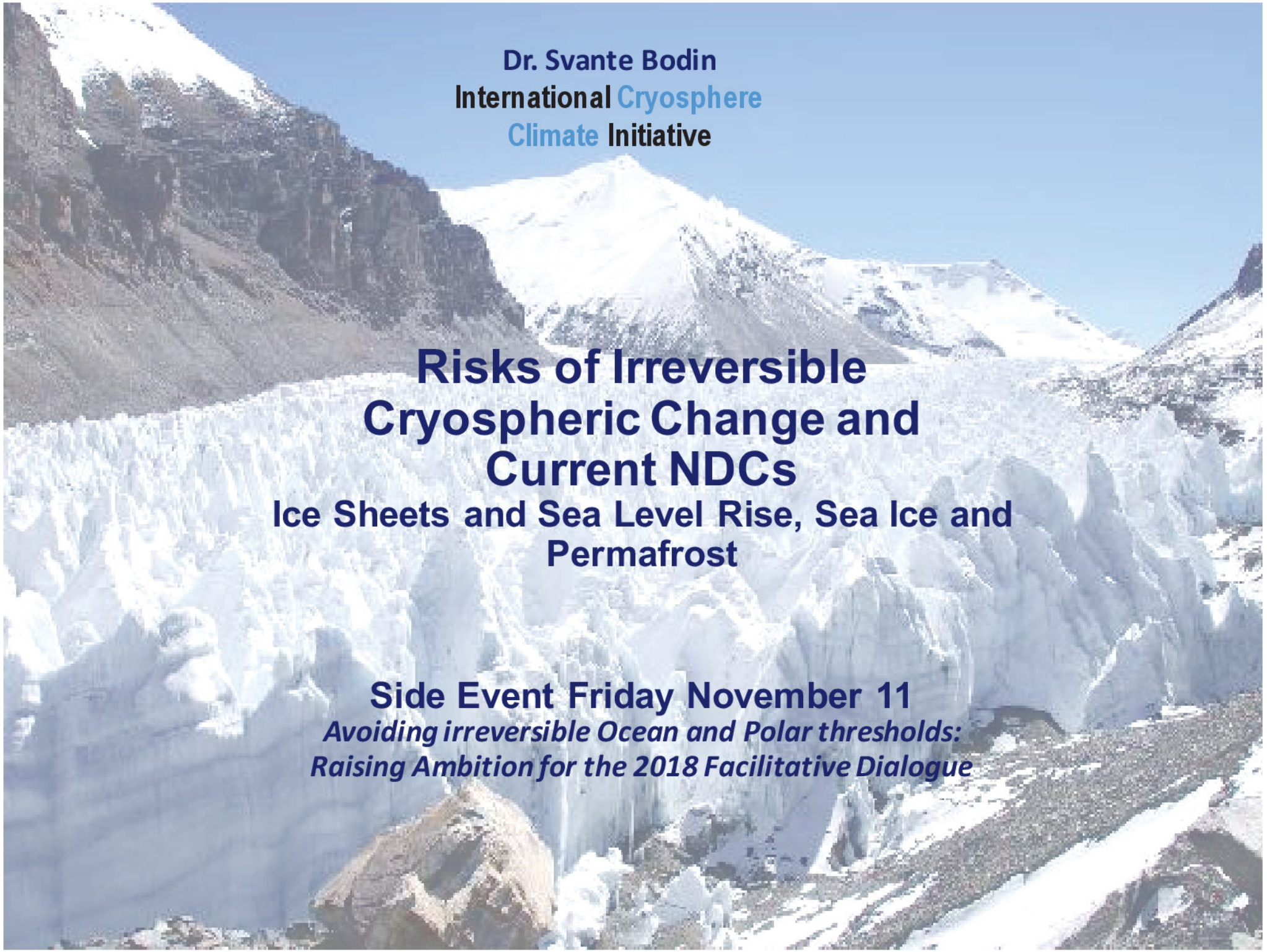


Dr. Svante Bodin
International Cryosphere
Climate Initiative

Risks of Irreversible Cryospheric Change and Current NDCs

Ice Sheets and Sea Level Rise, Sea Ice and Permafrost

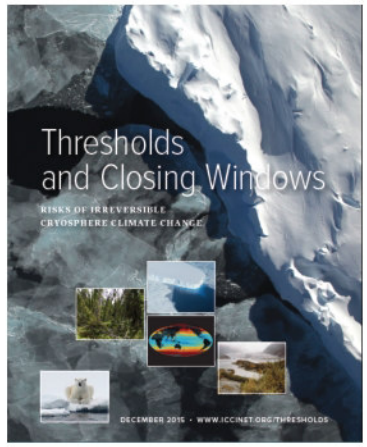
Side Event Friday November 11

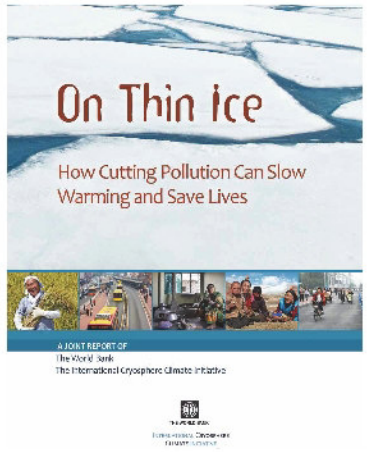
Avoiding irreversible Ocean and Polar thresholds:
Raising Ambition for the 2018 Facilitative Dialogue

INTERNATIONAL CRYOSPHERE CLIMATE INITIATIVE

"Designing climate policies for the most sensitive regions of the globe"

- Founded in 2010 after COP-15 in Copenhagen; international NGO with entities in the U.S. and Europe (Stockholm).
- Two main goals:
  - Designing policies/participating in the UNFCCC negotiations and other forums to address rapid climate change in cryosphere regions, especially to inform policy makers of latest science
  - Where gaps of special relevance to cryosphere preservation exist: Demonstration projects, especially directed at black carbon and methane. Current projects encompass open agriculktural burning as well as domestic heating including policy development





Polar Amplification

2-3 times Global Average Warming

What will be the contribution of INDCs to the temperature target?

UNEP

- Even if fully implemented, the unconditional INDCs are only consistent with staying below an increase in temperature of 3.2°C (2.9 – 3.4) by 2100 with greater than 66 per cent probability, and 3.0°C, if conditional INDCs are included.

- This is lower than the 3.6 °C (3.4 – 3.7) under the current policies.

- INDC estimates have uncertainty ranges associated with them.

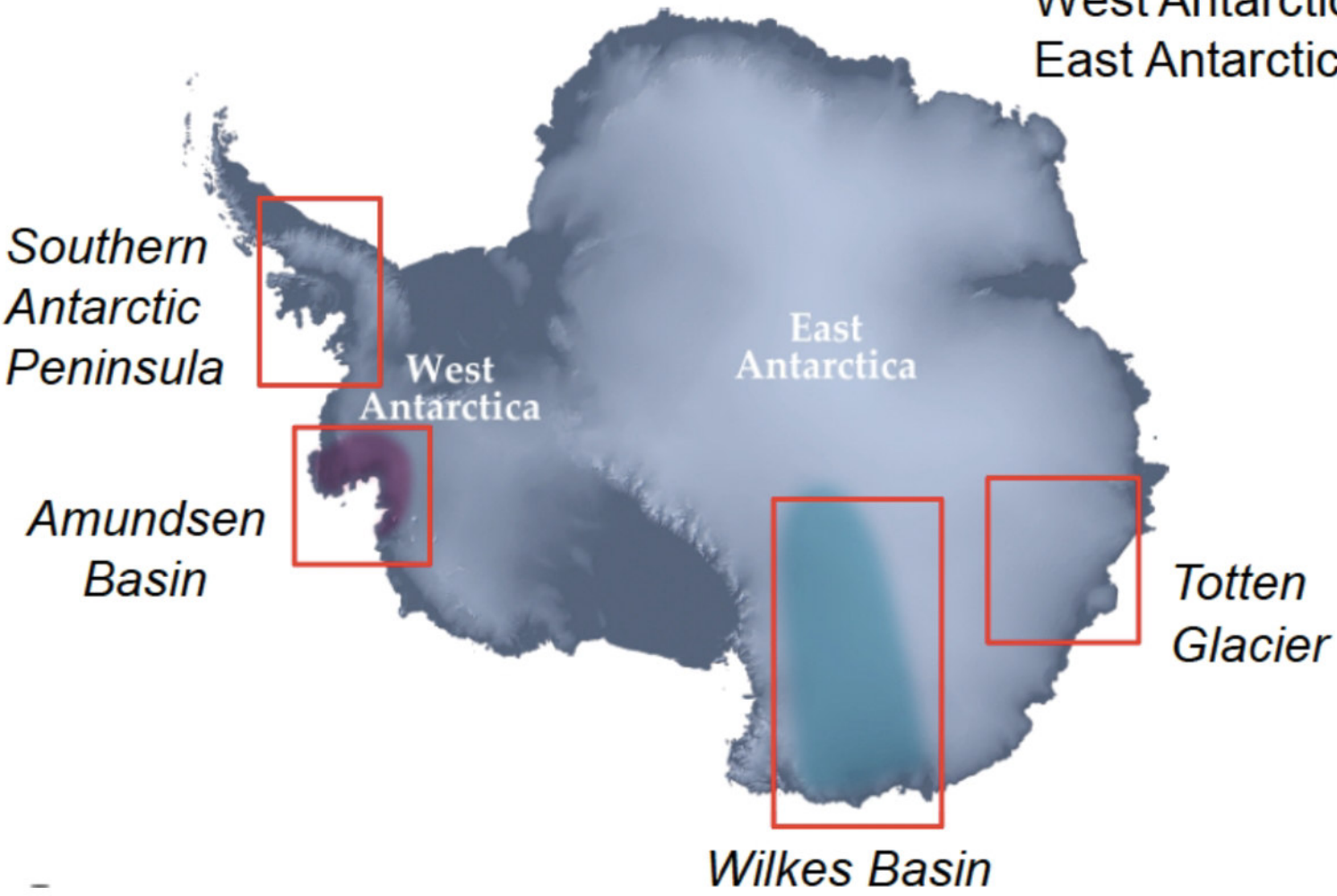
Ice Sheets

Three types of Ice sheet Instabilities

- Topography downward sloping towards and out over warm sea water, e.g. West Antarctic Ice Sheet (WAIS) – Thwaites, Pine Island
- Ice Plug Removal- Ice sheet is grounded in coast parallell subsurface valleys melting from below by intrusion of warm sea water – Wilkes Basin in East Antarctica
- Height-Temperature feed back – Temperatures highly dependant on altitude. Lowering of Greenland hig plateau by summer melting allows for longer and longer melt season. As an additional consequence changing circulation by removing the Greenland mountain barrier

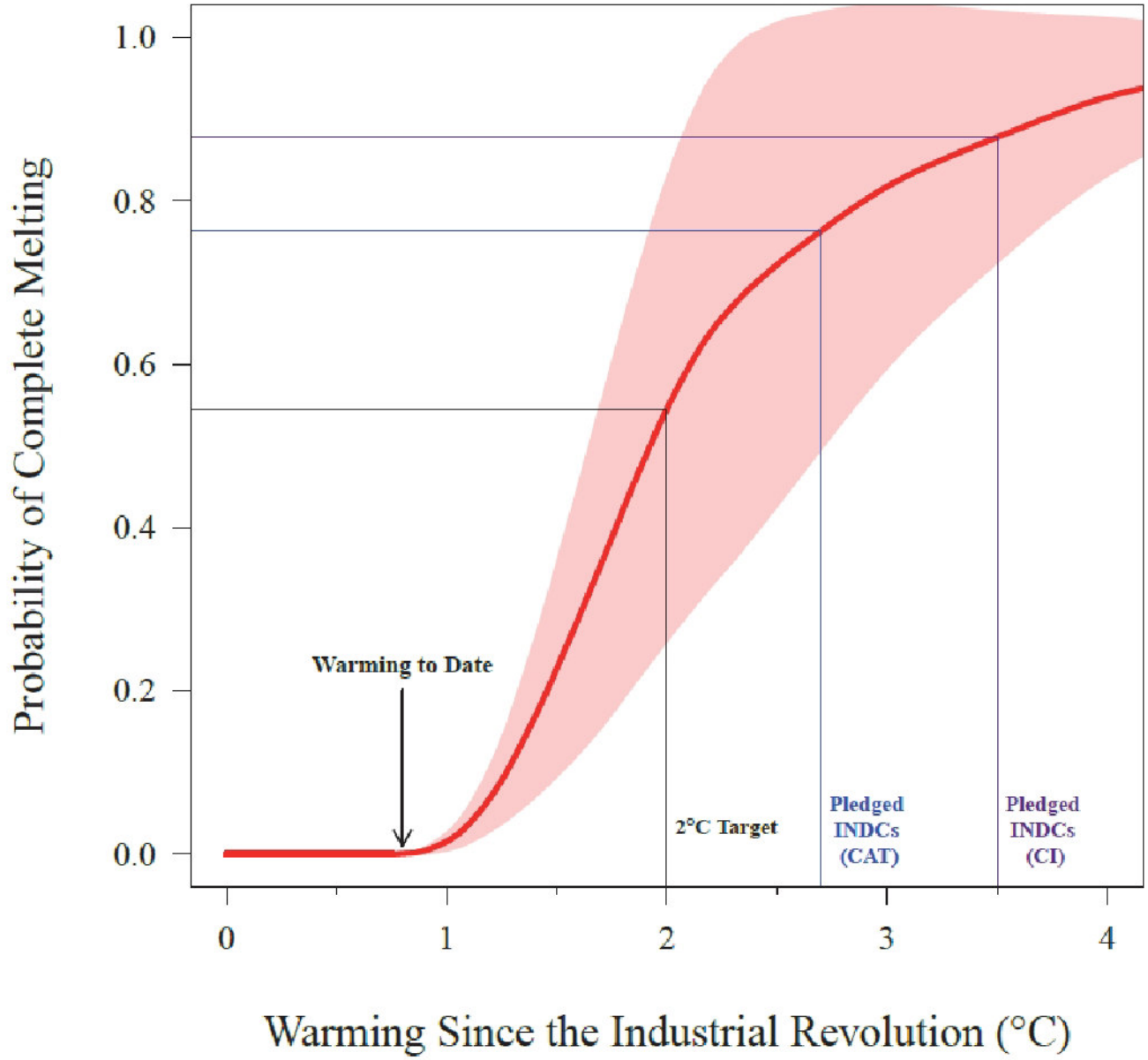
The ice continent

Total sea-level potential:
West Antarctica ~ 5 meters
East Antarctica ~ 50 meters



MELTING OF THE GREENLAND ICE SHEET

Total loss about 6 meter sea level rise

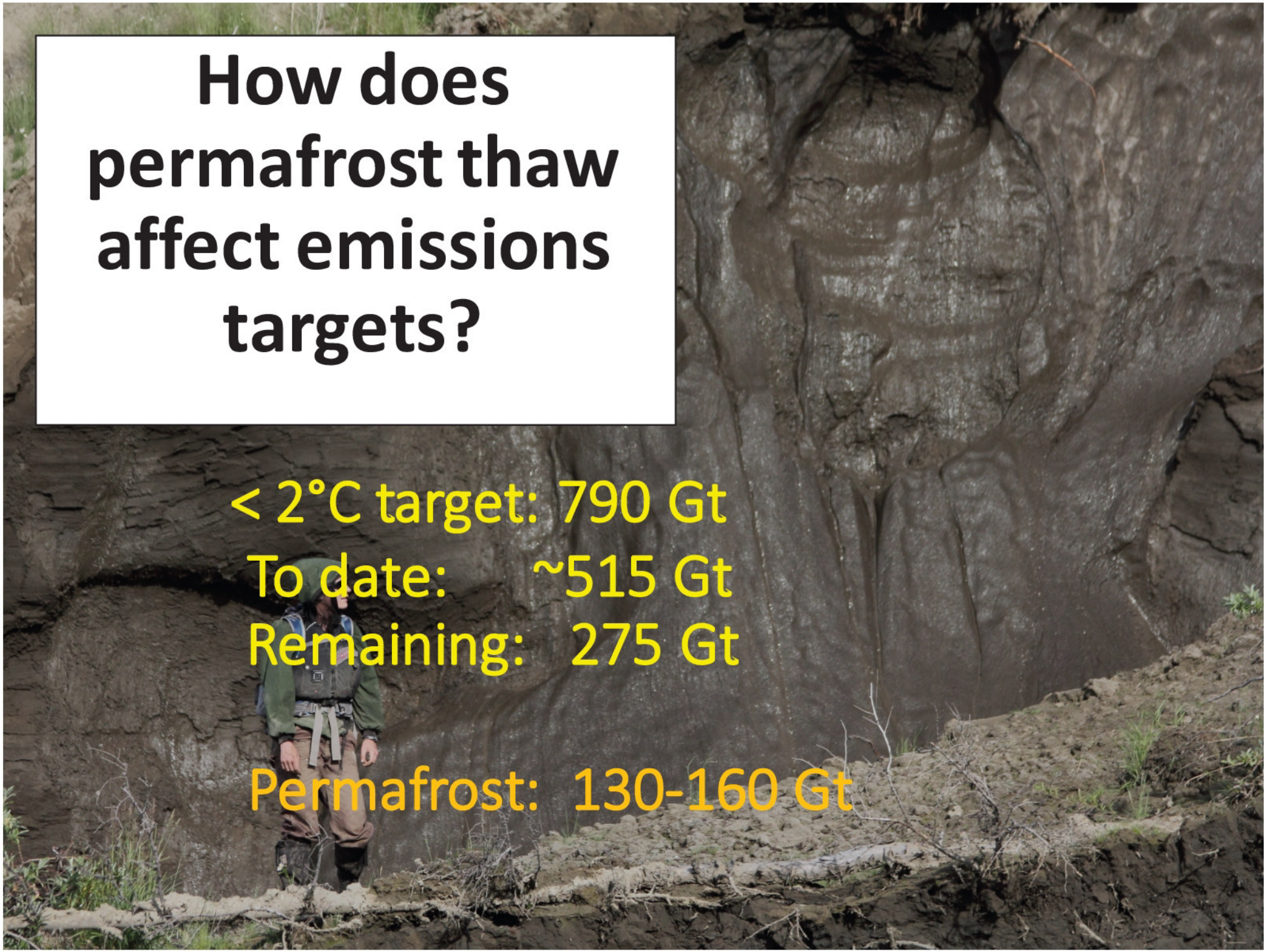


Created by Woods Hole Research Center for the Thresholds Report, based on published literature. Not published.

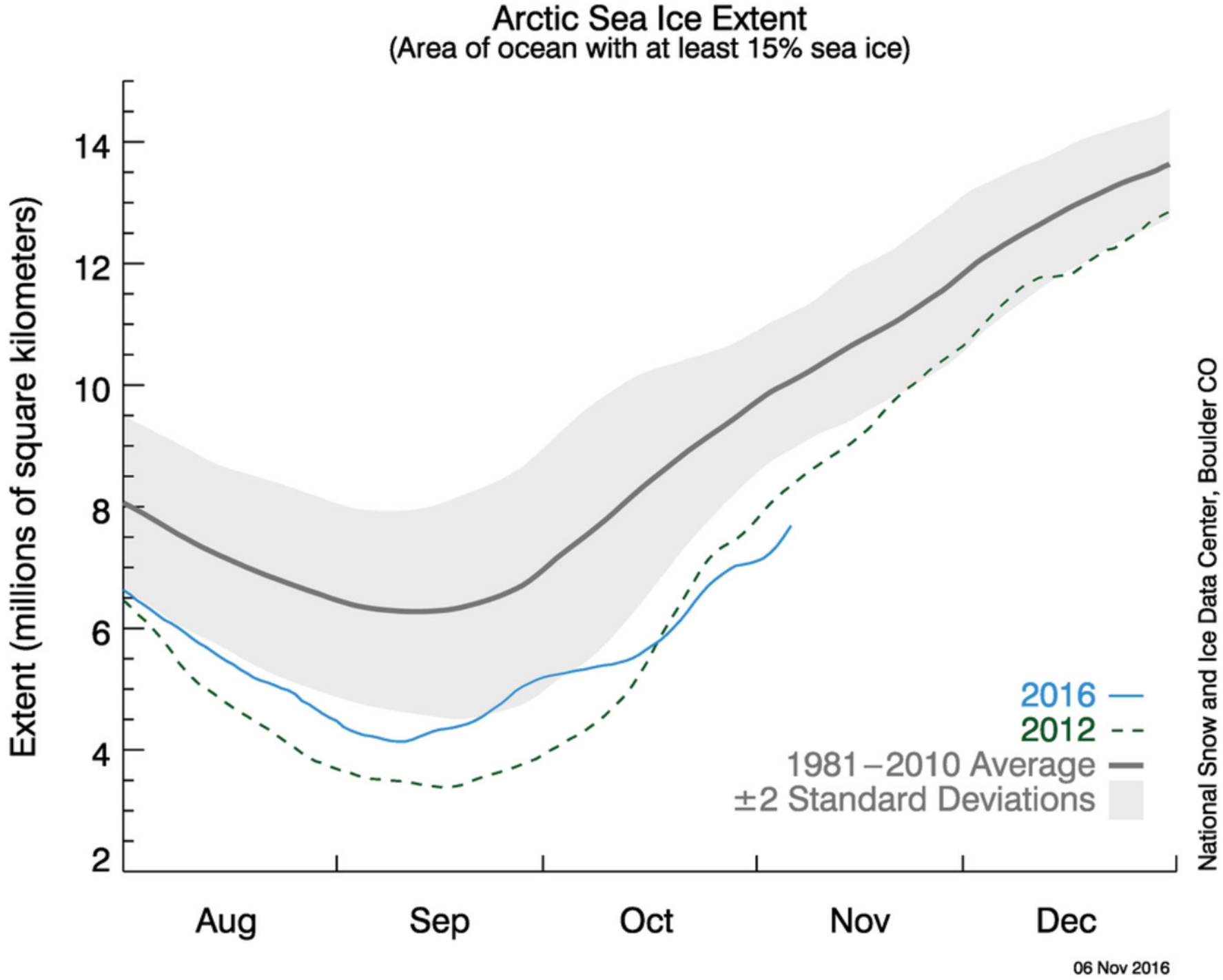
INTERNATIONAL CRYOSPHERE CLIMATE INITIATIVE

Permafrost

INTERNATIONAL CRYOSPHERE CLIMATE INITIATIVE

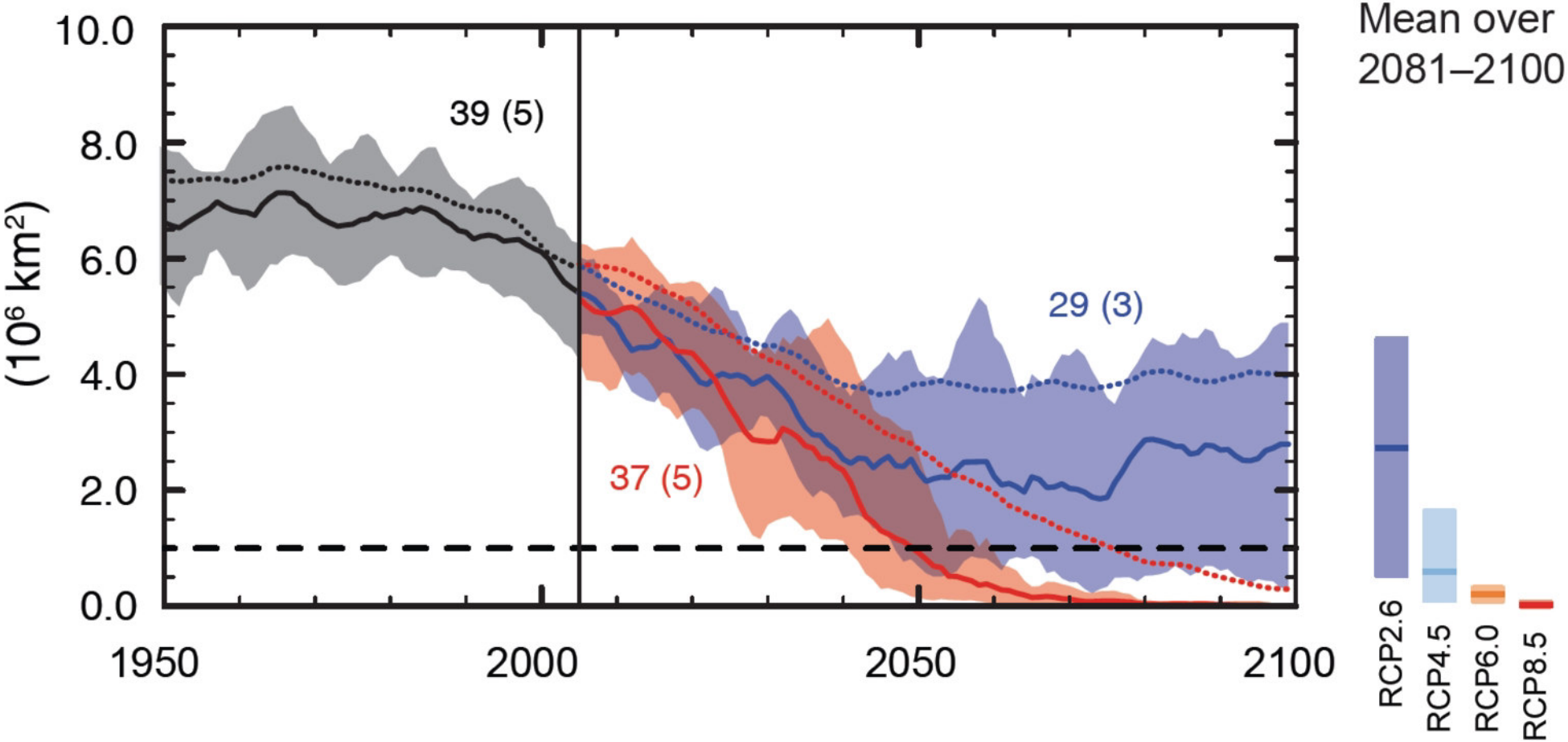

How does permafrost thaw affect emissions targets?
< 2°C target: 790 Gt
To date: ~515 Gt
Remaining: 275 Gt
Permafrost: 130-160 Gt

Arctic Sea Ice


Arctic Sea Ice Extent
(Area of ocean with at least 15% sea ice)
Extent (millions of square kilometers)
14
12
10
8
6
4
2
Aug
Sep
Oct
Nov
Dec
2016
2012
1981–2010 Average
±2 Standard Deviations
National Snow and Ice Data Center, Boulder CO
06 Nov 2016

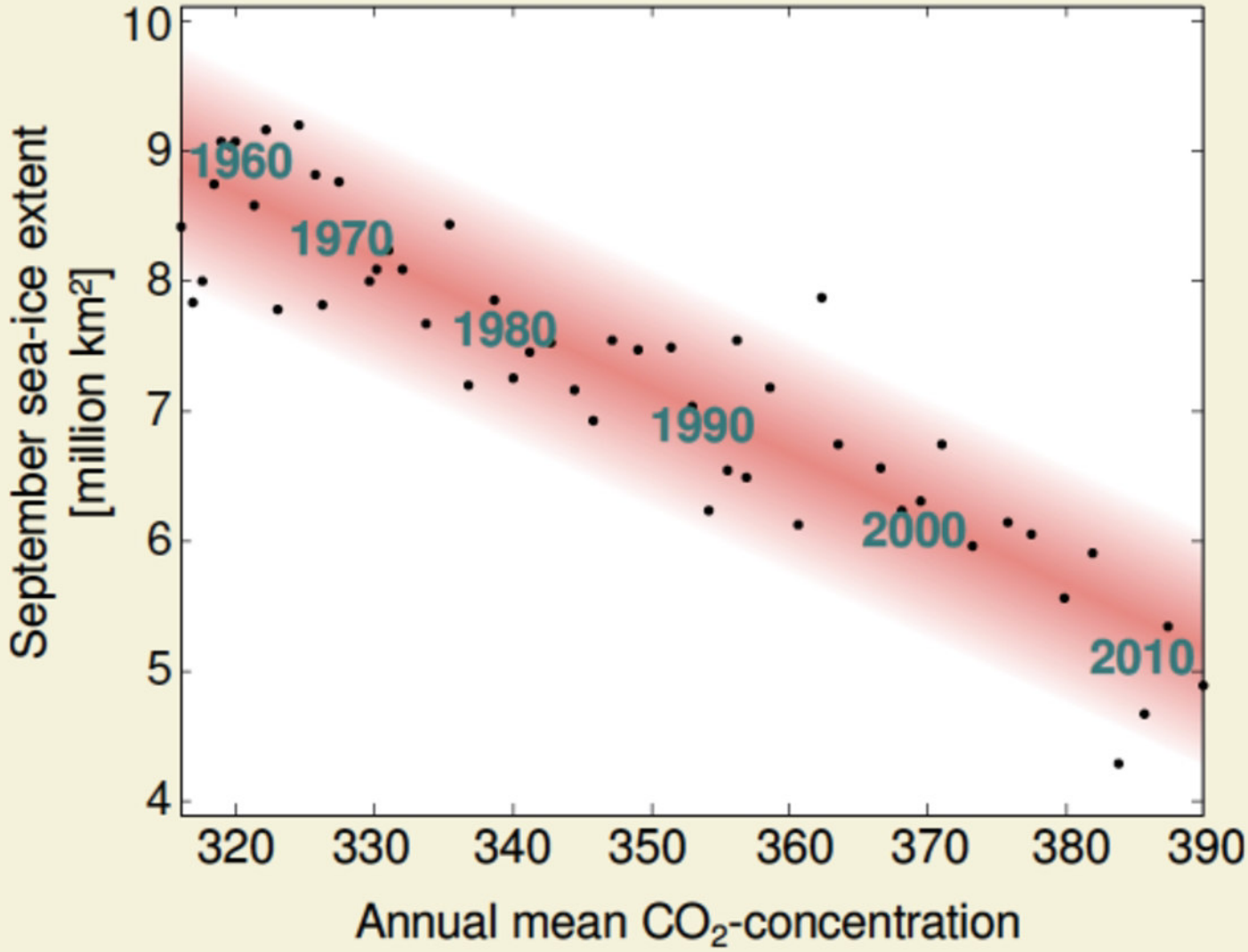
ARCTIC SEA ICE

CMIP5 Model Simulations of Arctic Summer Sea Ice Extent out to 2100

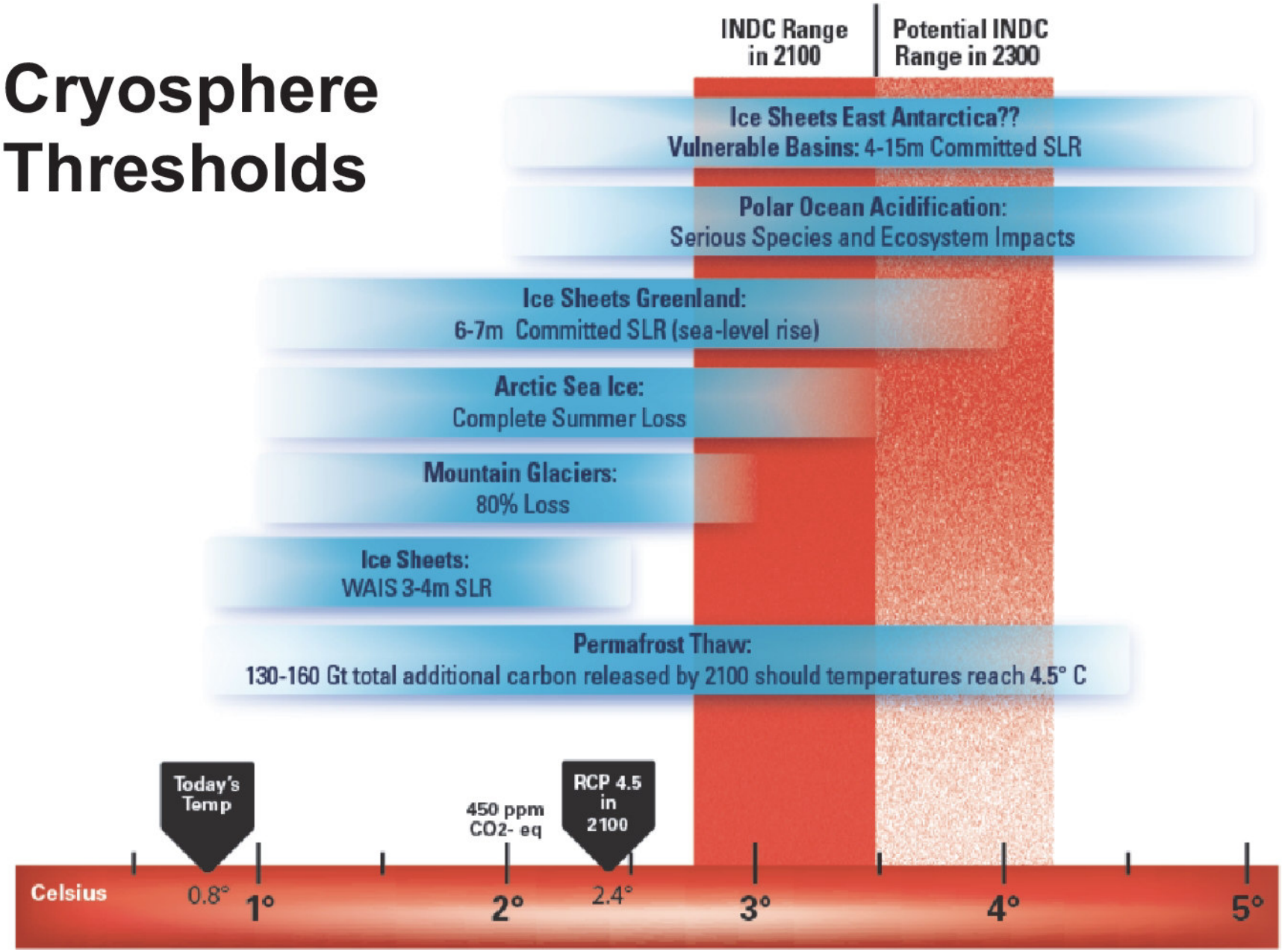


IPCC AR5

Observed Arctic sea ice versus CO_2



Cryosphere Thresholds



Global Mean Temperature Above Pre-Industrial