



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

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AR5: CLA WGII CH. 6, Ocean Systems,  
Ocean products in TS and SPM, CC-Boxes, SYR, SED

# OCEAN & CRYOSPHERE IN A GLOBAL CONTEXT

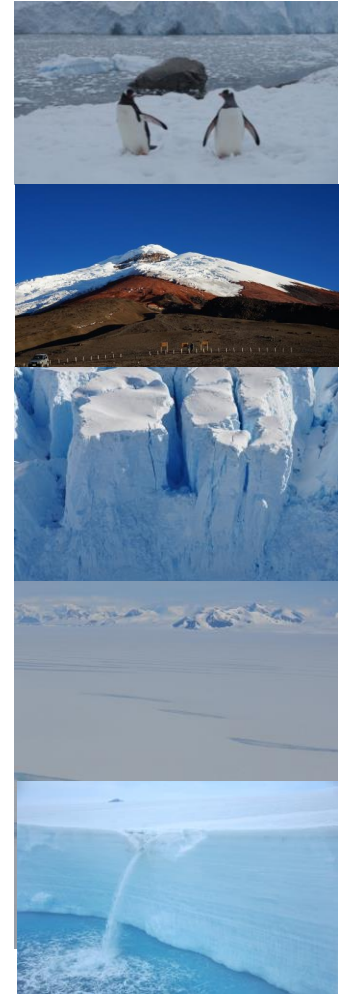
- **The Ocean**

- covers **>70% of earth's surface**
- plays a key role in **climate regulation**, weather systems 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**



# 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**

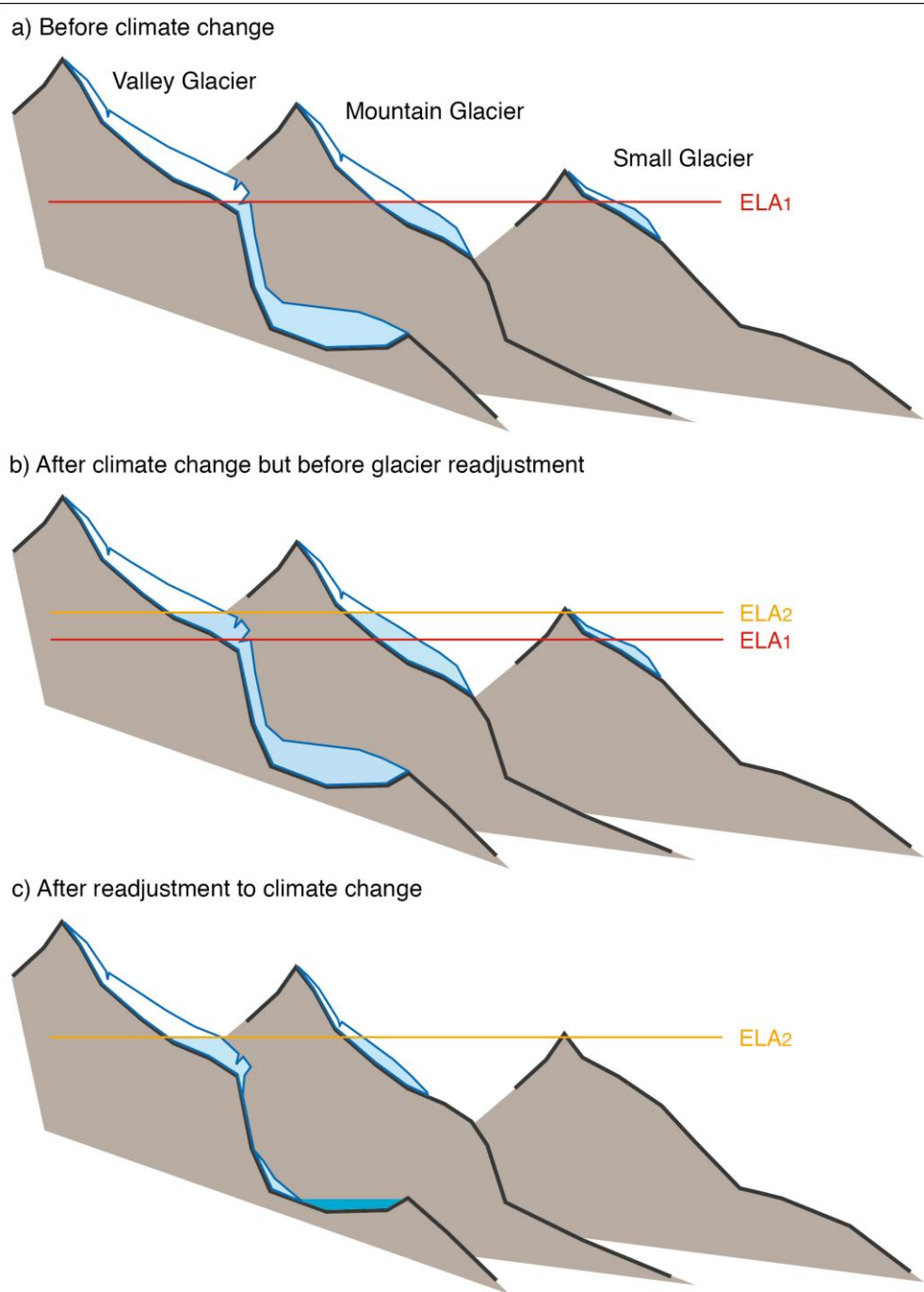


# Schematic of three types of glacier and their response to climate change (IPCC AR5)

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



WGI FAQ 4.2, Figure 1

# Vulnerable ecosystems identified in AR5 and SR1.5:

## Arctic summer sea ice systems

1.5°C

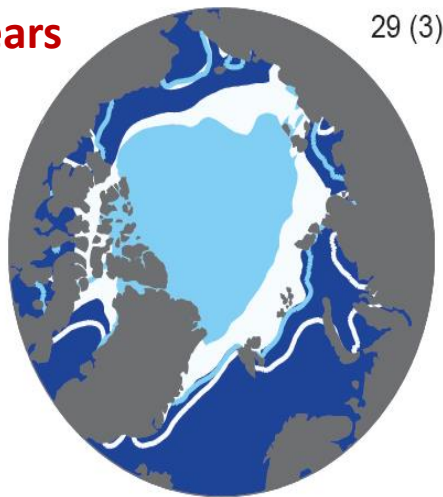
RCP 2.6  
ambitious mitigation

≥2°C

RCP 8.5  
business as usual

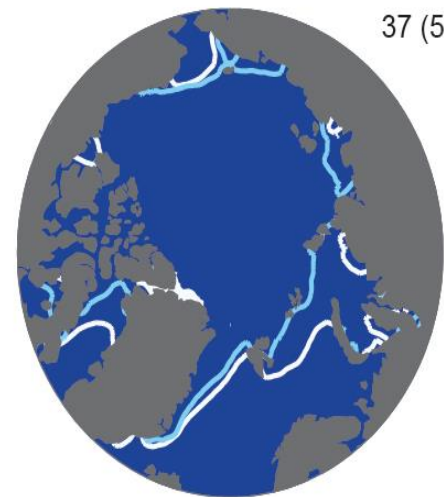
Northern Hemisphere September sea ice extent (average 2081–2100)

**1 in 100 years  
ice-free  
at 1.5°C**



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

37 (5) **> 1 in 10  
years ice-  
free at  
2°C**



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AR5 WGI SPM.7b, 8c





OBSERVATIONS

0.8 to 1.0°C

Vulnerable ecosystem identified in AR5 and SR1.5  
**Warm water coral reefs under various pressures**

Even in a 1.5°C warmer world.... high risk of losing 70 to 90% of coral reefs and their services to humankind; ... even higher losses at 2°C

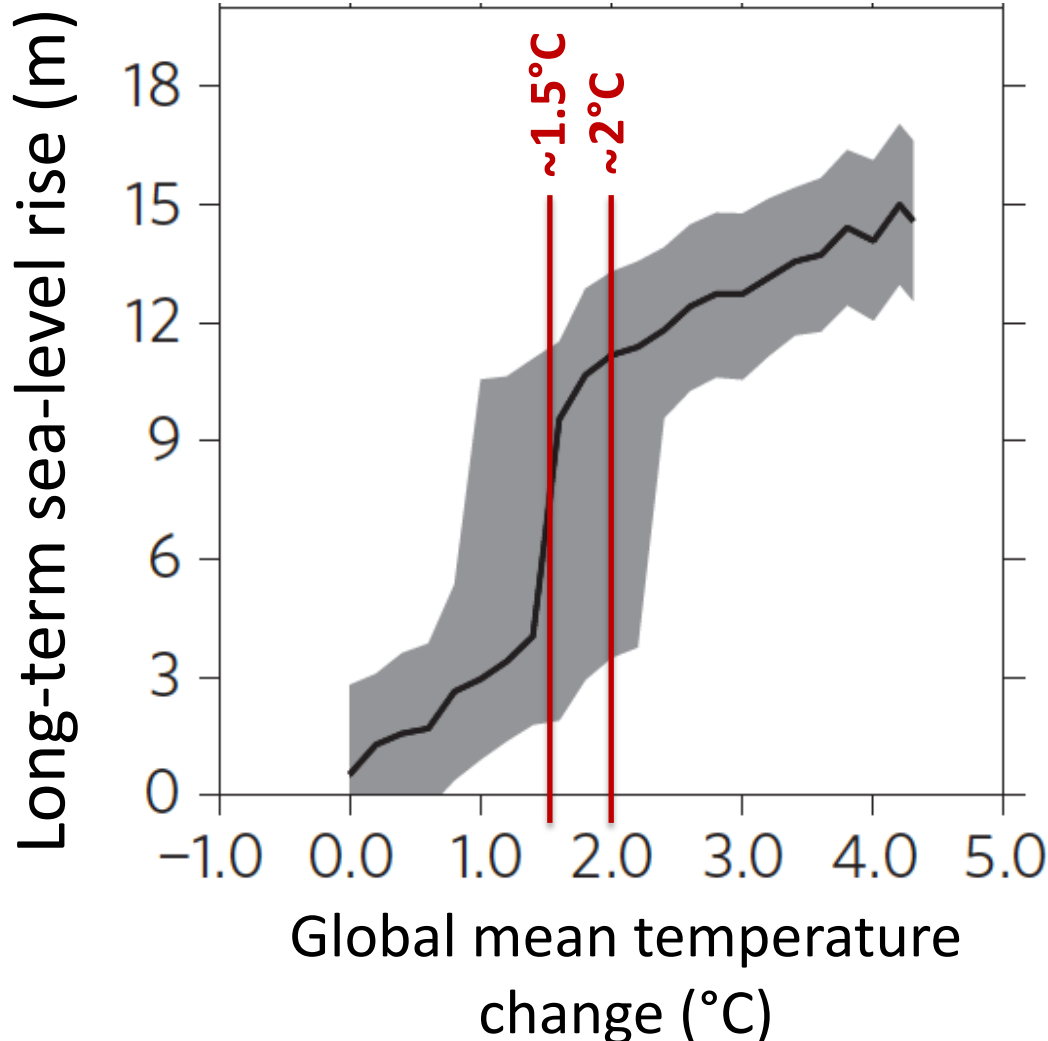
2016  
Coral Reef Studies

# 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 CO<sub>2</sub> (in Pliocene, 3-5 Mya)

Knutti et al., Ngeo 2015

TO BE  
ASSESSED  
IN AR6



# 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.

# THANK YOU FOR YOUR ATTENTION!

## For more information:

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INTERGOVERNMENTAL PANEL ON climate change

