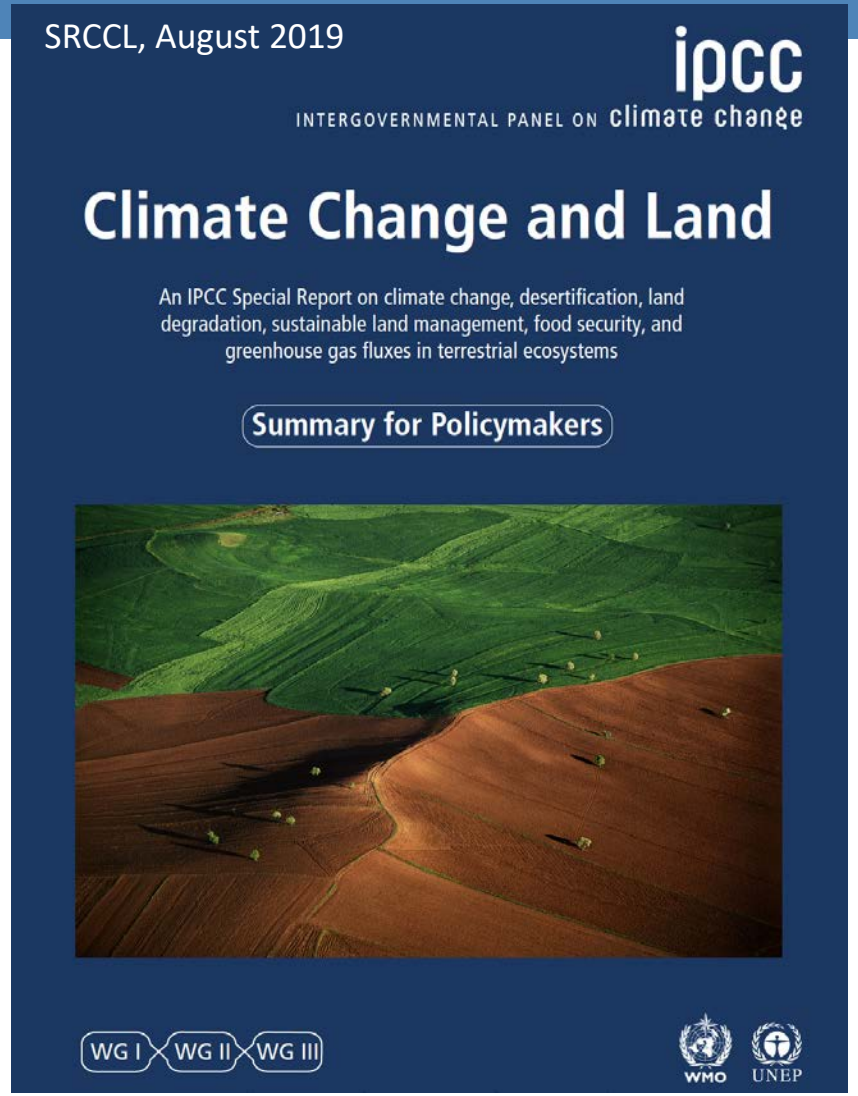
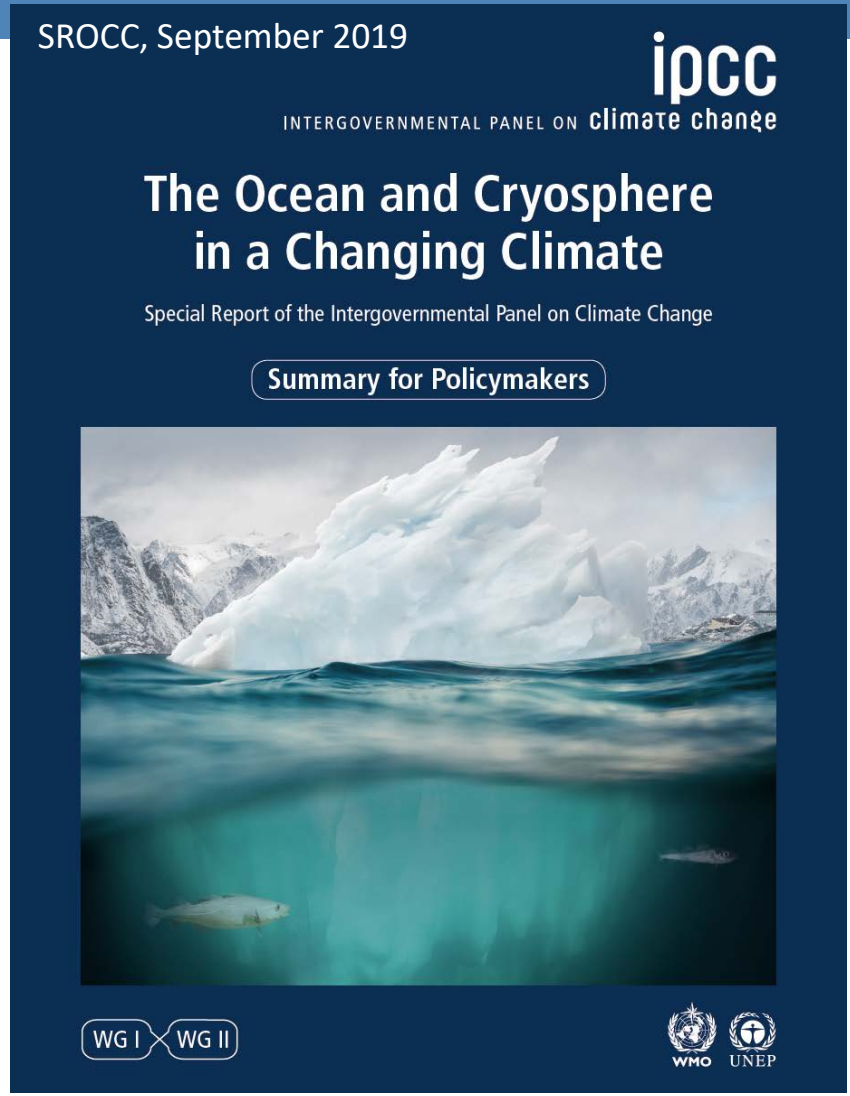
SR1.5, October 2018



SRCCL, August 2019



SROCC, September 2019



WGII: Avoiding Impact (Severity) guiding AMBITION in Mitigation and Adaptation

Hans-O. Pörtner, Co-Chair IPCC WGII AR6

IPCC 6th Assessment Cycle: 3 Special Reports released between October 2018 and September 2019

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Ashley Cooper / Aurora Photos

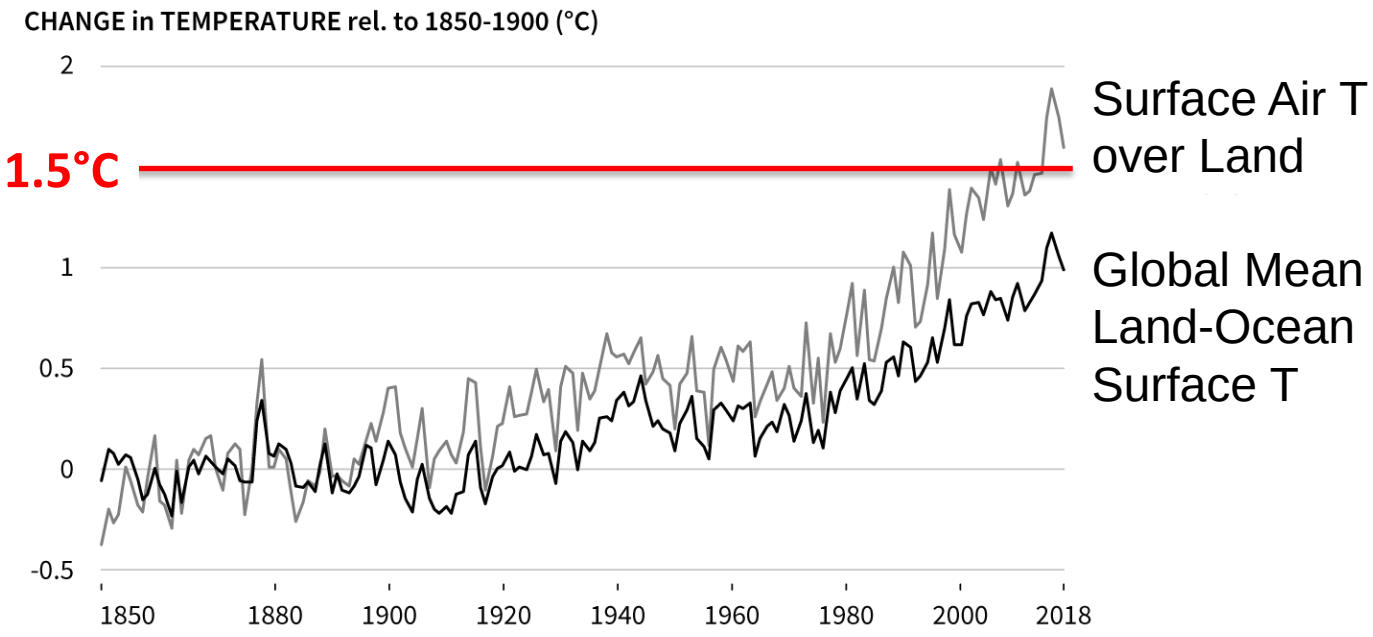
Where are we?

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 2030 and 2052**
- **Past emissions alone do not commit the world to 1.5°C**

Observed temperature change relative to 1850 - 1900

SRCCL



Land is a critical resource – we rely on it for food, water, health and wellbeing – but it is already under **growing human pressure. Climate change is adding to these pressures**

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Drylands currently cover about **46.2% of global land** and are **home to 3 billion people.**

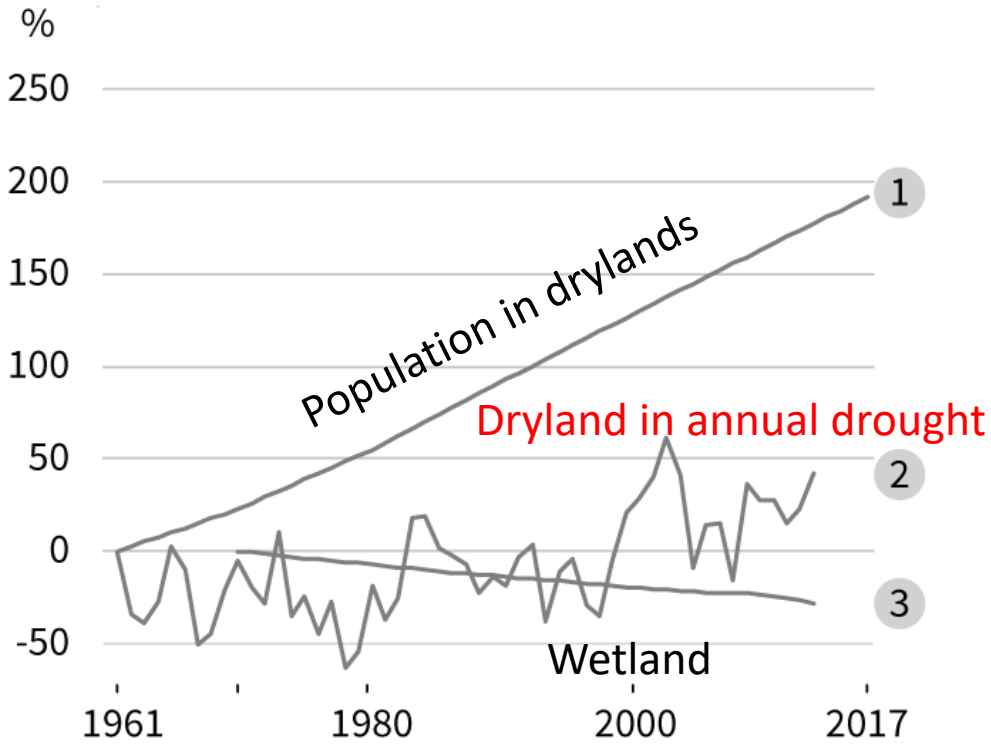
SRCCL

F. Desertification and land degradation

Land-use change, land-use intensification and climate change have contributed to desertification and land degradation.

CHANGE in % rel. to 1961 and 1970

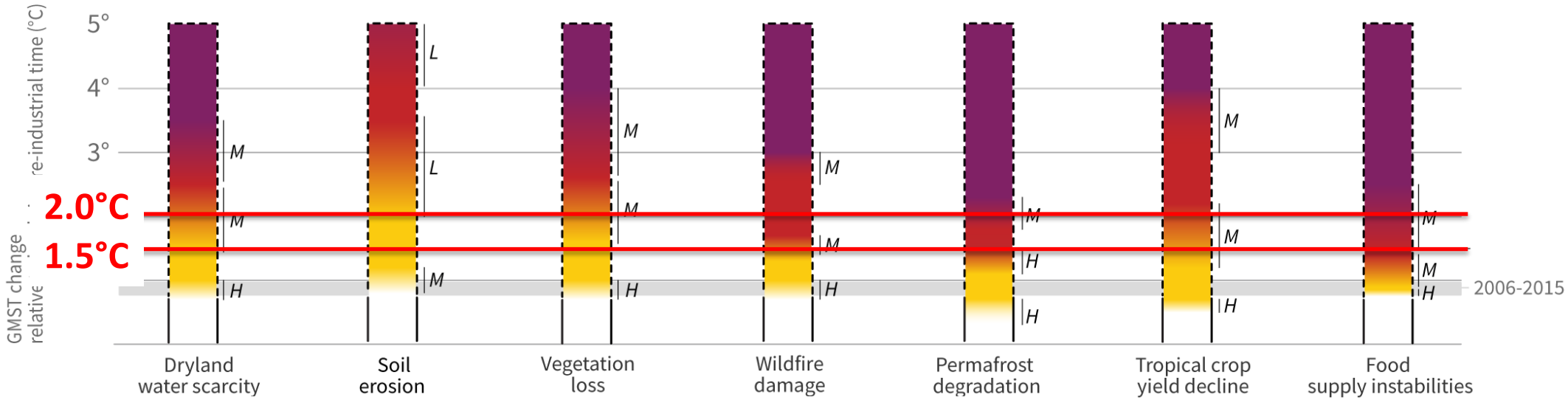
1 Population in areas experiencing desertification
2 Dryland areas in drought annually
3 Inland wetland extent



SRCCL

A. Risks to humans and ecosystems from changes in land-based processes as a result of climate change

Increases in global mean surface temperature (GMST), relative to pre-industrial levels, affect processes involved in **desertification** (water scarcity), **land degradation** (soil erosion, vegetation loss, wildfire, permafrost thaw) and **food security** (crop yield and food supply instabilities). Changes in these processes drive risks to food systems, livelihoods, infrastructure, the value of land, and human and ecosystem health. Changes in one process (e.g. wildfire or water scarcity) may result in compound risks. Risks are location-specific and differ by region.



Human food security is at stake

Level of added impacts/risks

- **Very high** — **Purple:** Very high probability of severe impacts/ risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.
- **High** — **Red:** Significant and widespread impacts/risks.
- **Moderate** — **Yellow:** Impacts/risks are detectable and attributable to climate change with at least medium confidence.
- **Undetectable** — **White:** Impacts/risks are undetectable.

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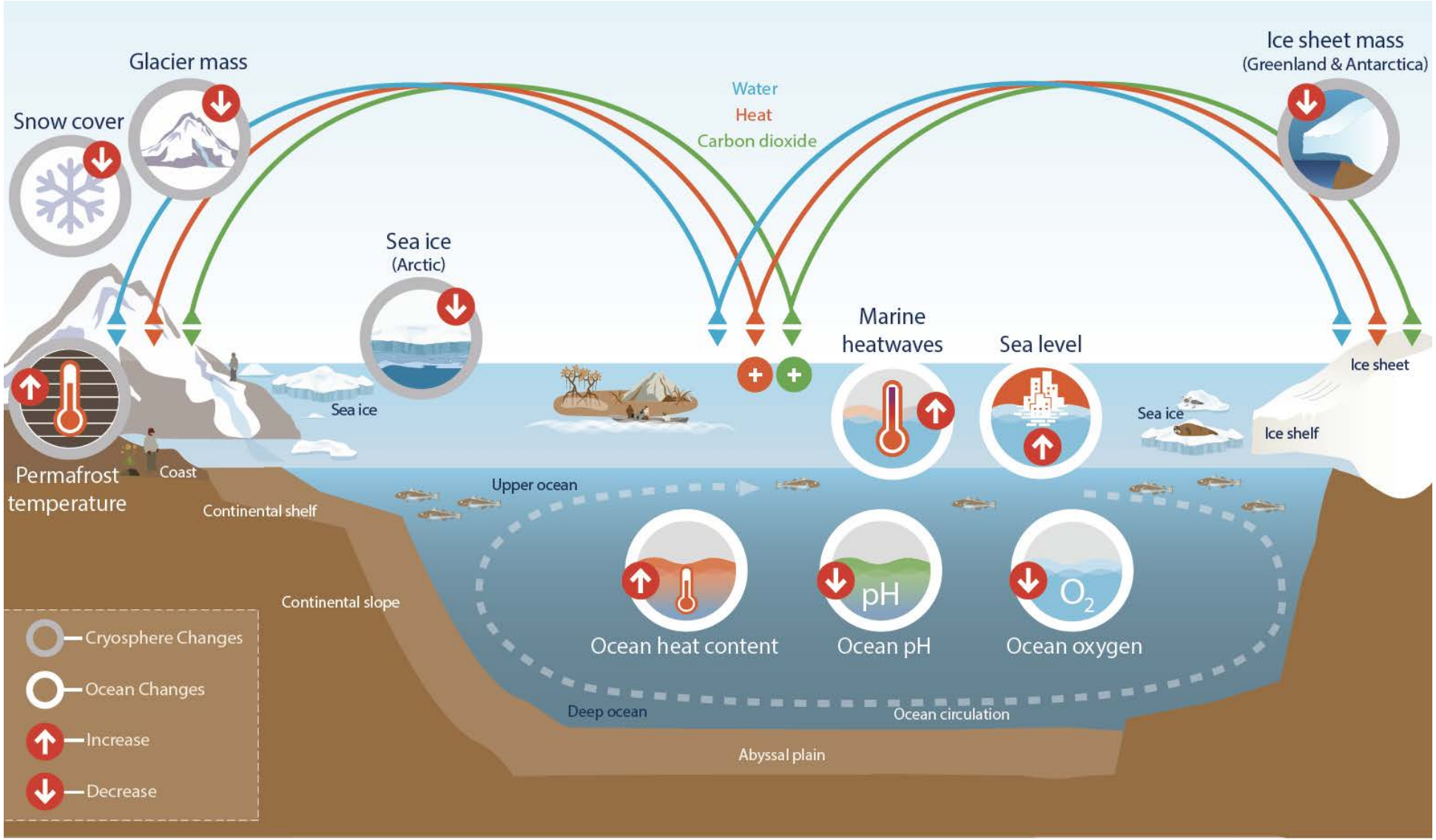
SROCC in a nutshell

…on 80 % of the earth surface climate change affects the life sustaining systems - from the top of the mountains to the depth of oceans. These changes will continue for generations to come.



TS.2

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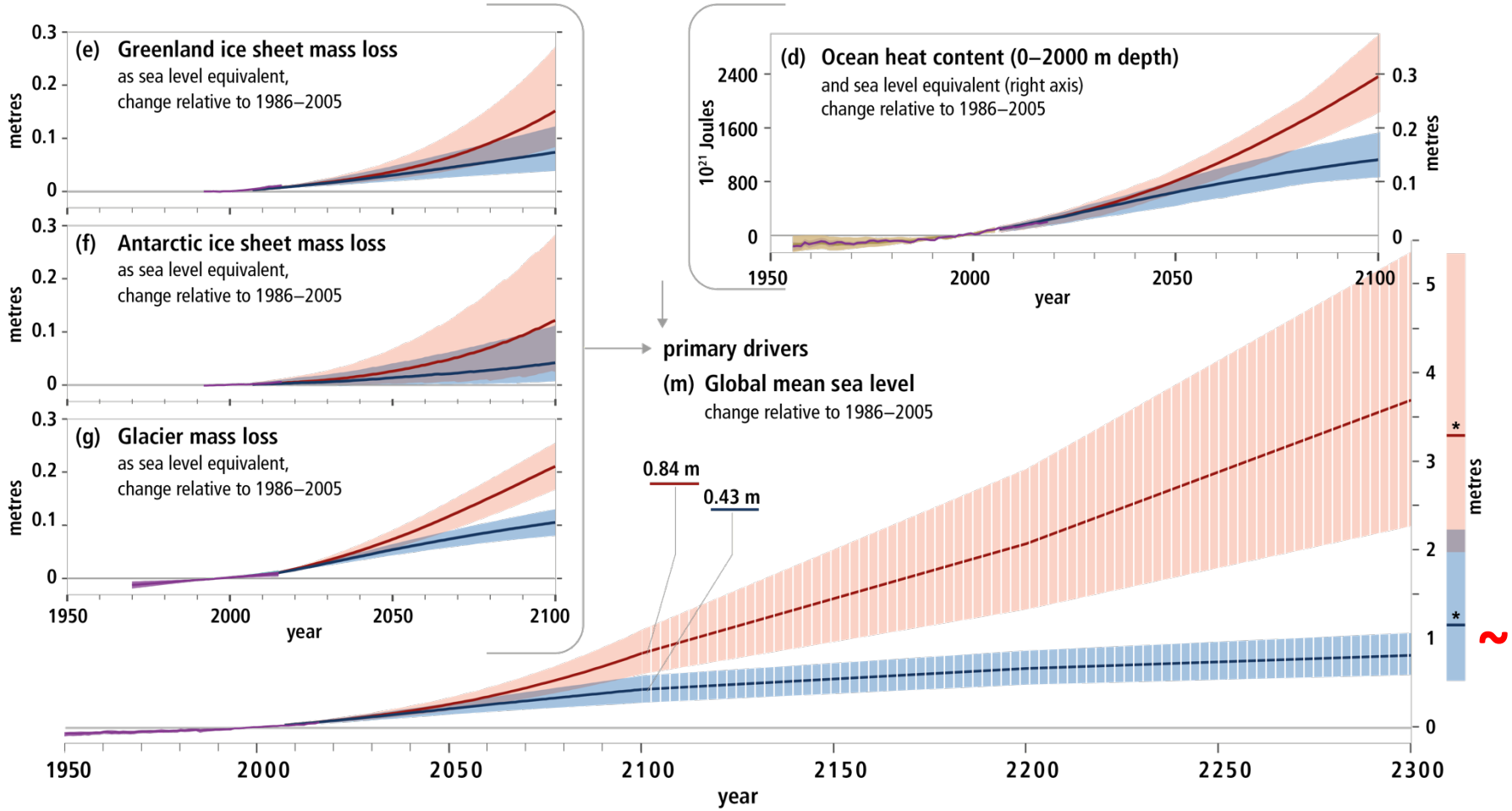
SROCC

Past and future changes in the ocean and cryosphere

Historical changes (observed and modelled) and projections under RCP2.6 and RCP8.5 for key indicators

Historical (observed) | Historical (modelled) | Projected (RCP2.6) | Projected (RCP8.5)



Sea level: according to present knowledge... we have choices between below 1 metre or several metres by 2300 due to

- Thermal expansion
- Glacier melt
- Ice sheet melt

~1.5°C

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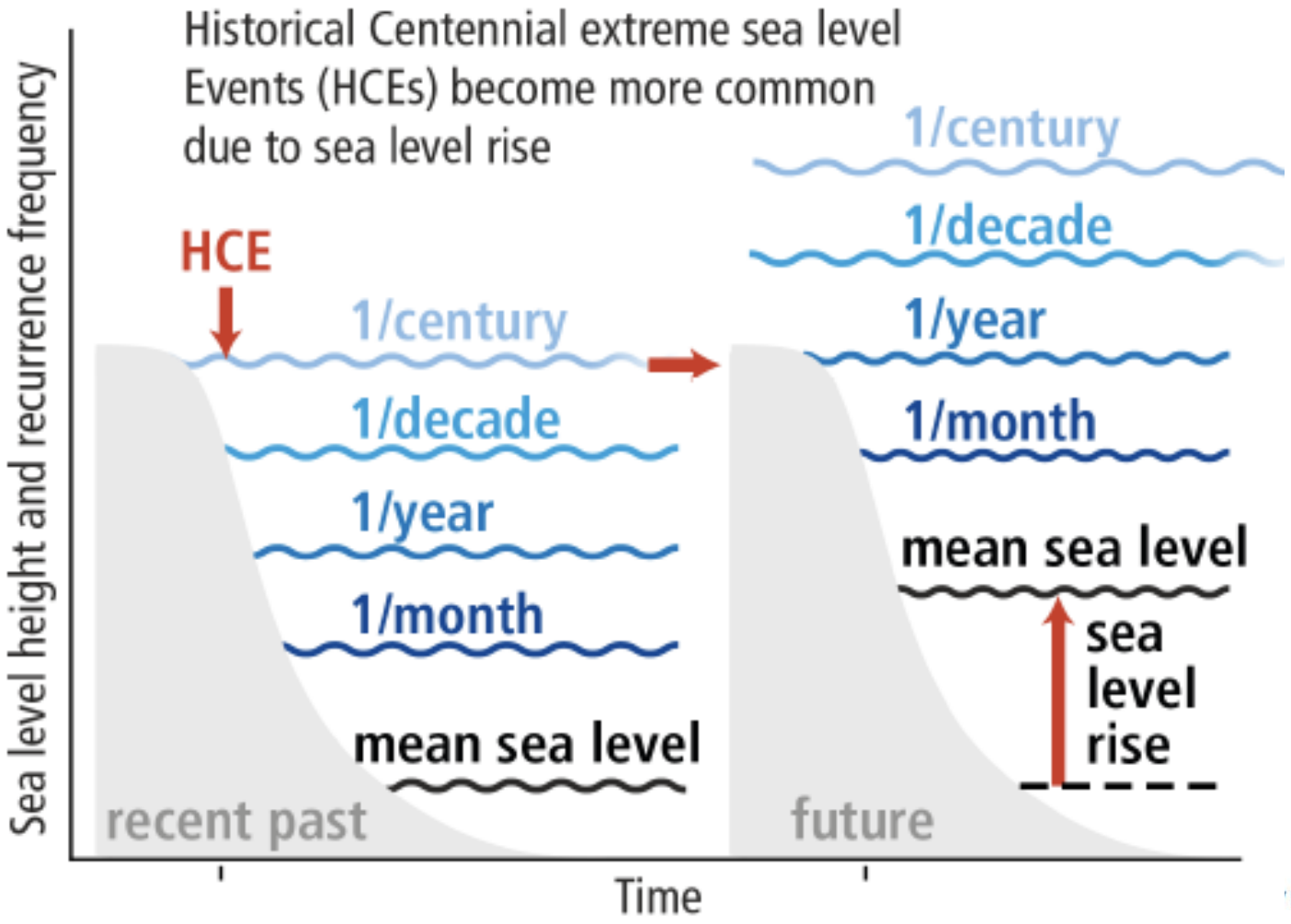
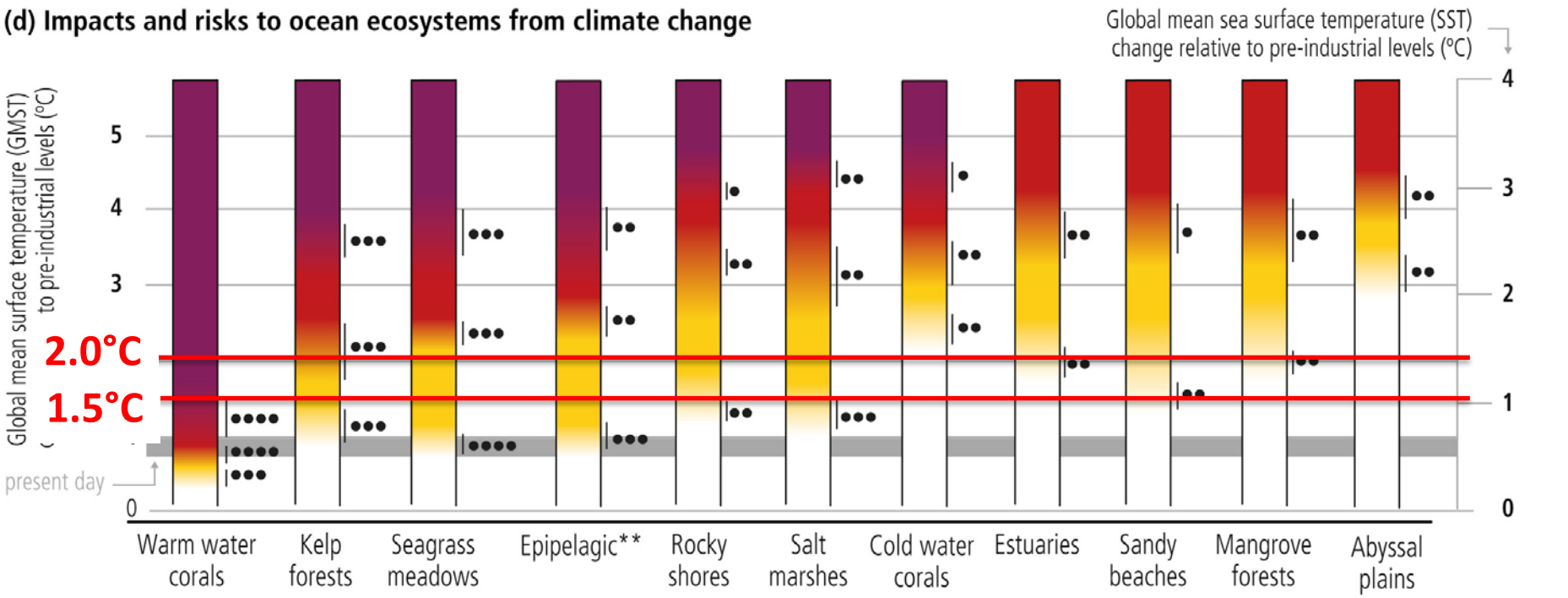
Extreme events on top of sea level rise

(a) Schematic effect of regional sea level rise on projected extreme sea level events (not to scale)



Ocean and coastal ecosystems: future risks

SROCC



Ecosystems would benefit from ambitious mitigation

Level of added impacts/risks

- **Very high** — **Purple:** Very high probability of severe impacts/ risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.
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- **Undetectable** — **White:** Impacts/risks are undetectable.

Confidence level for transition

•••• = Very high
••• = High
•• = Medium
• = Low
| = Transition range

**see figure caption for definition

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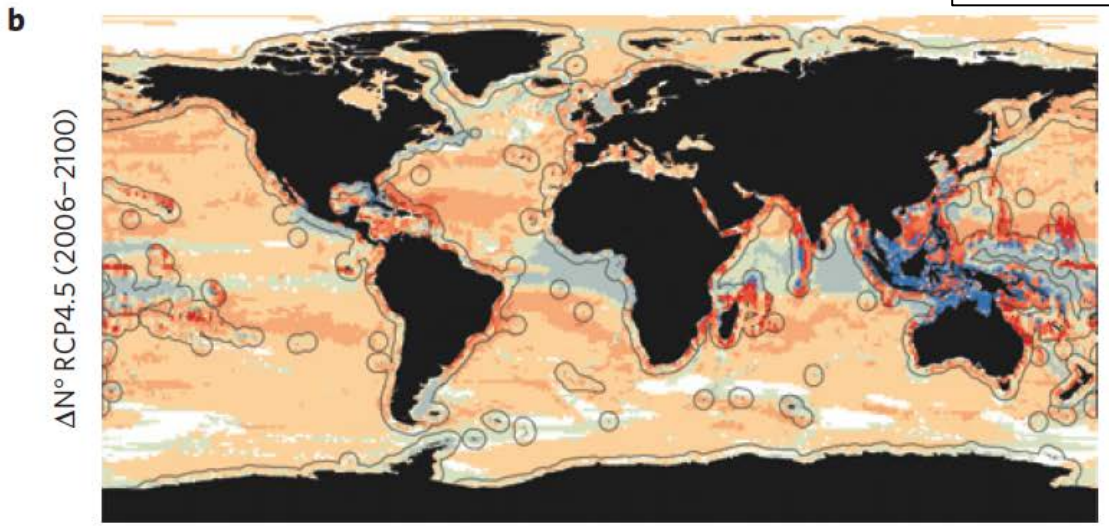
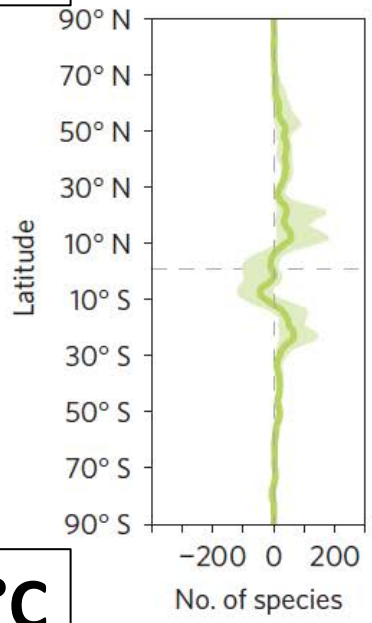
Marine biodiversity

+2.4°C



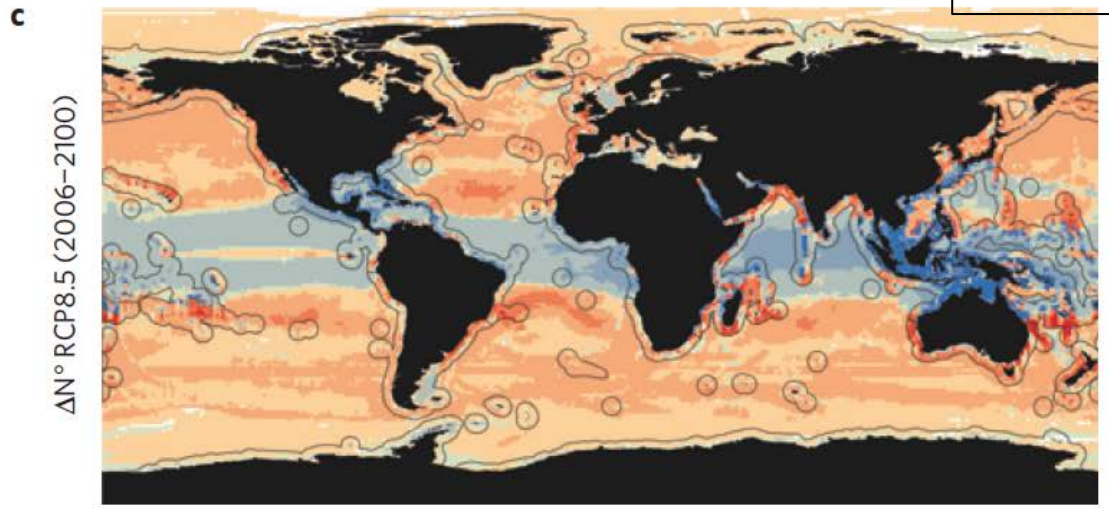


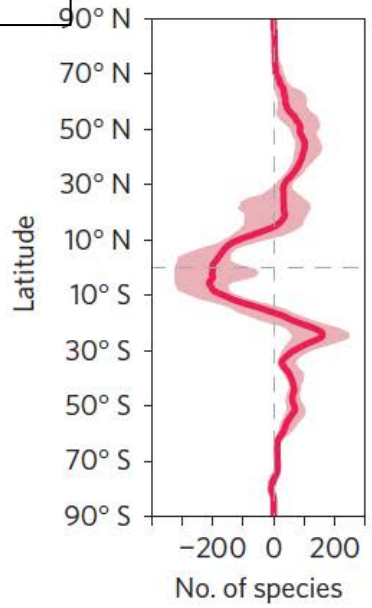
RCP 4.5

RCP4.5 versus 8.5

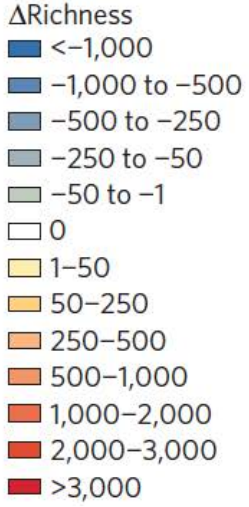
Ultimate Species Heat Limits surpassed in Tropics

+4.3°C





RCP 8.5



Drivers of change:
Warming and velocity....

Garcia-Molinos et al. 2015, 2017 NCC

Projections: Large changes in community composition expected driven by local invasions and losses

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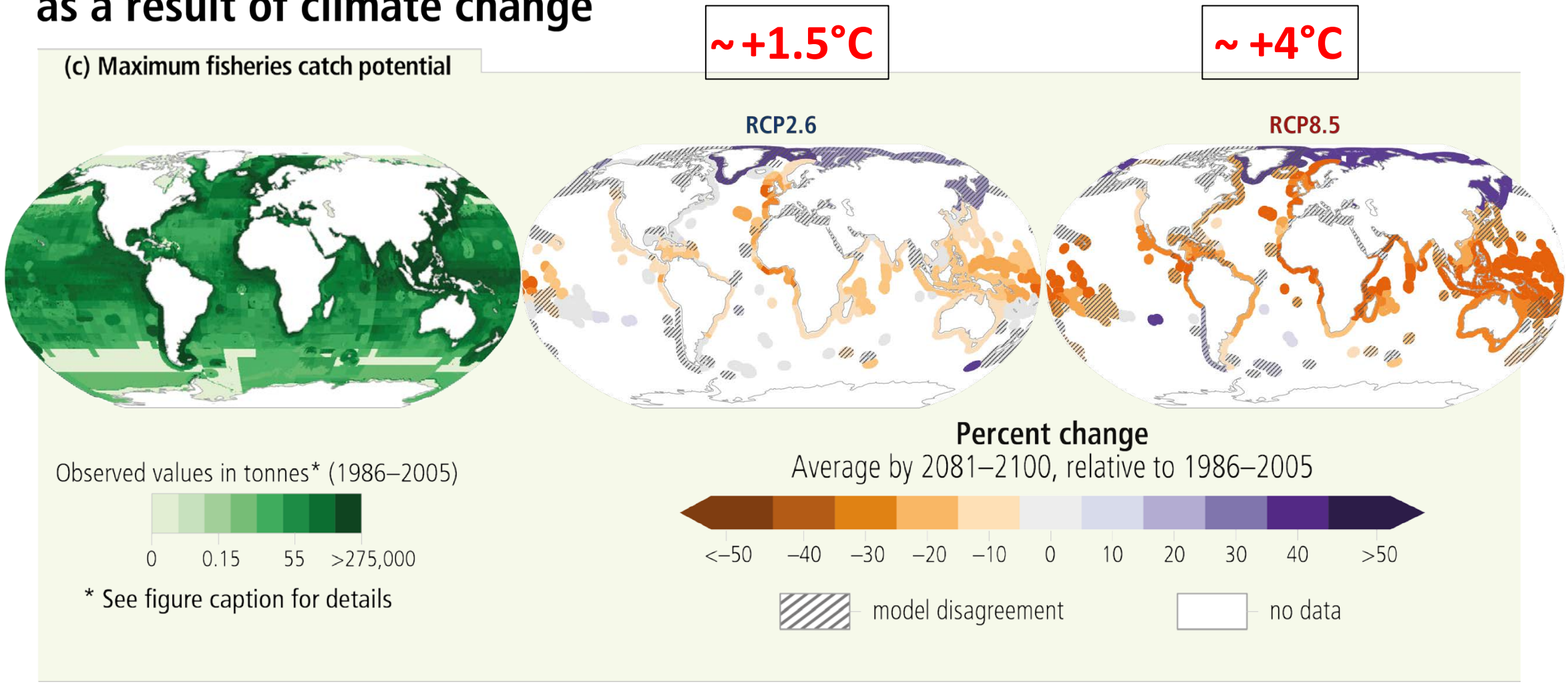
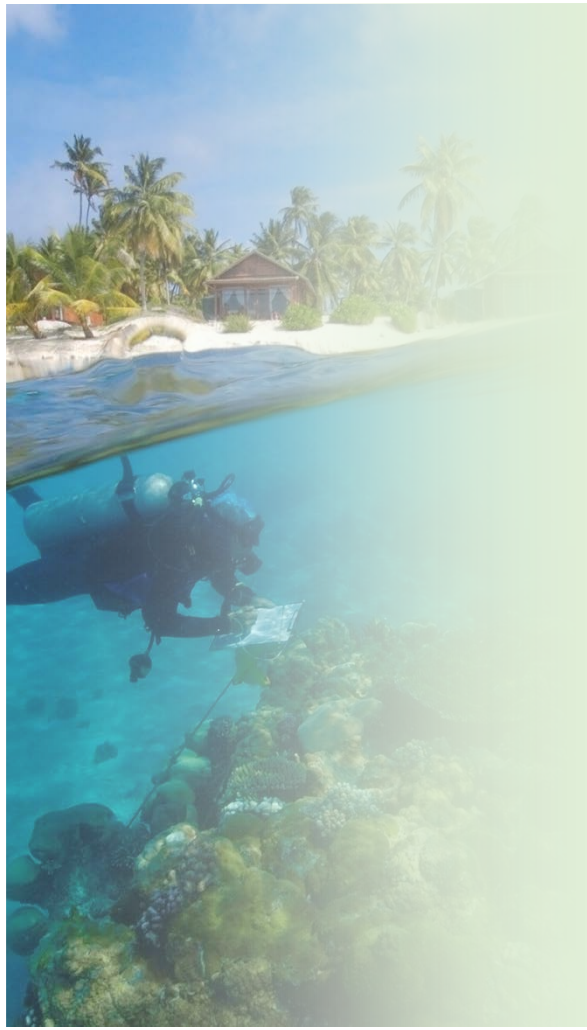
Projected changes, impacts and risks for fisheries as a result of climate change



INTERGOVERNMENTAL PANEL ON climate change



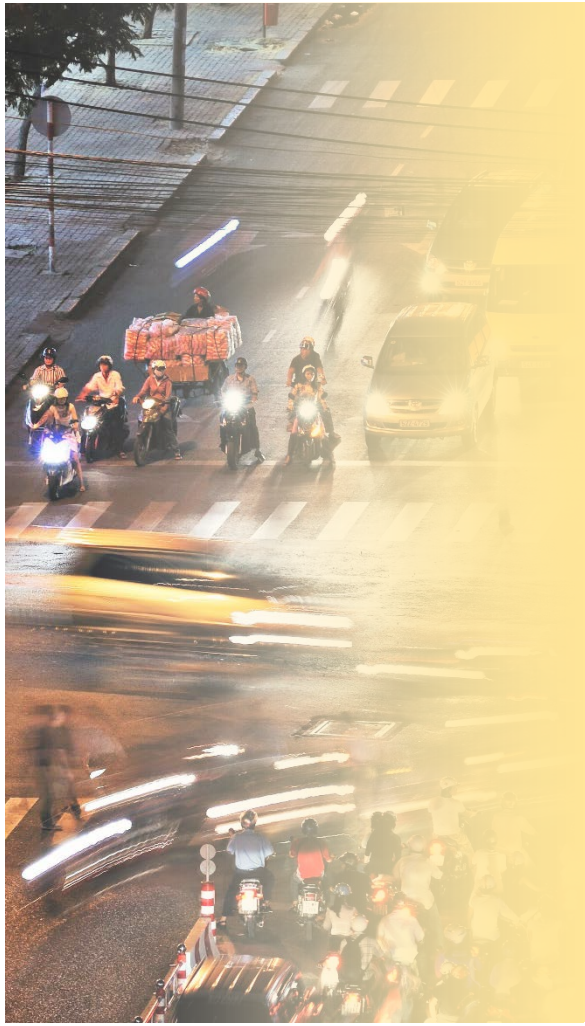
Andre Seale / Aurora Photos

Where do we want to go?

At 1.5°C compared to 2°C:

- Smaller **reductions in yields** of maize, rice, wheat and sorghum
- Global **human population exposed to water stress is up to 50% less**, also less water stress for ecosystems
- Up to **several hundred million fewer people exposed to climate-related risk and susceptible to poverty by 2050**
- **Lower impact on biodiversity and species**

Avoided impact (severity): guiding ambition in adaptation and mitigation



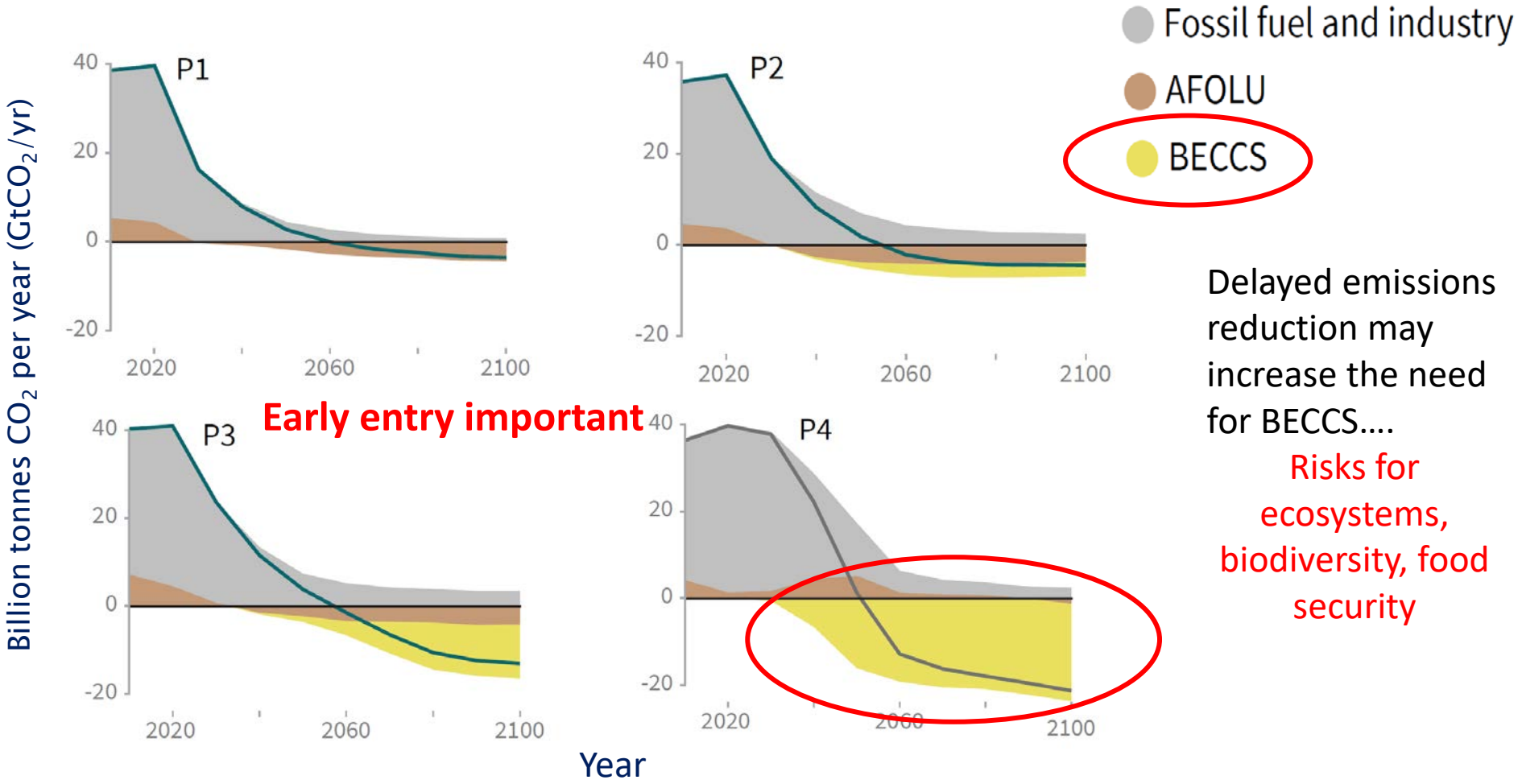
Gerhard Zwerger-Schoner / Aurora Photos

How do we get there?

- To limit warming to 1.5°C, CO_2 **emissions fall by about 45% by 2030 (from 2010 levels**)
  - *Compared to 20% for 2°C*
- To limit warming to 1.5°C, CO_2 emissions would need to reach **'net zero' around 2050**
  - *Compared to around 2075 for 2°C*
- **Reducing non-CO_2 emissions** would contribute and also have direct and immediate health benefits

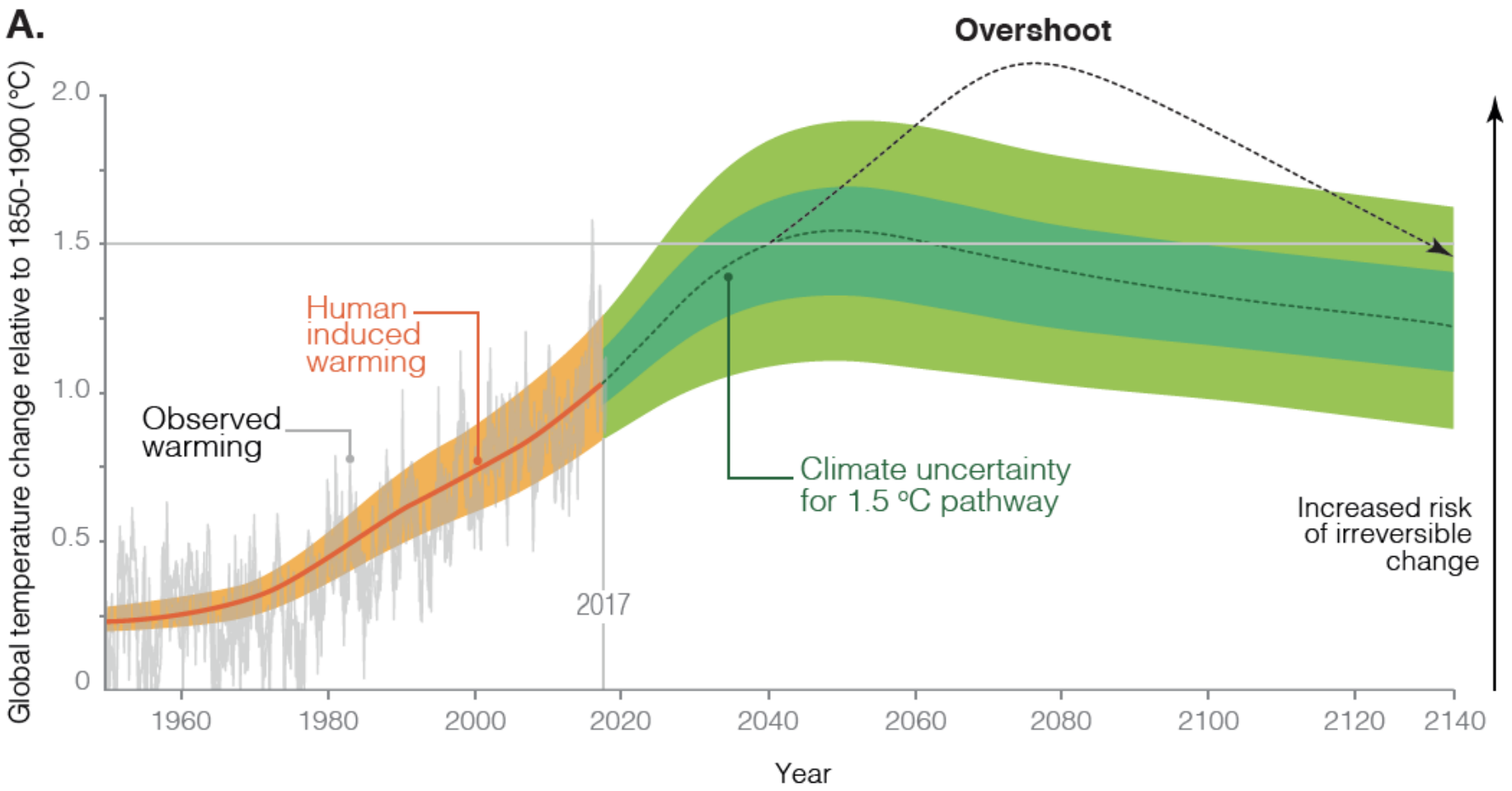
For keeping warming to 1.5°C ADAPTATION and MITIGATION measures can bring their own risks:

Different pathways and mitigation strategies have variable needs for negative emission technologies, **e.g. BECCS, i.e. Bioenergy and Carbon Capture and Storage**

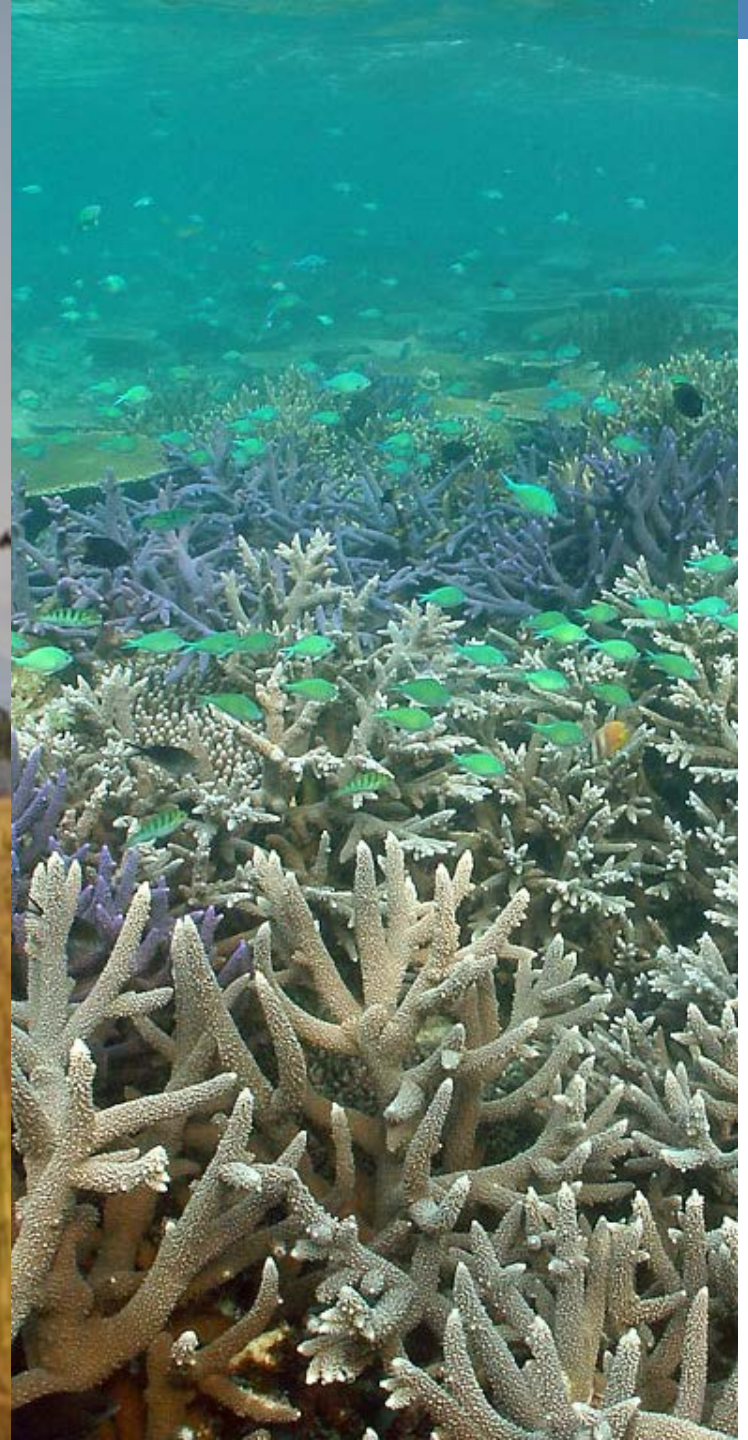


Delayed emissions reduction may increase the need for BECCS….

Risks for ecosystems, biodiversity, food security



Pathways of global warming with the goal to reach and maintain 1.5°C



Ambitious mitigation combined with better land and ocean management supports **biodiversity conservation** and **food security for human society**

1.5°C facilitates reaching SDGs: Multiple synergies between mitigation and adaptation technologies

The Paris agreement and climate impacts provide a sense of urgency: Overcoming societal inertia, political paralysis and inaction in transformation ... reaching sustainability for ecosystems and people

Feasibility at various levels:

- Keeping warming to 1.5 according to the laws of chemistry and physics ---- yes
- Technologies to support mitigation and adaptation measures ---- yes
- Redirection of financial flows ---- yes (stopping fossil fuel subsidies)
- Institutions --- yes
- Informed policy and governance leading and directing societal transformation ---- may be .....? BOTTLE NECK

SR1.5, SRCCL, SROCC:

For minimizing impact (severity) and associated risks….

Every bit of warming matters

Each year matters

Each choice matters …. closely following emission pathways matters

Political and societal will matters

Let us unite behind the science (Haakon, Crown Prince of Norway, OurOceans Oslo 2019)

Ashley Cooper/ Aurora Photos

More Information:

Website: http://ipcc.ch

microsites: SR1.5, SRCCL, SROCC

IPCC Secretariat: ipcc-sec@wmo.int

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