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NORCE and Bjerknes Centre for Climate Research
EU Polar Cluster community meeting , February 2023

Photo: Svein Østerhus





Overall objective

To assess the **likelihood of large and abrupt near-future changes** in the contribution of the **Antarctic Ice Sheet** to **global sea level**,



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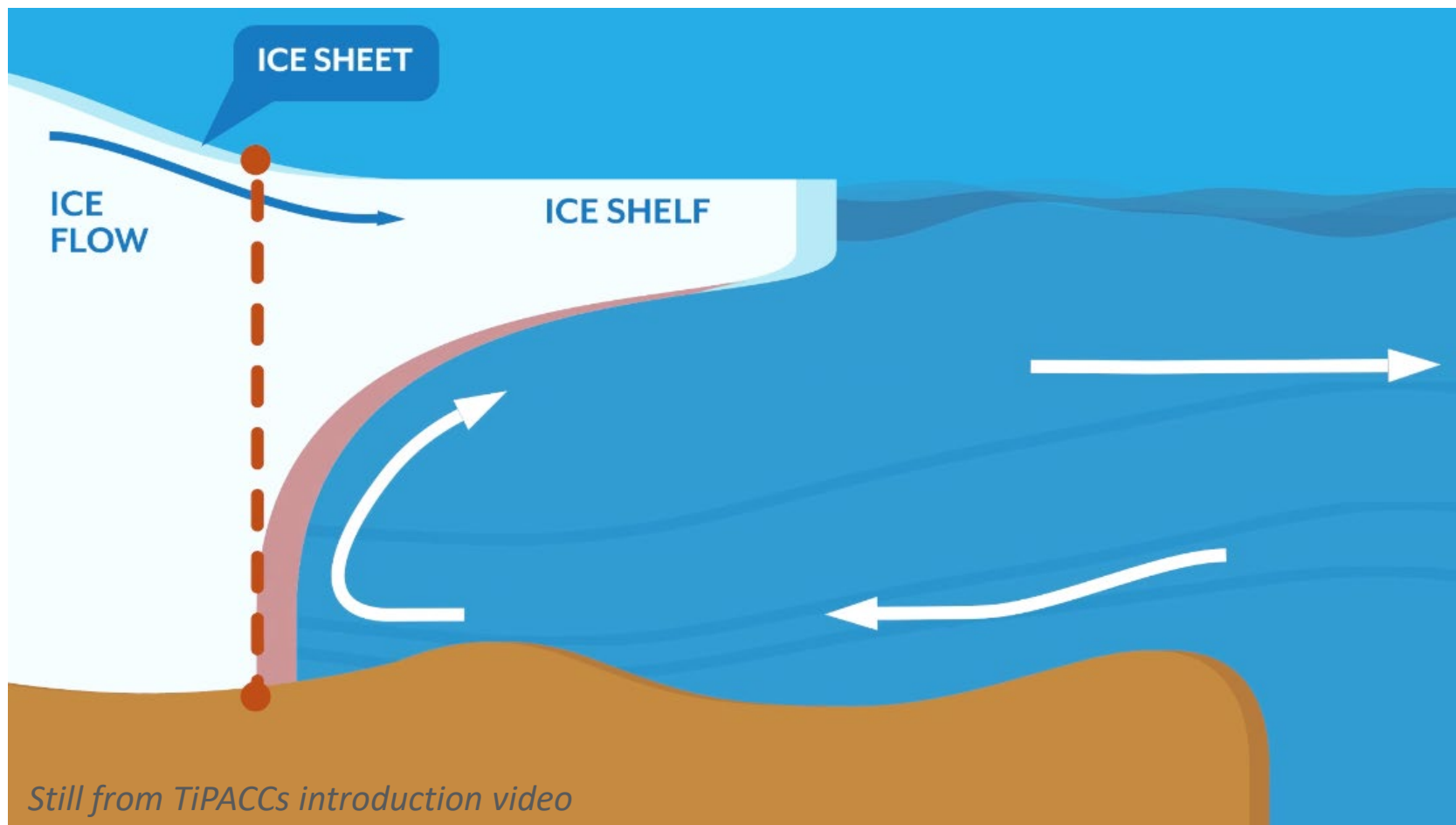
caused by **tipping points** in the Antarctic **continental shelf seas** and the **Antarctic Ice Sheet**.



Photo: Svein Østerhus

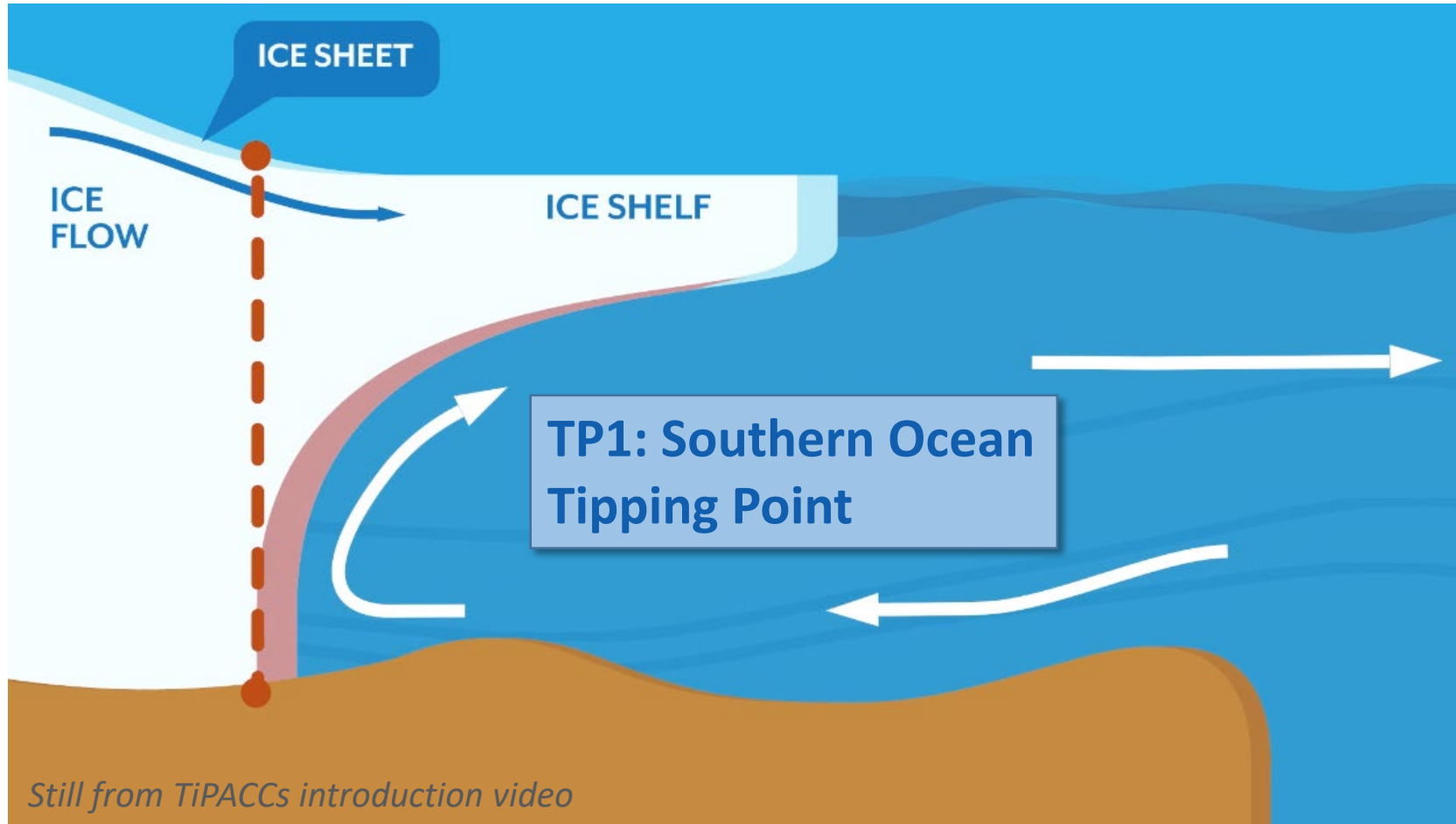


Tipping points in Antarctic Climate Components





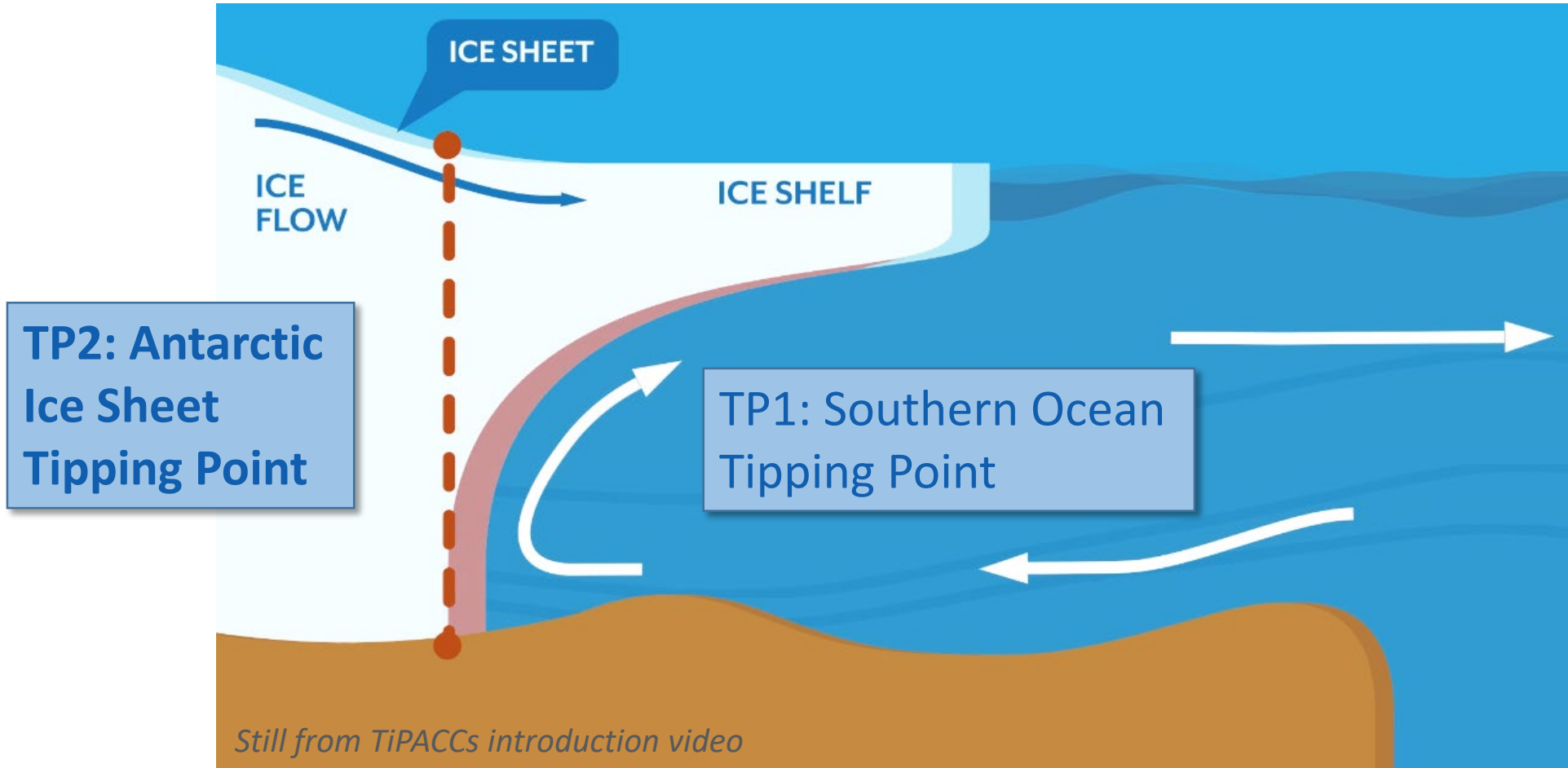
The Southern Ocean Tipping Point (TP1)



Under which conditions do the Antarctic continental shelf seas switch from a “cold” to “warm” state ?

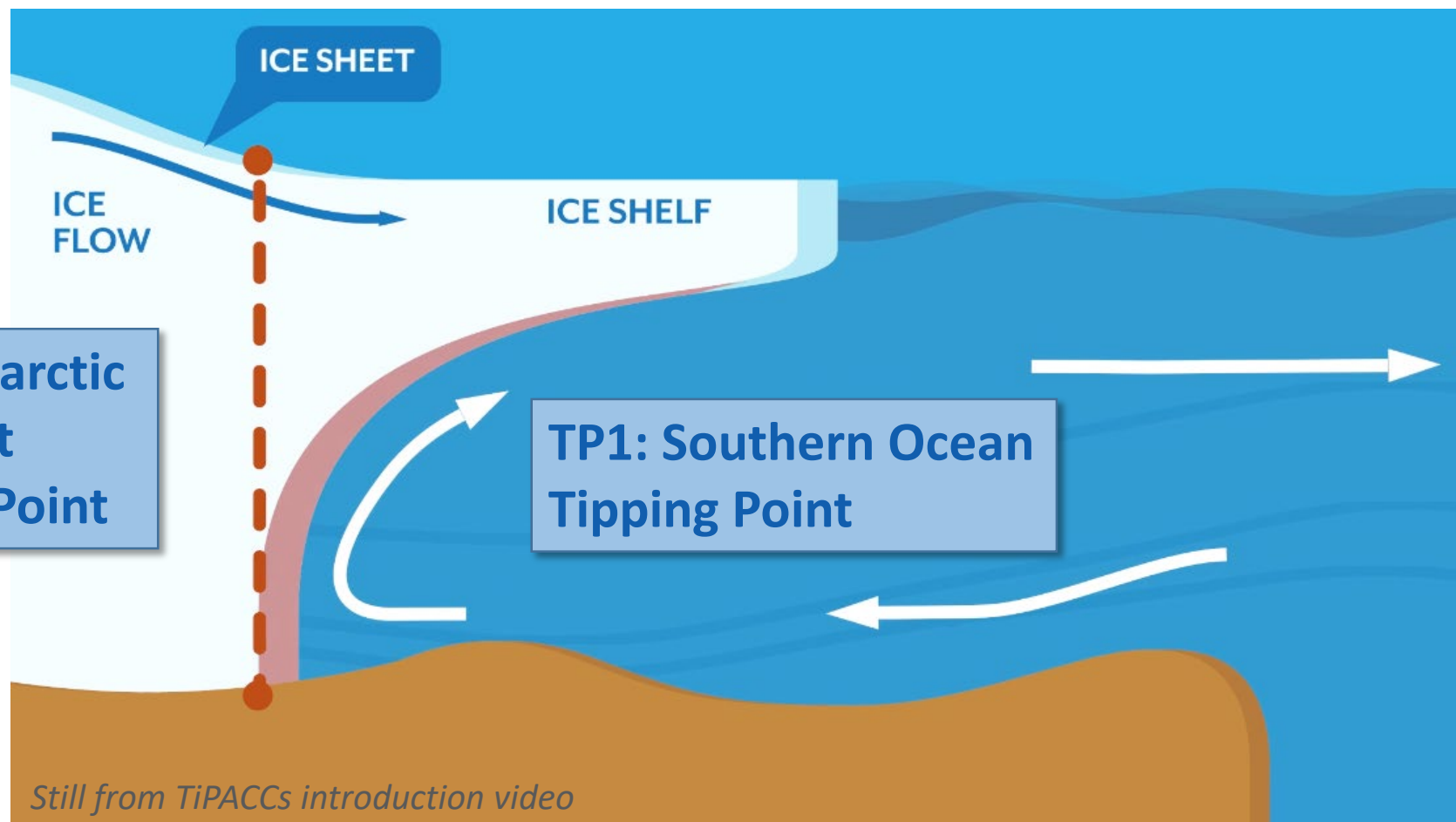


The Antarctic Tipping Point (TP2)



How **stable** are the grounding lines of the Antarctic ice sheet, now and after **enhanced ice-shelf melting** ?

Impact of combined Tipping Points (TP1 + TP2)



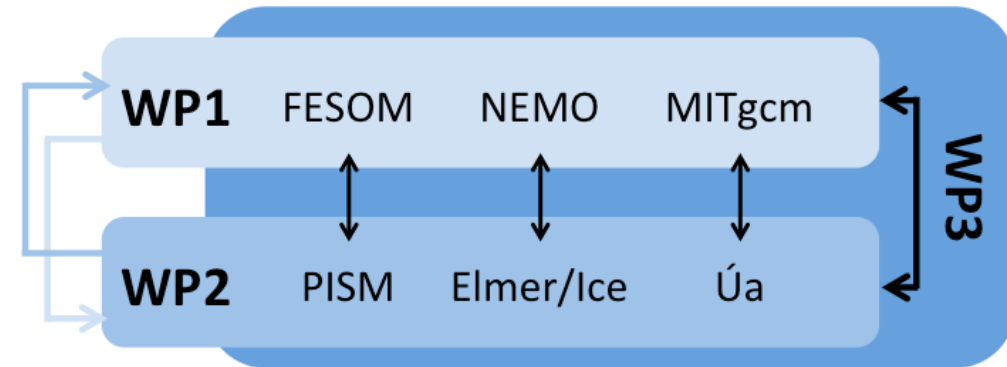
*How much does a switch to a “warm” ocean state impact the stability of the **Antarctic ice sheet**, and what are its implications for global sea level ?*

Numerical Models:

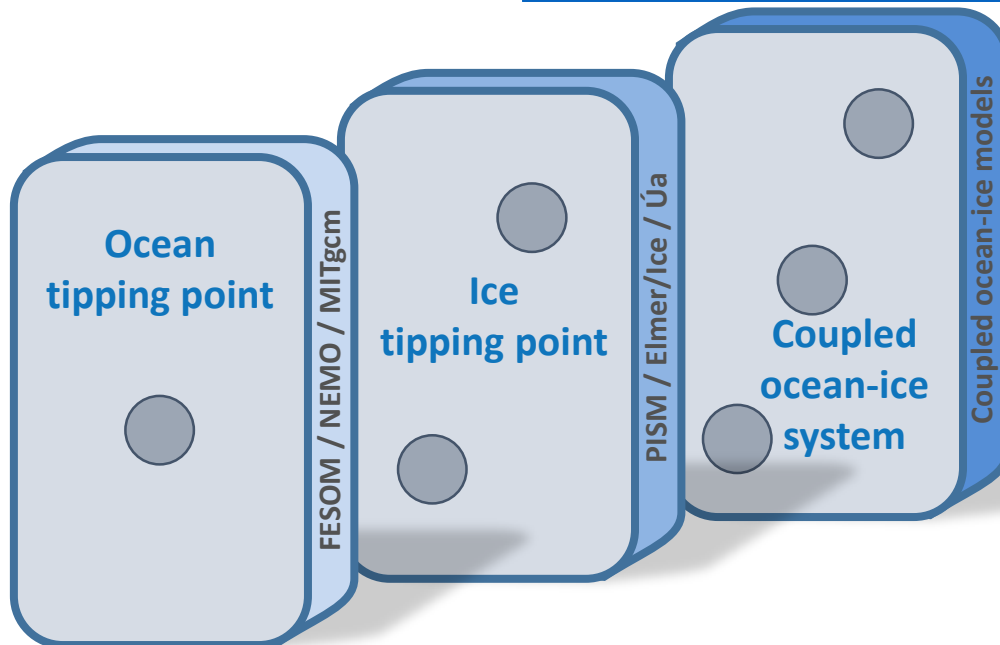
- ocean-circulation models (WP1; TP1)
- ice-flow models (WP2; TP2)
- coupled ocean-ice models (WP3; TP1&TP2)

Observations and (paleo) data:

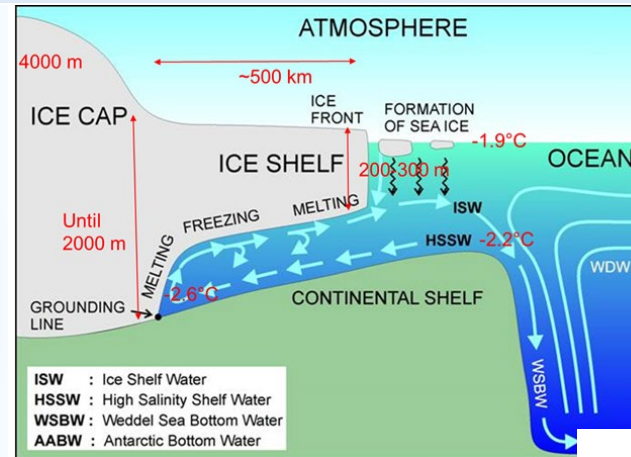
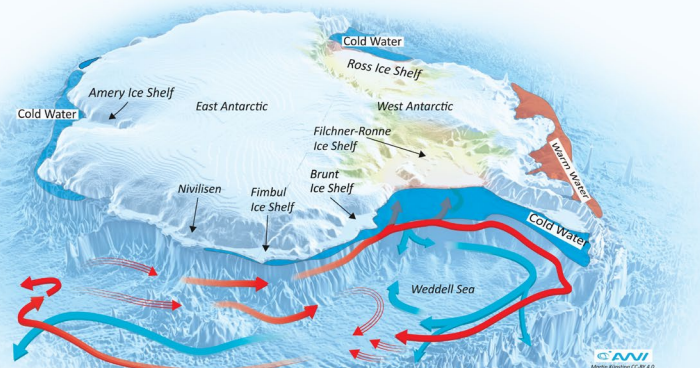
To define proximity of simulated tipping points



[Søk '52317' - 397 treff - page 40 - Cristin](#)

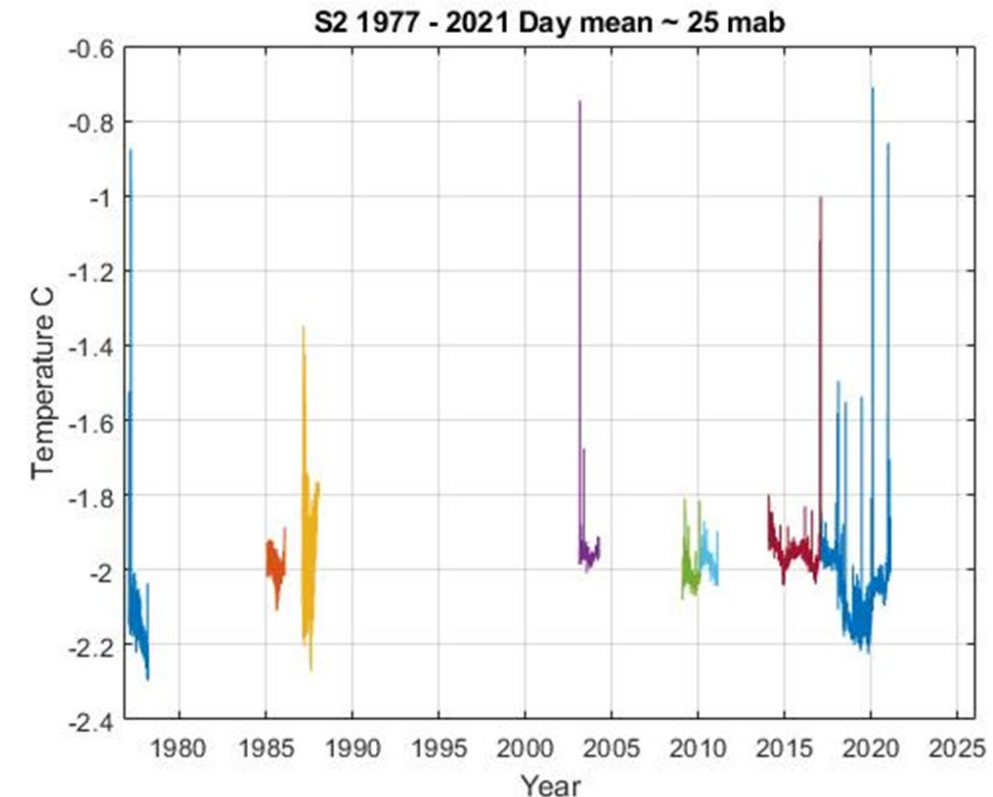
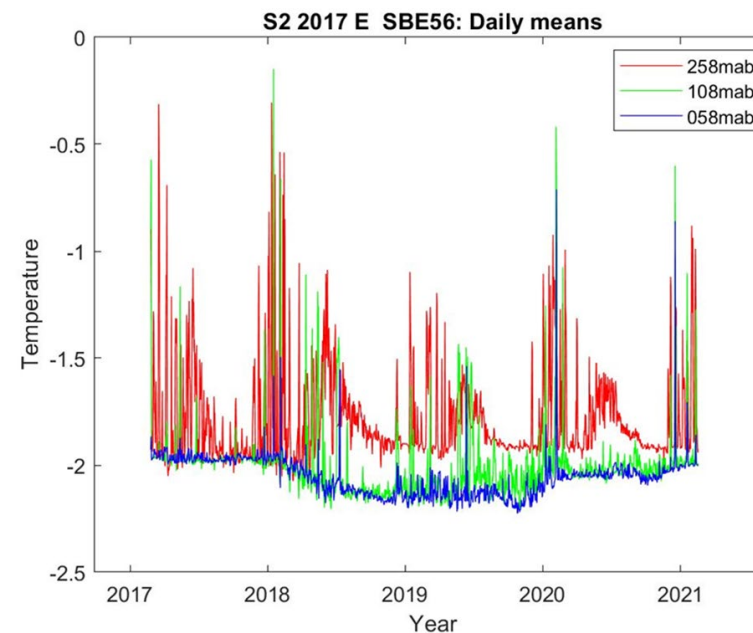
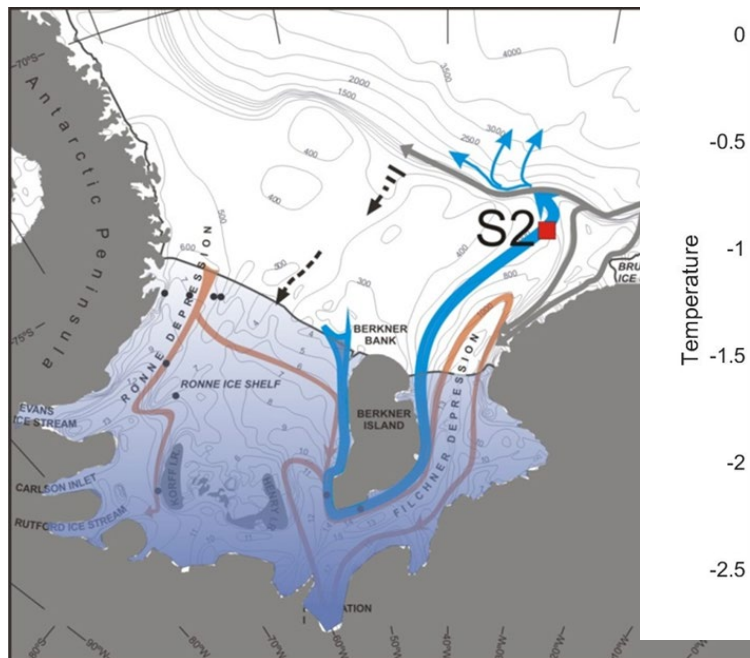


One Result from observations in the Southern Weddell Sea



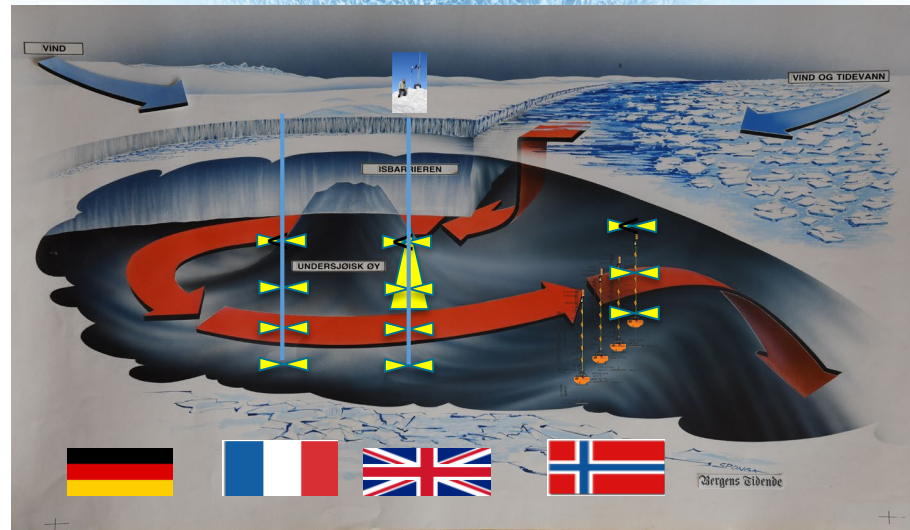
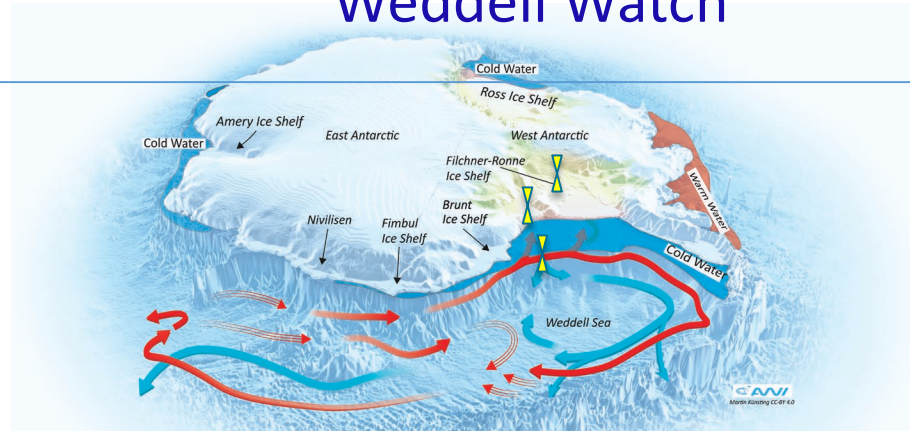
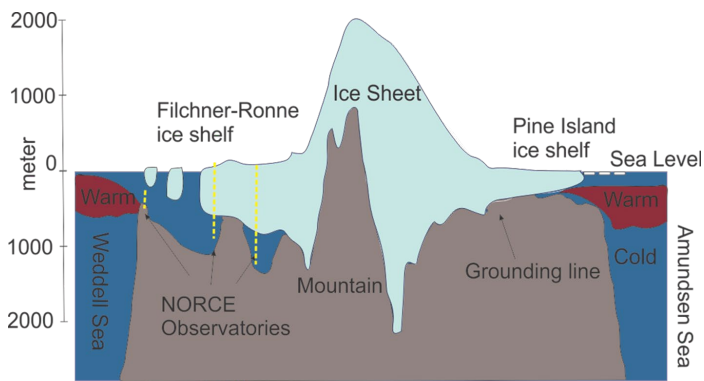
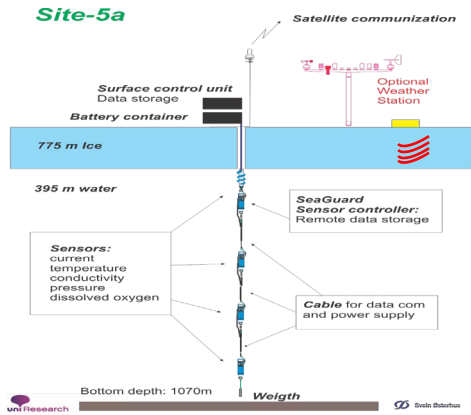
Bottom temperature at the continental shelf:

- Cold outflow
 - Ice Shelf Water (ISW)
- “Warm inflow”
 - Weddell Deep Water (WDW)

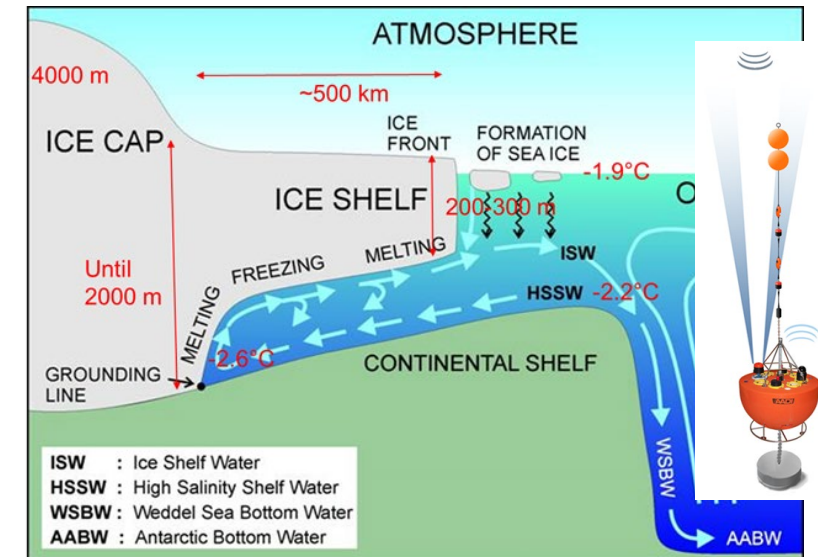


Long-term observing system for the oceanic regime of Filchner-Ronne Ice Shelf, Antarctica

Weddell Watch



AWI LOCEAN BAS NORCE



observatories beneath the ice shelf are operated by AWI, BAS and NORCE
Year-long time series back to the 1990s

observatories under the sea ice are operated by AWI, LOCEAN, UiB and NORCE
Year-long time series back to 1968/77



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