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Melting Giants: How Polar Ice Sheet Shape Our Future Sea Levels

11 June 2025

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sea level rise

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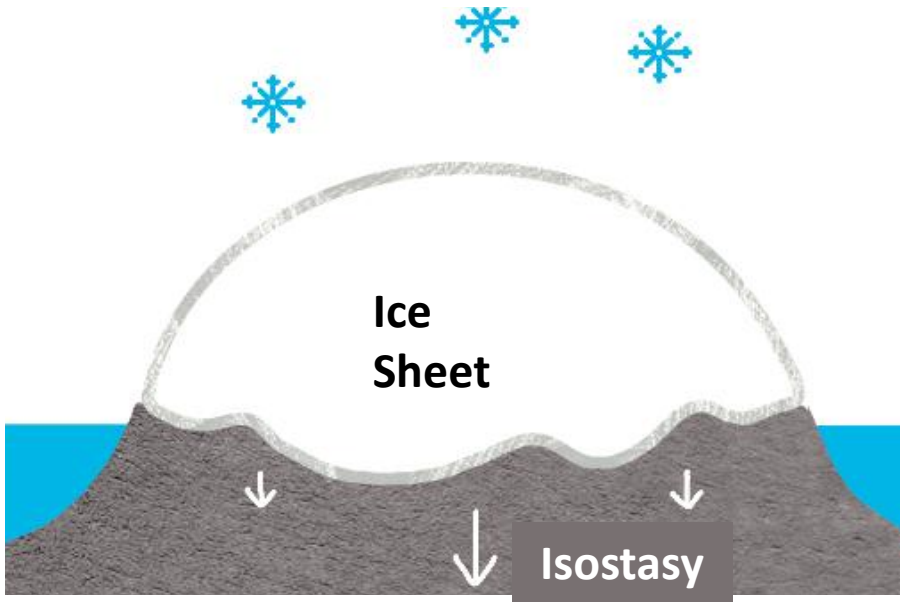
Gael Durand

CNRS-IGE

Polar Ice Sheets and Their Role in Global Sea-Level Change



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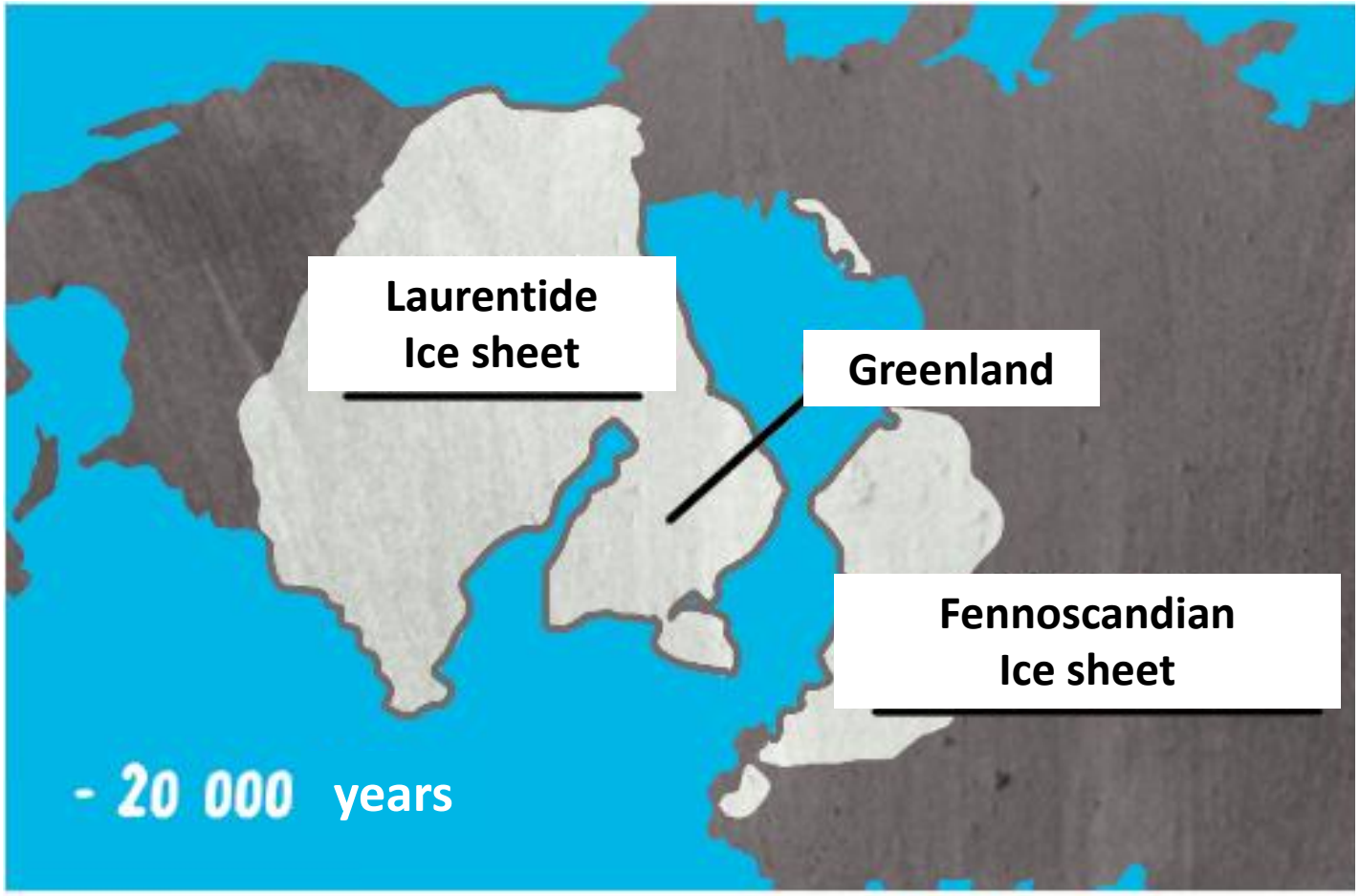
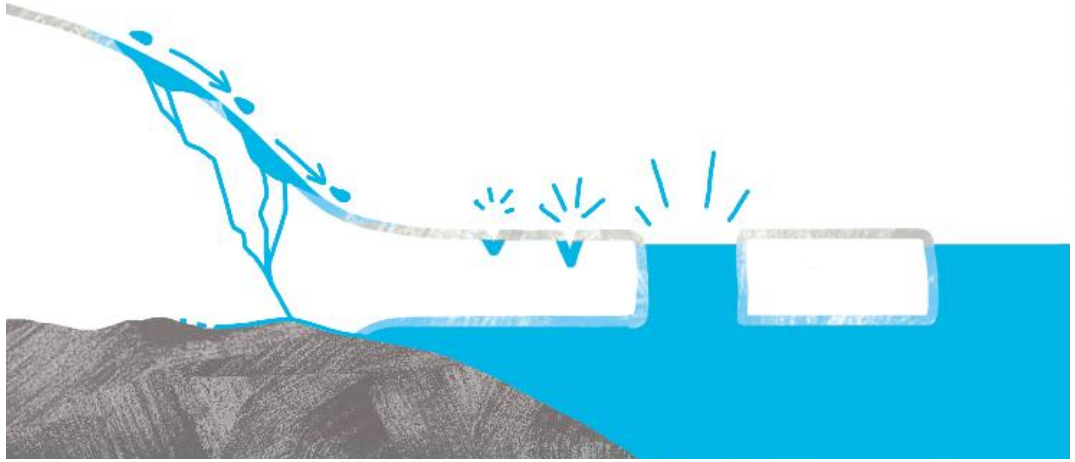


Ice sheets set the pace for long-term sea-level change

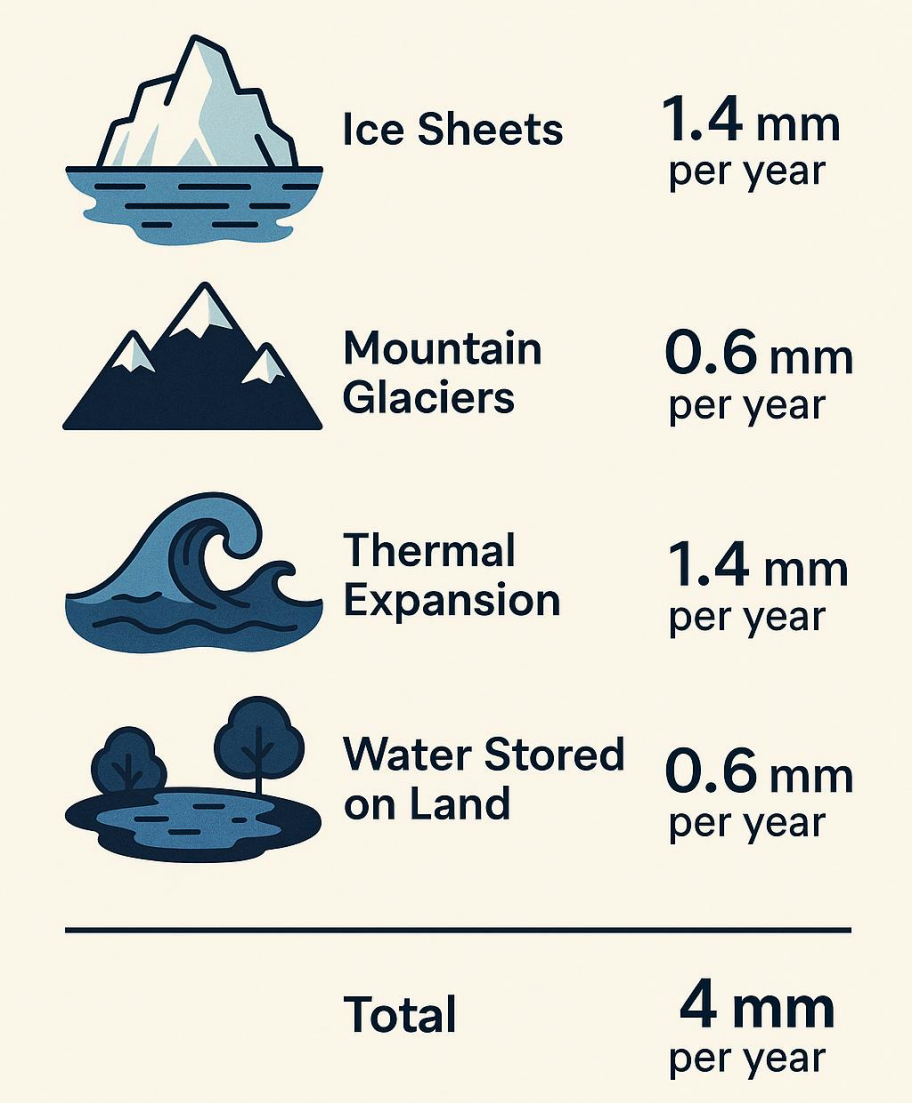
Polar Ice Sheets and Their Role in Global Sea-Level Change

Surface melting

Iceberg Calving

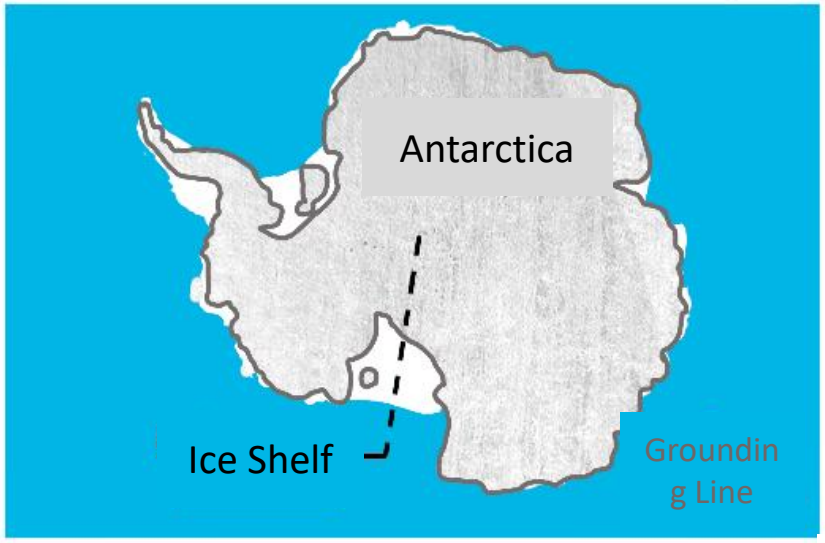


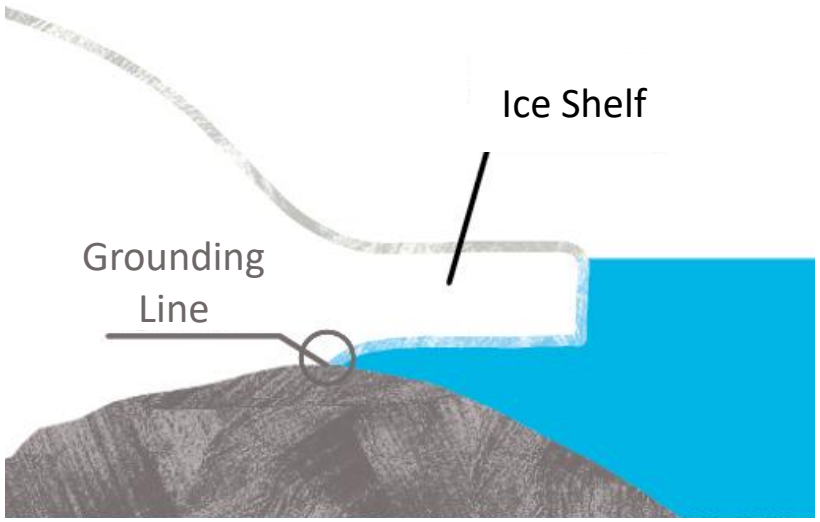
From Ice to Ocean: The Contributors of Today's 4mm/year Rise

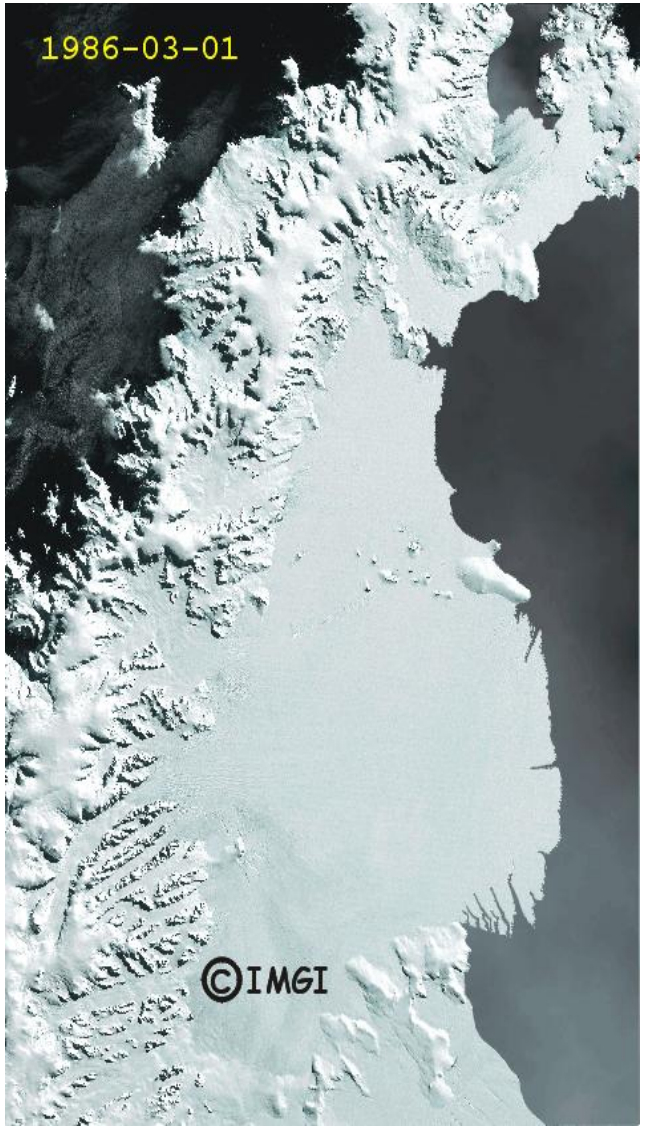


From Melt to Collapse: Greenland’s Vulnerability to Warming

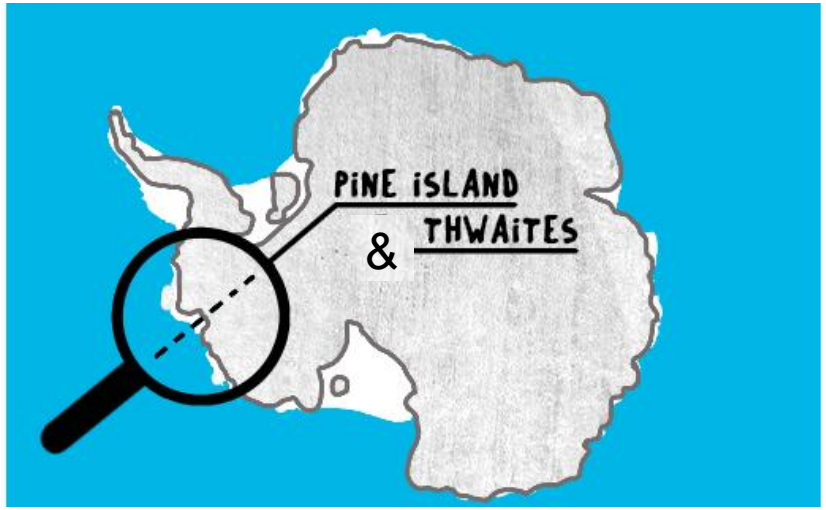
Ice Shelves: Gatekeepers of Antarctic Ice Loss

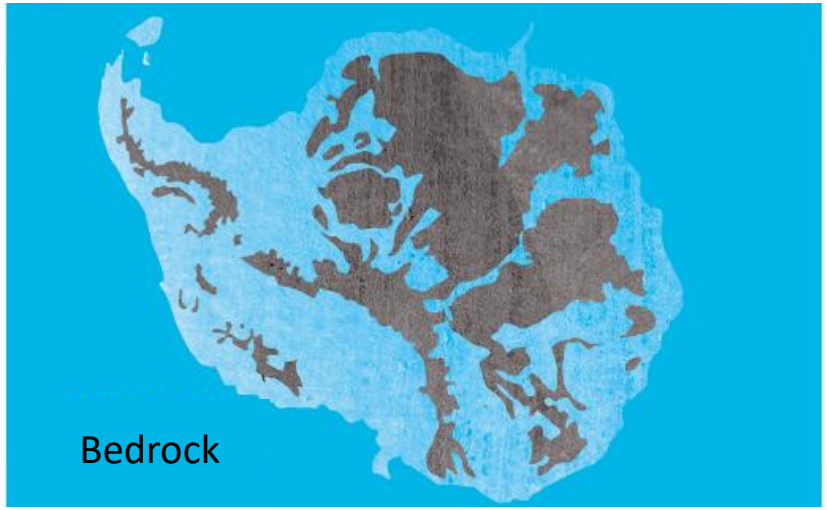


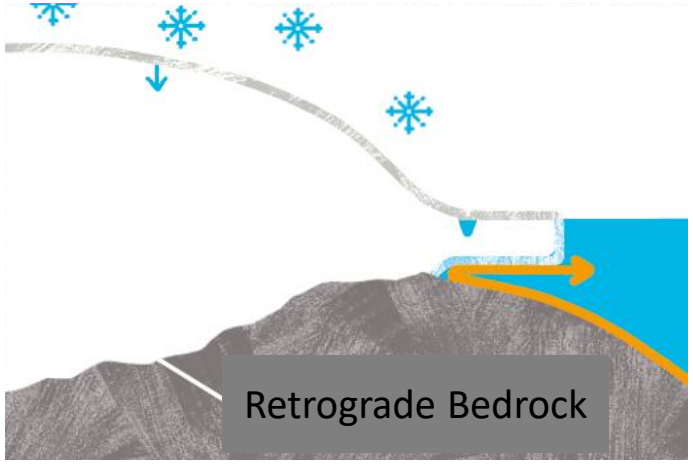


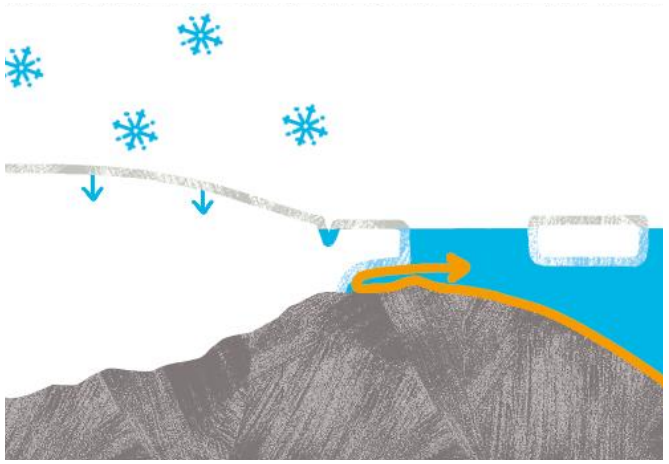


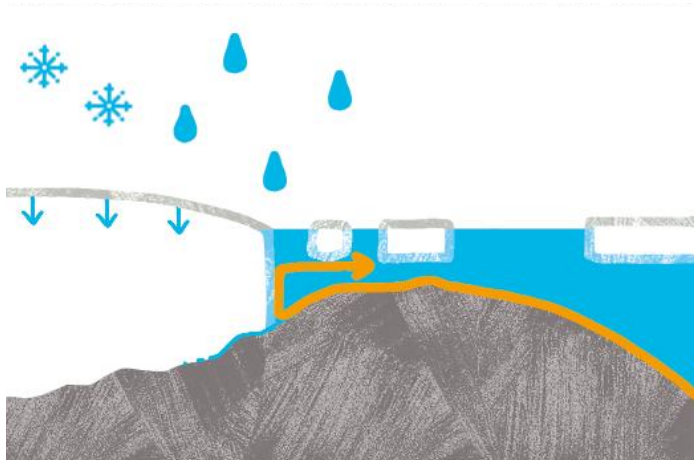
Retreat Without Return: The Fate of West Antarctic Glaciers



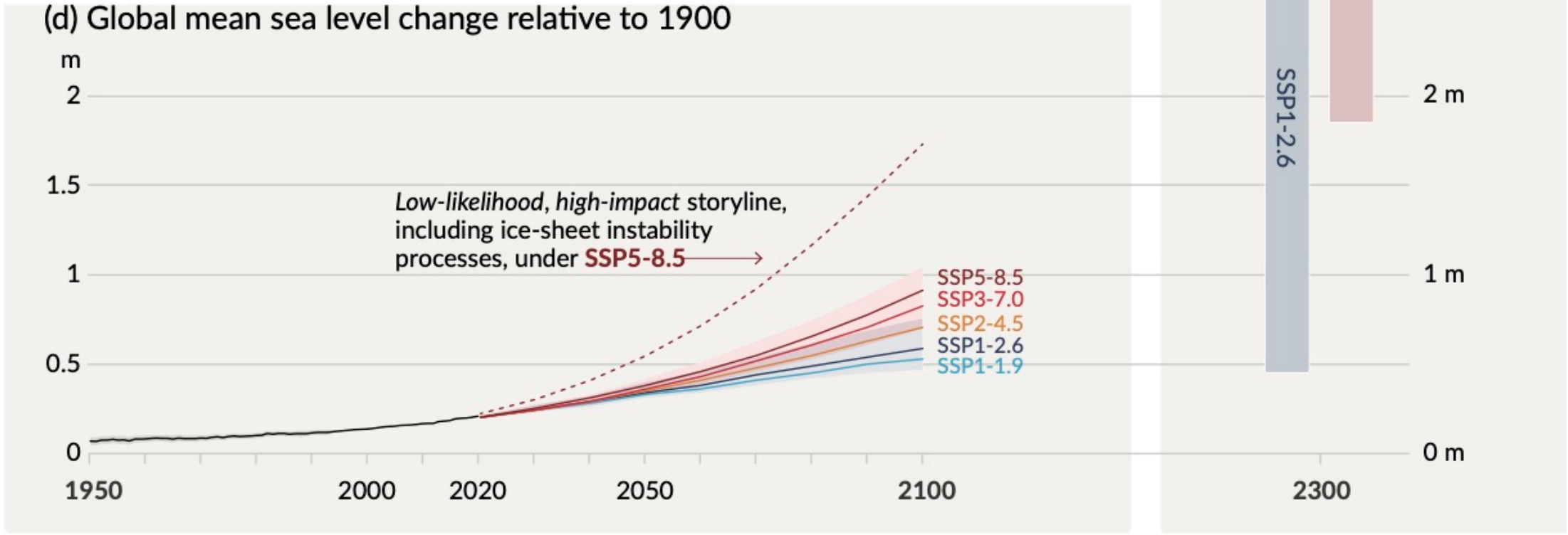








Rising Waters Ahead: Not If, But When



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Take-Home Messages

Ice sheets are powerful drivers of long-term sea level change
They store vast amounts of water — enough to raise sea levels by over 65 meters — and their stability is sensitive to even moderate warming.

Greenland and West Antarctica are approaching critical thresholds
Tipping points around +1.5 to +2°C of global warming could lead to irreversible ice loss, accelerating sea-level rise for centuries to millennia.

Sea level rise is already underway — and accelerating
Currently rising ~4 mm/year, driven by melting ice sheets, glaciers, and thermal expansion. This is more than twice the rate of the 20th century.

Extreme sea-level rise cannot be ruled out
By 2300, sea levels could rise over 10 meters in worst-case scenarios. Even 1 meter by 2100 is possible under rapid ice sheet retreat.

The future depends on what we do now
Reducing emissions and preparing for change are both essential. Mitigation and adaptation must go hand-in-hand.

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