



IPCC 6th Assessment Cycle: Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)

Second Lead Author Meeting

Quito, Ecuador, 12-16 February
2018

Hans-O. Pörtner: Co-Chair WGII AR6
AR5: CLA WGII CH. 6, Ocean Systems,
Ocean products in TS and SPM, CC-Boxes, SYR, SED

ipcc

INTERGOVERNMENTAL PANEL ON climate change



OCEAN & CRYOSPHERE IN A GLOBAL CONTEXT

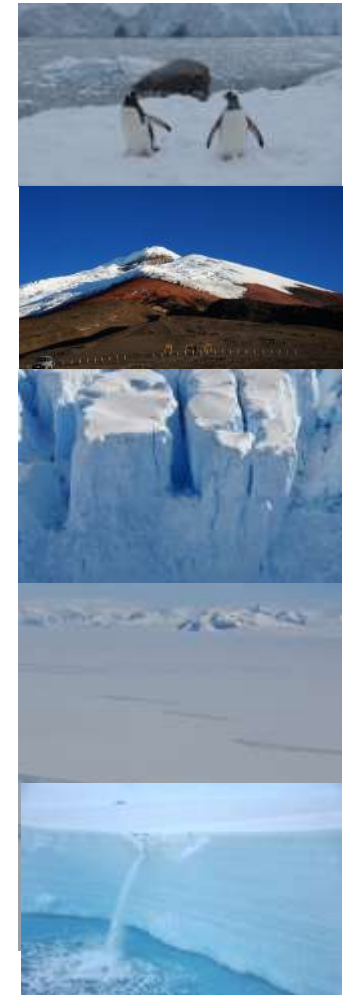
- **The Ocean**

- covers **>70%** of earth's surface
- plays a key role in **climate regulation**, weather system and global carbon cycle
- carries **~50%** of **global primary and oxygen production**
- supports immense **biodiversity**
- provides important **social and economic goods and services** (tourism, fisheries, transport (90%), etc)



OCEAN & CRYOSPHERE IN A GLOBAL CONTEXT

- **The Cryosphere (“Frozen World“)**
 - is **~2% of the world’s water** storage, with **~11%** of the world’s land surface and **7%** of ocean surface covered with multiyear snow and ice
 - includes **mountain glaciers and ground ice, snow covers**, as well as Antarctic and Greenland **ice sheets**, and polar and subpolar **sea ice**,
 - plays a key role in **river runoff, sea level rise, ocean-atmosphere exchange, permafrost methane storage**, etc.
 - holds water **equivalent to 66 m of sea level rise**



PURPOSE OF SROCC: SPECIAL REPORT ON OCEANS AND CRYOSPHERE IN A CHANGING CLIMATE

- *Provide* a focussed **cross-cutting assessment** of:
 - The **role of oceans and cryosphere in the climate system** - observed and projected **changes in oceans and cryosphere, ocean cryosphere interactions**
 - **Risks, vulnerability, impacts and implications** of climate-related ocean and cryosphere change **for biological and human systems**, e.g. **sea level rise**
 - **Resilience pathways** and **adaptation options**
- *Present* new and updated information for decision-makers to inform the design and implementation of appropriate policies and actions.

SROCC OUTLINE

1. Framing and Context of the Report
 2. High **Mountain** Areas
 3. **Polar** Regions
 4. **Sea level** rise and implications for low lying islands, coasts and communities
 5. Changing **ocean, marine ecosystems**, and dependent communities
 6. **Extremes**, abrupt changes and managing risks
- + Cross-chapter box: Low lying **islands and coasts**

AR5 key and related findings: Cryosphere and Ocean Impacts



Projected regional climate change (IPCC AR5): South America

Annual Temperature Change

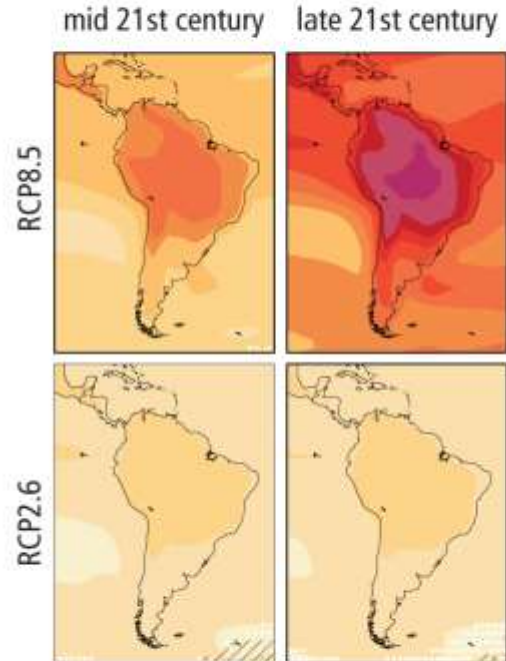


Difference from 1986–2005 mean (°C)

Annual Precipitation Change

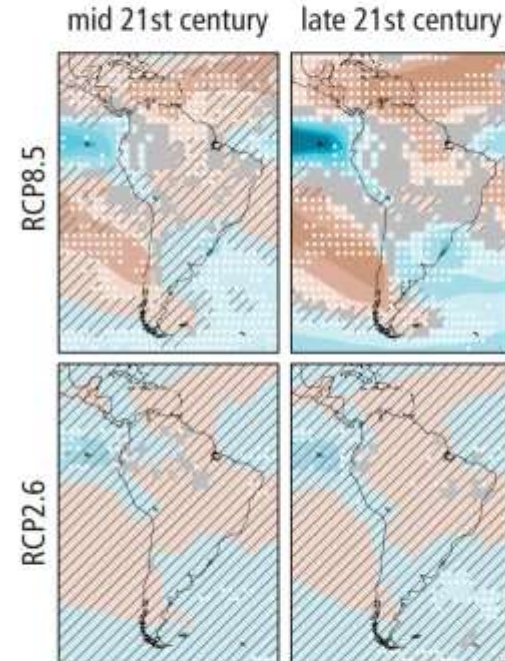


Difference from 1986–2005 mean (%)



Business as usual

Ambitious mitigation



Solid Color

Very strong agreement

White Dots

Strong agreement

Gray

Divergent changes

Diagonal Lines

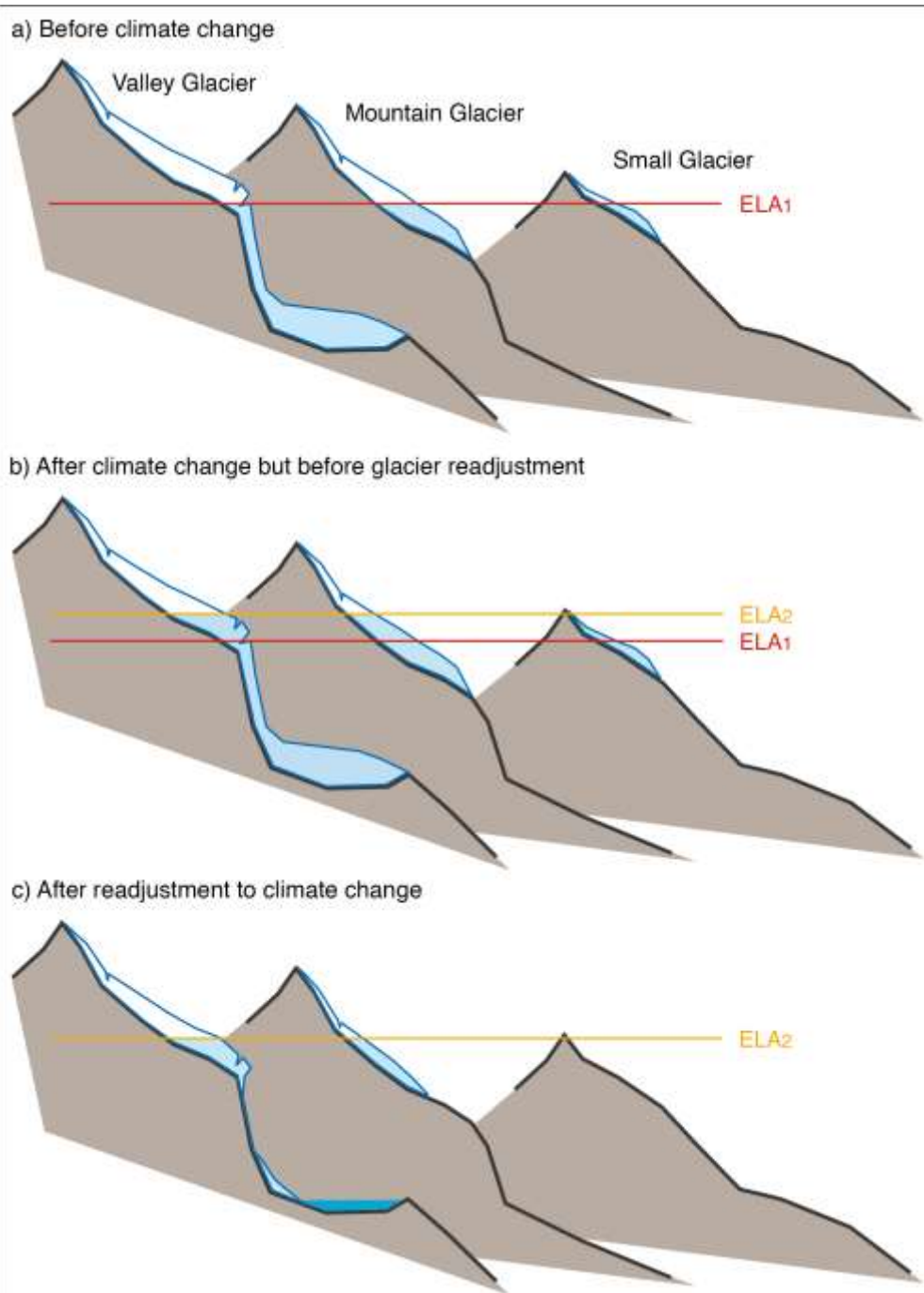
Little or no change

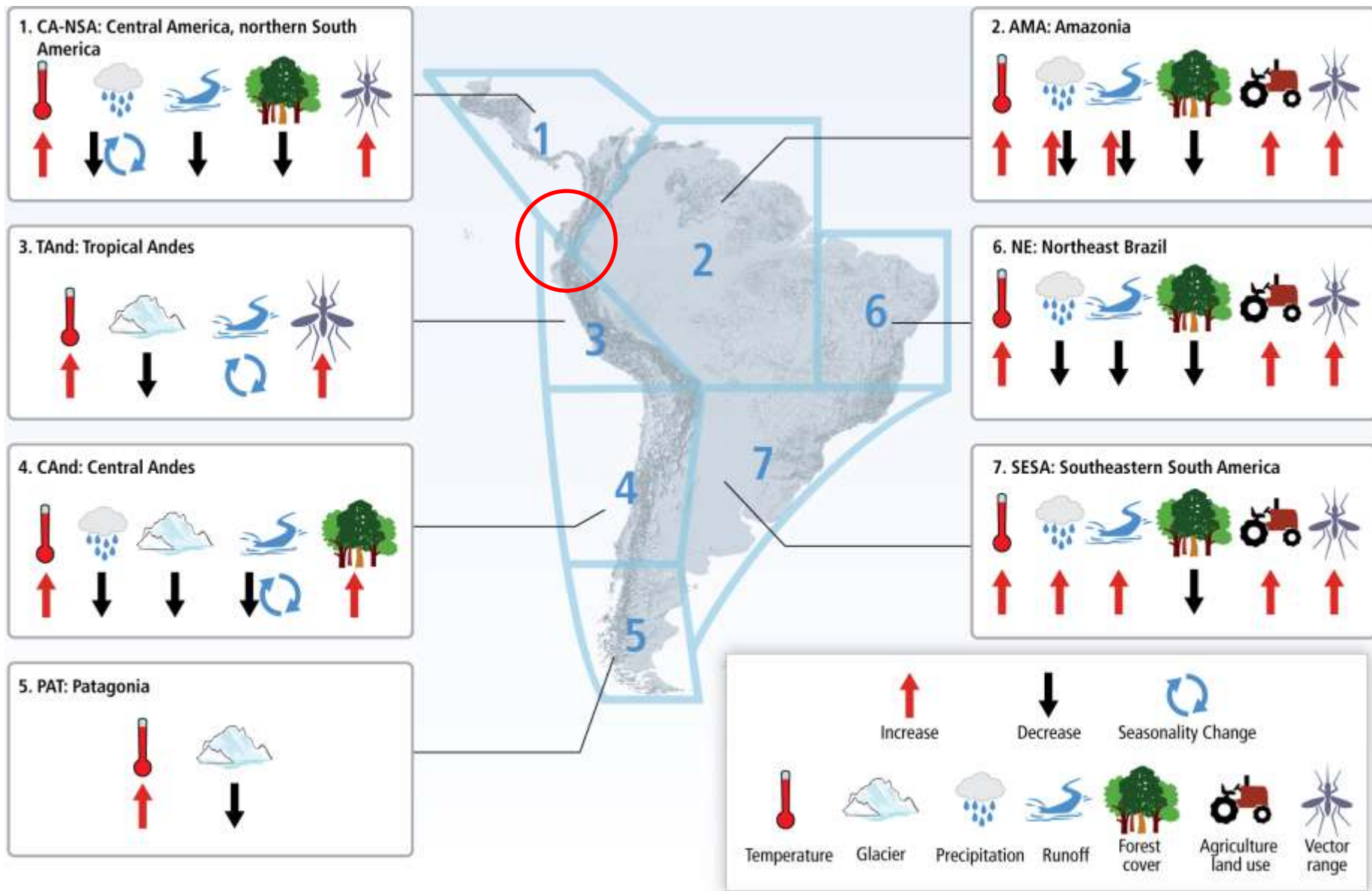
Schematic of three types of glacier and their response to climate change (IPCC AR5)

Most glaciers are currently larger than they would be if they were in balance with current climate.



ELA: Equilibrium line altitude, shifting up from ELA1 to ELA2





AR5 WGII Figure 27-7

Vulnerable ecosystems identified in AR5: Arctic summer sea ice systems

1.5°C

RCP 2.6
ambitious mitigation

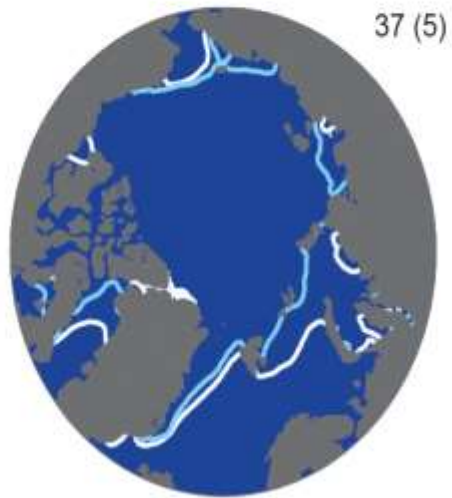
≥2°C

RCP 8.5
business as usual

(c) Northern Hemisphere September sea ice extent (average 2081–2100)



- CMIP5 multi-model average 1986–2005
- CMIP5 multi-model average 2081–2100
- CMIP5 subset average 1986–2005
- CMIP5 subset average 2081–2100



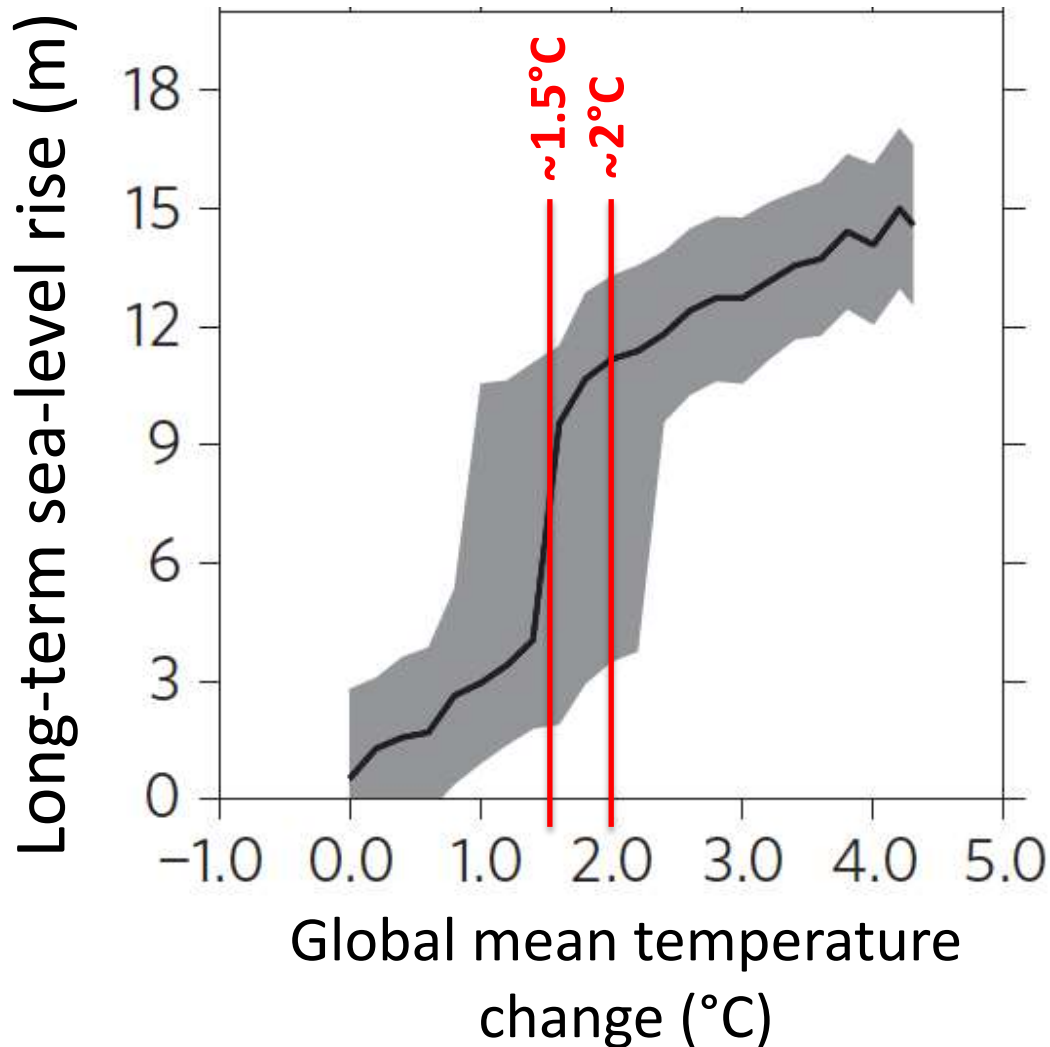
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Sea level rise beyond 2100 may challenge biological and human systems:

1.5°C

High ambition mitigation needed

....affecting habitat, freshwater resources, human society through flood events



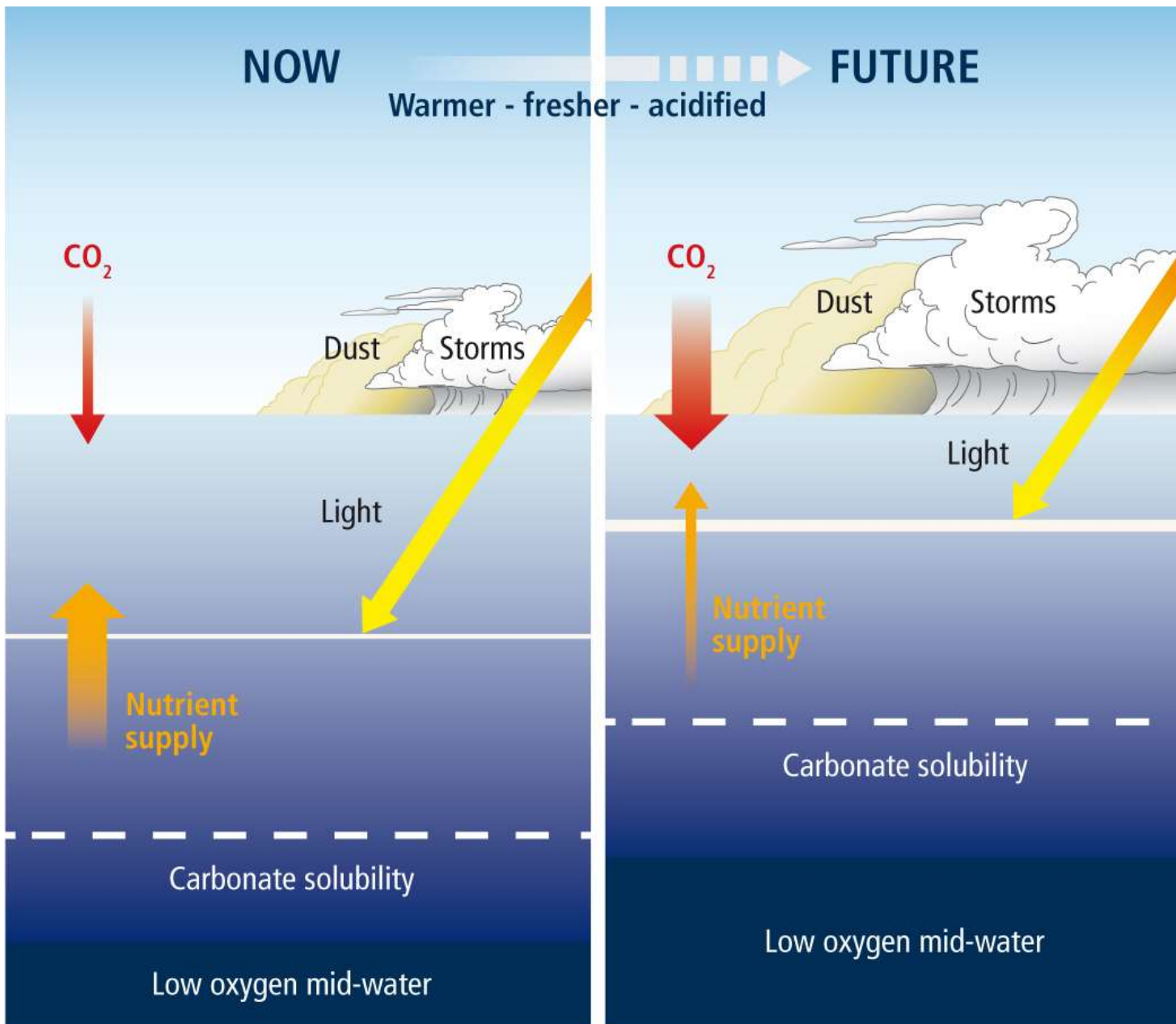
Coming close to Paleo-findings....

5-9 m : ...during the last interglacial (Eemian, 125.000 ya, at 0.7-2°C above pre-industrial)

>7m : ...last time when the atmosphere had 400 ppm CO₂ (in Pliocene, 3-5 Mya)

Knutti et al., Ngeo 2015

TO BE
ASSESSED
IN AR6

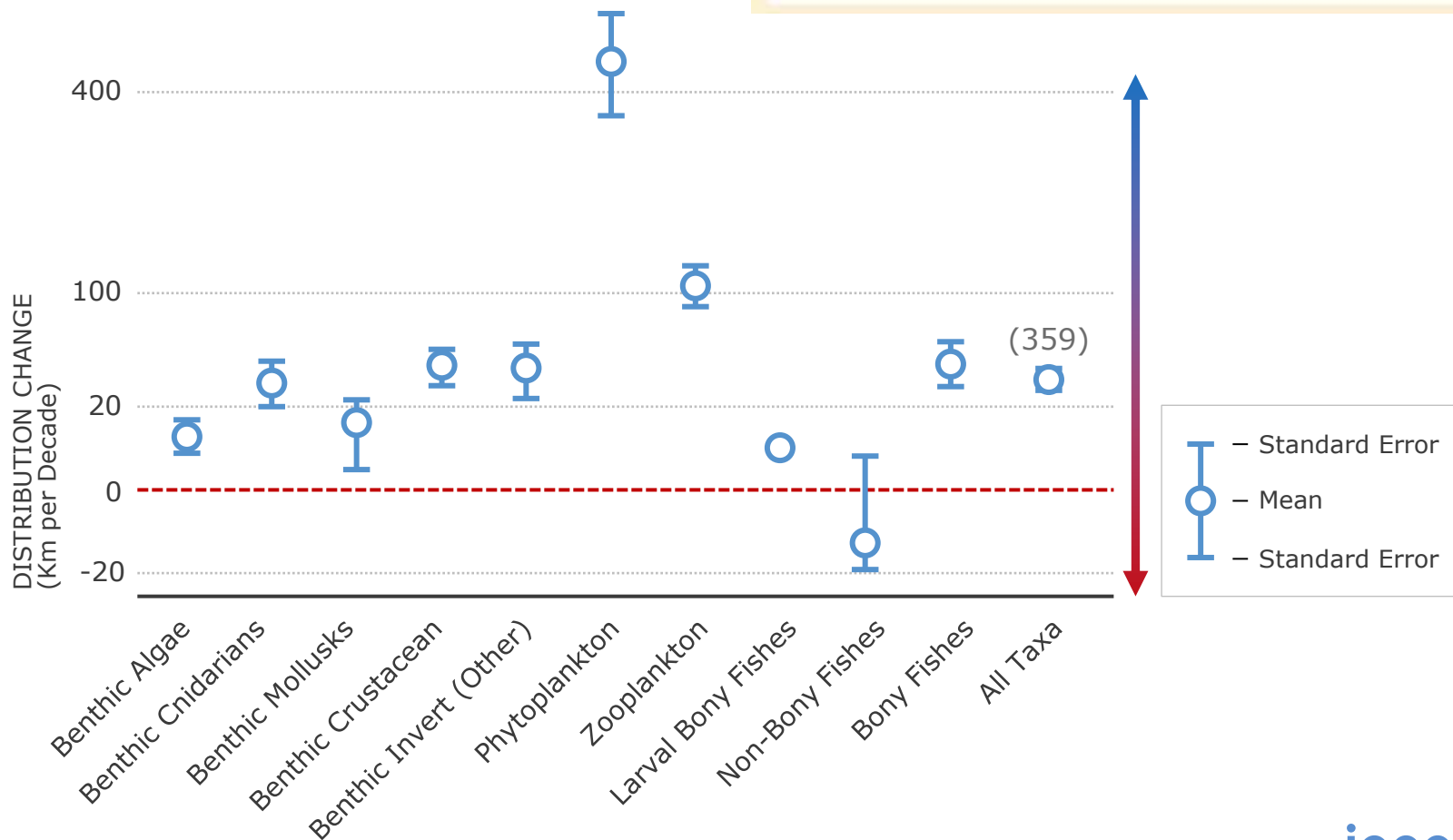
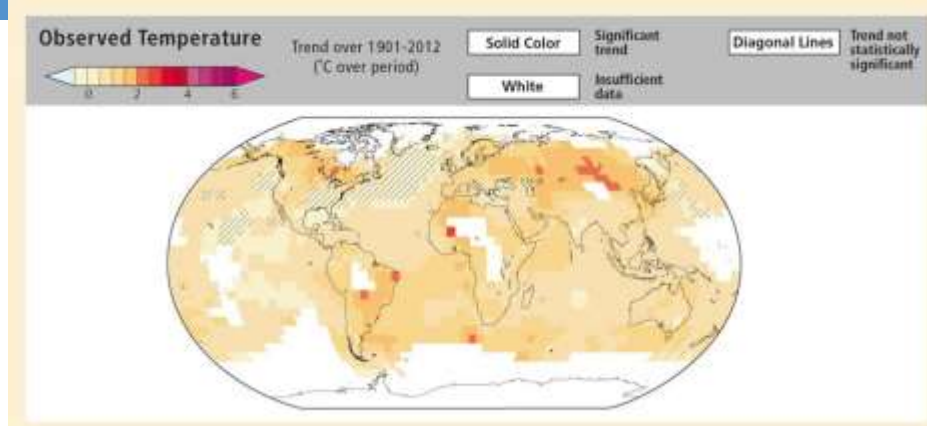


WGII AR5 Figure 6-2

OBSERVATIONS

World-wide marine species displacements due to climate change

...ocean warming as the key driver

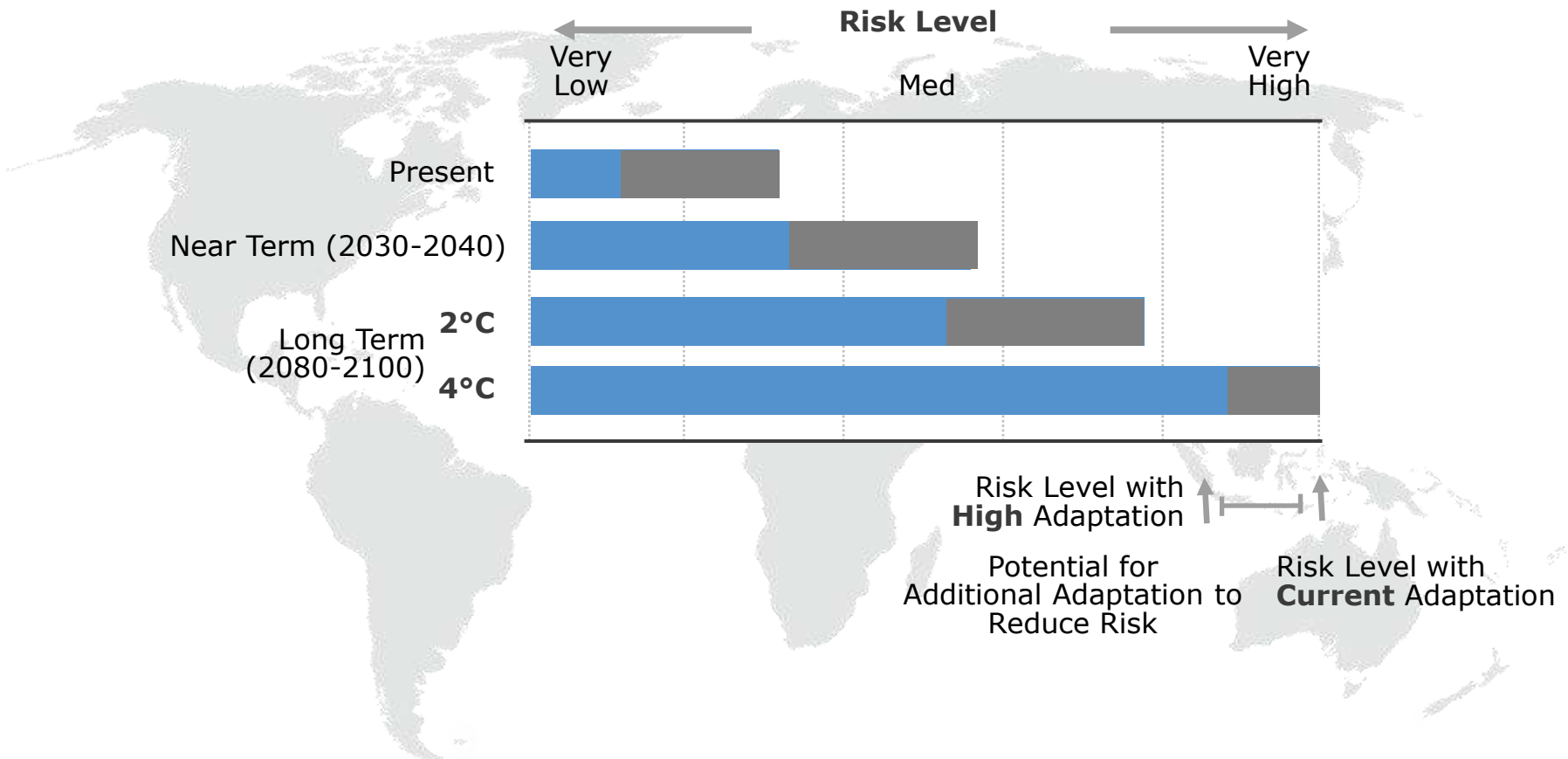


Reducing risks through adaptation

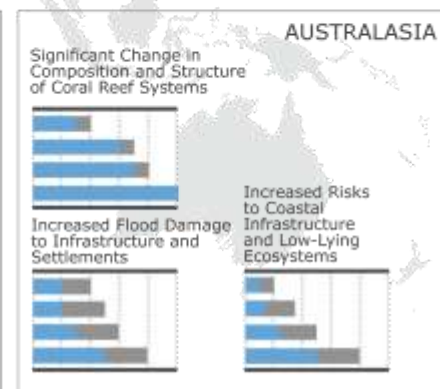
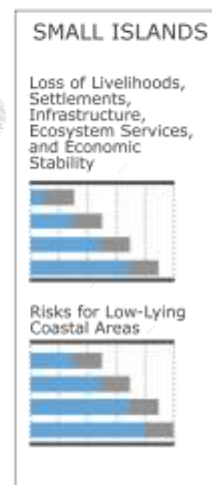
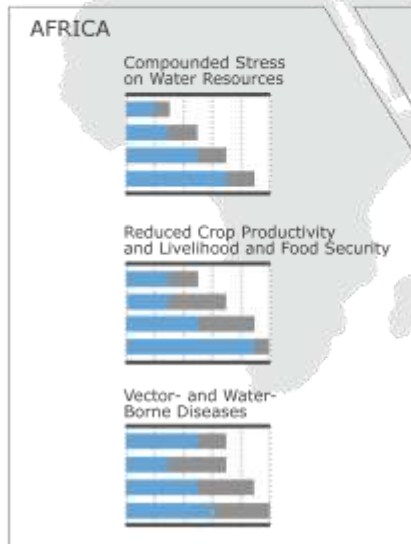
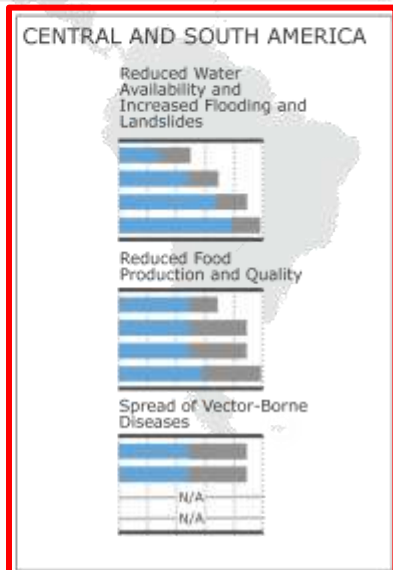
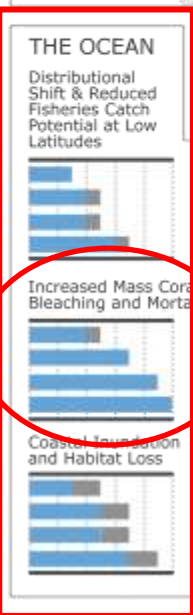
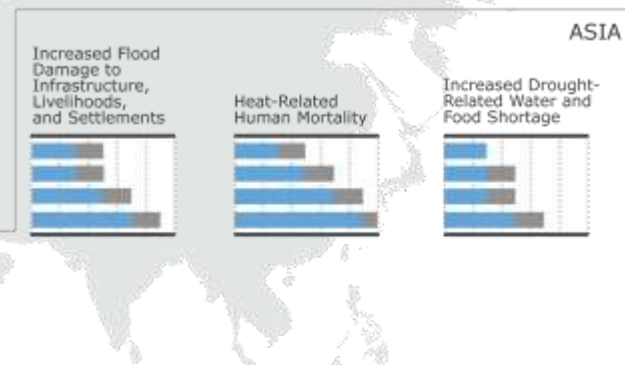
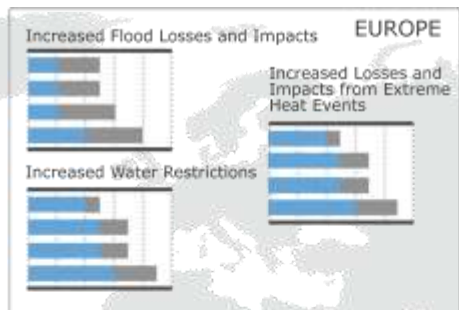
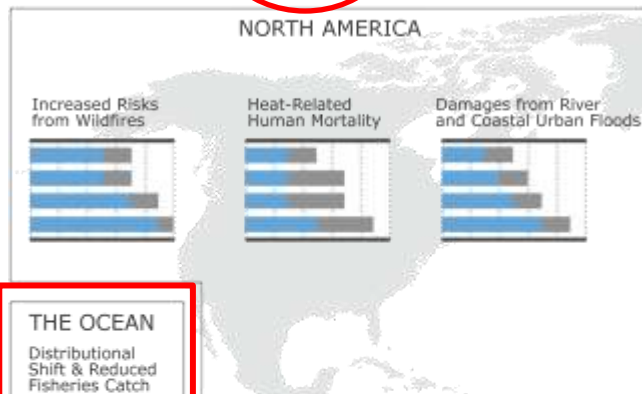
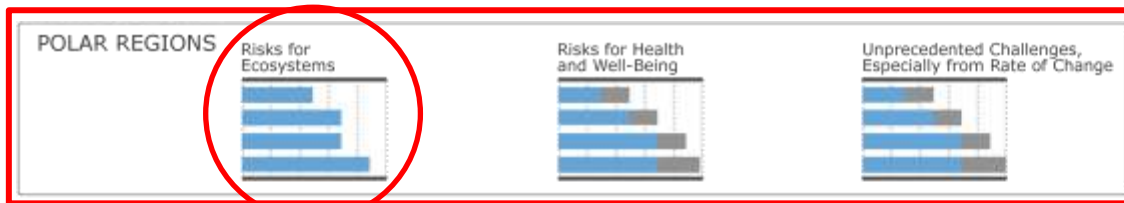
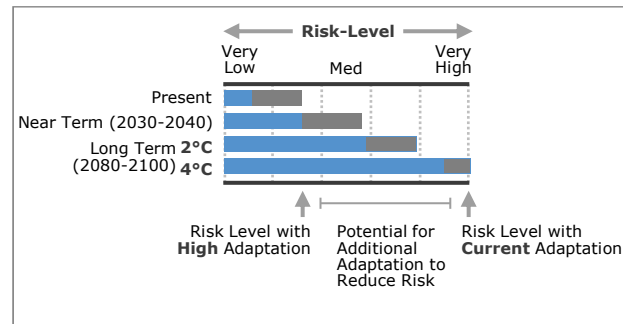
...risks were assessed in AR5, with open questions for AR6:

(key risks are those relevant to article 2, UNFCCC:

“avoid dangerous anthropogenic interference with the climate system”)



Impacts of climate change: Key regional risks, Risk reduction by adaptation



THANK YOU FOR YOUR ATTENTION!

For more information:

Website: <http://ipcc.ch/>

IPCC Secretariat: ipcc-sec@wmo.int

IPCC Press Office: ipcc-media@wmo.int

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