IODP PROPOSAL 848

Late Neogene to Quaternary ice-sheet and sea-level history of the Weddell Sea, Antarctica

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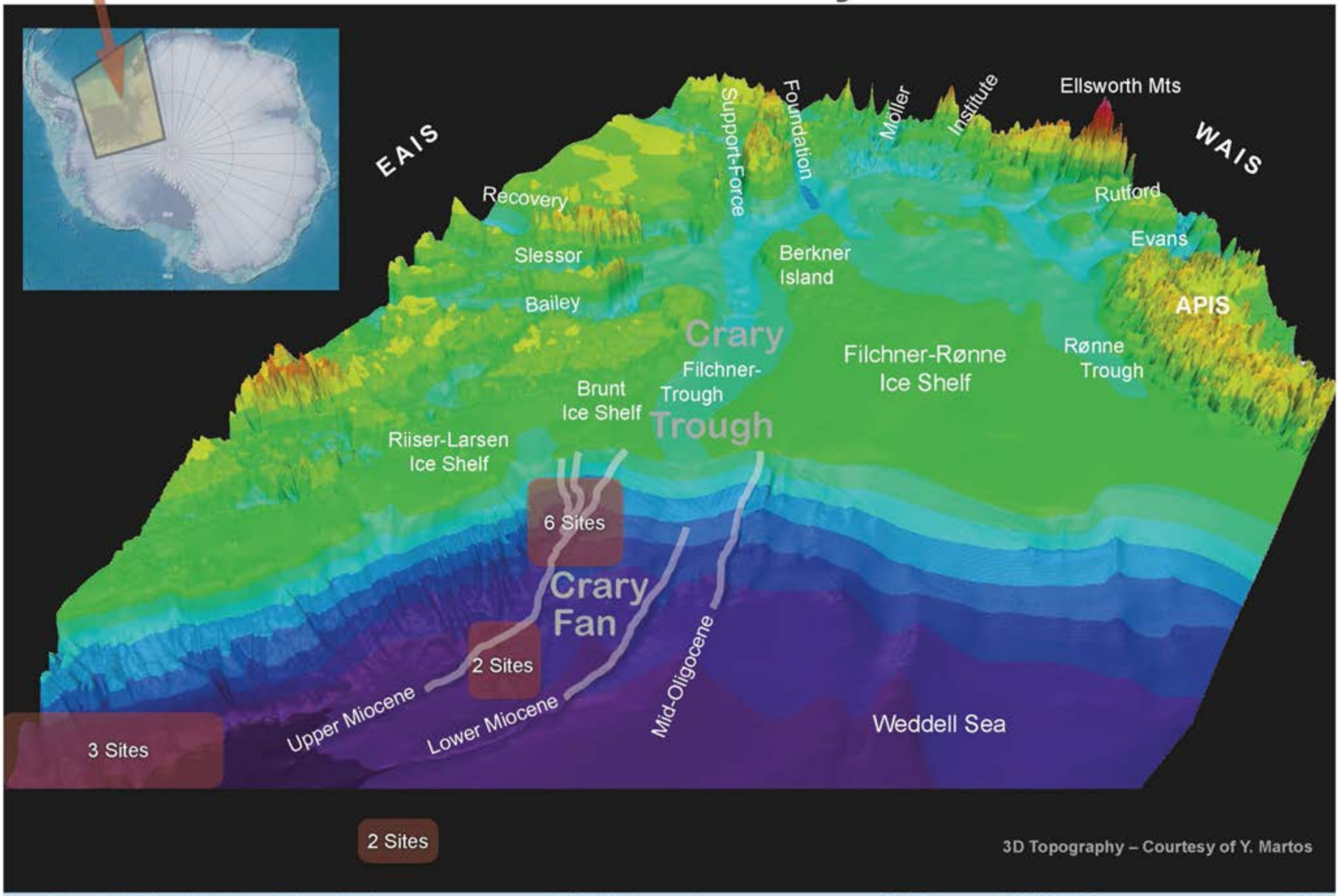
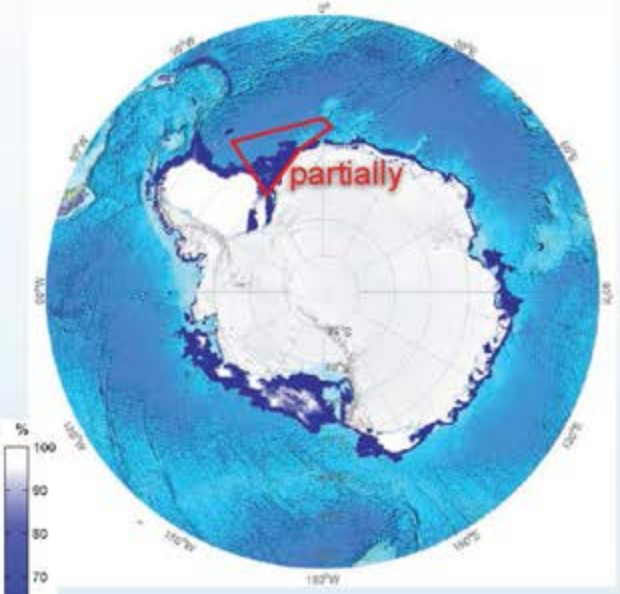
Weddell Sea Embayment

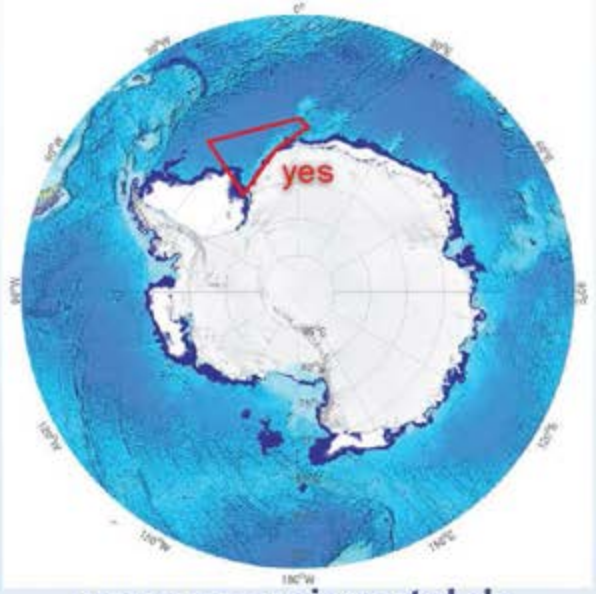


Sea-ice Conditions

Feb. 2010



Feb. 2011



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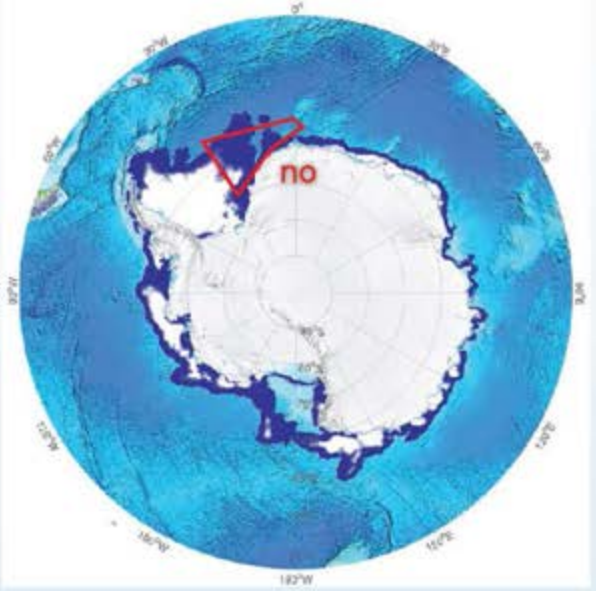

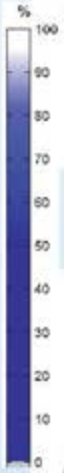

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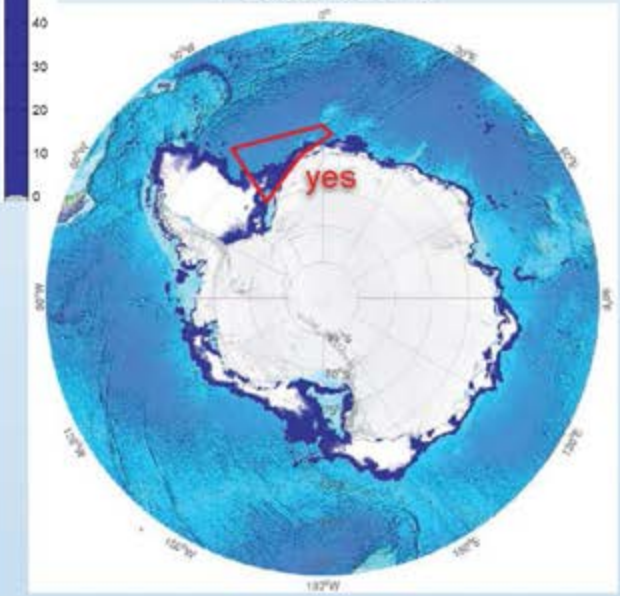
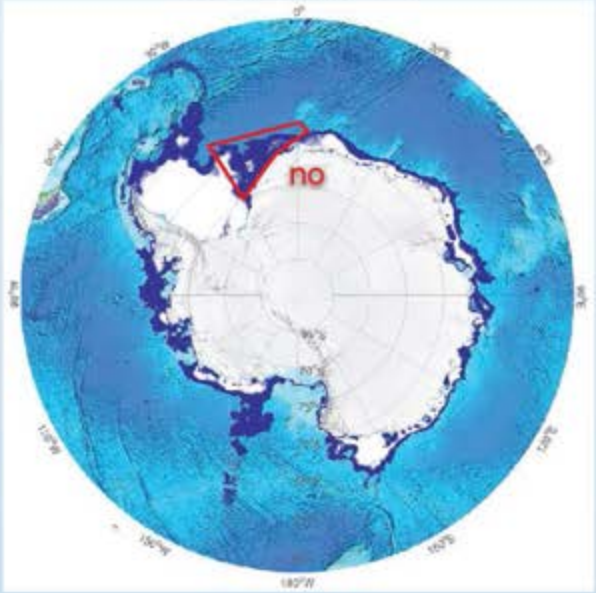
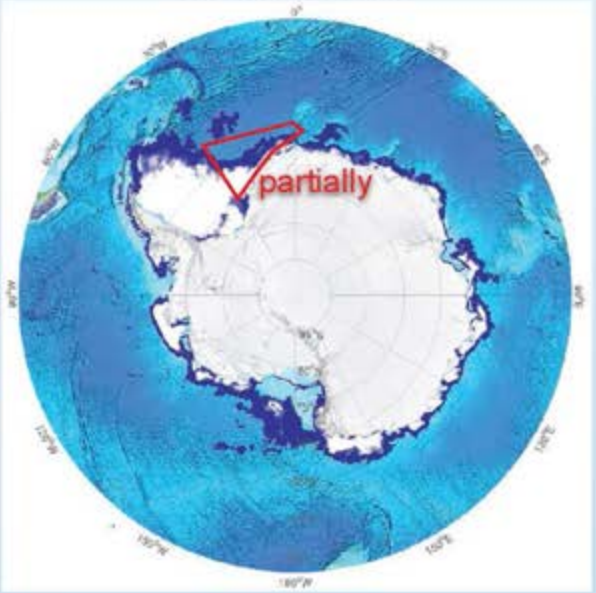
Feb. 2013



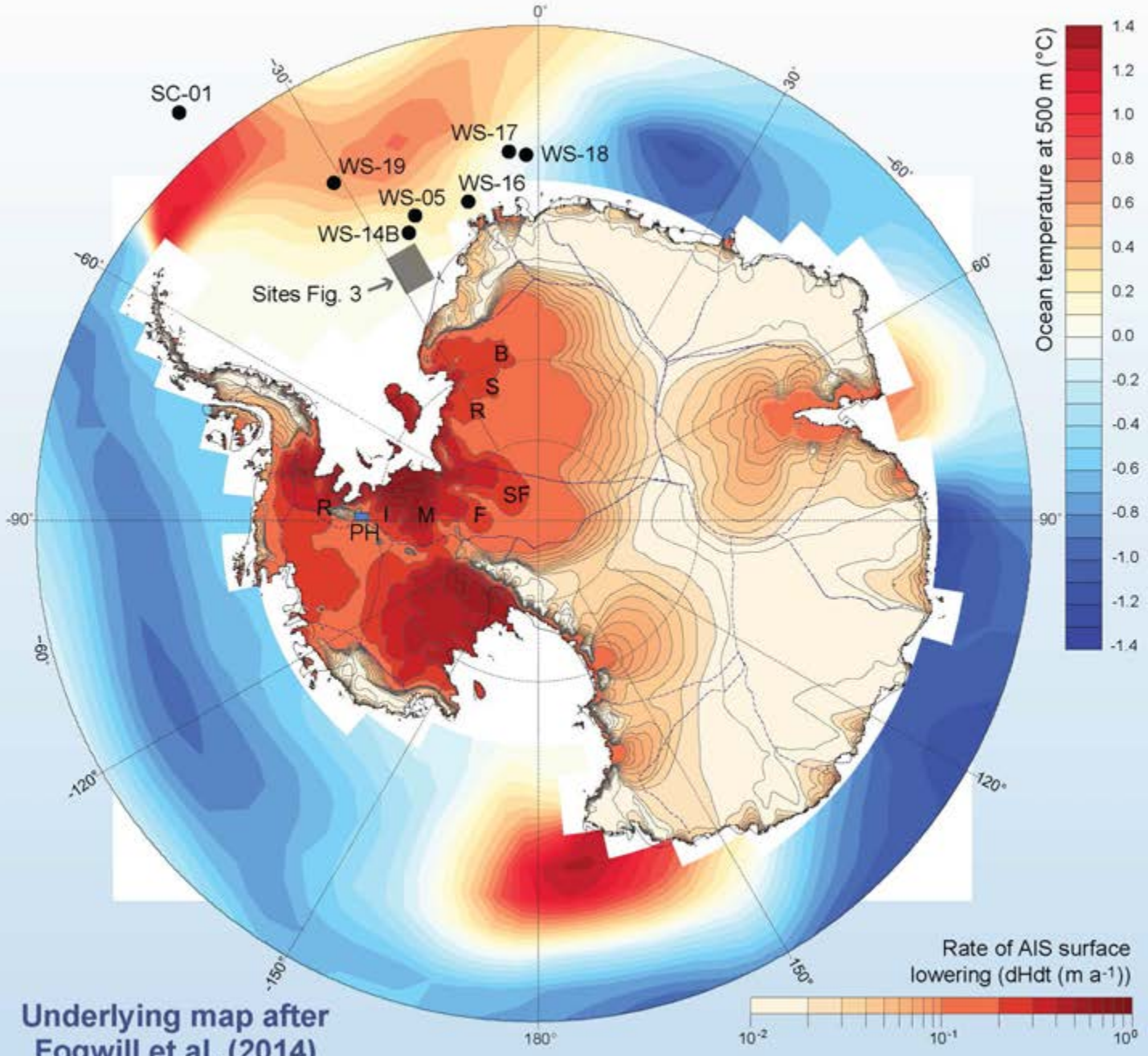
Feb. 2014



Feb. 2015



Proposed Drill Sites – Weddell Sea

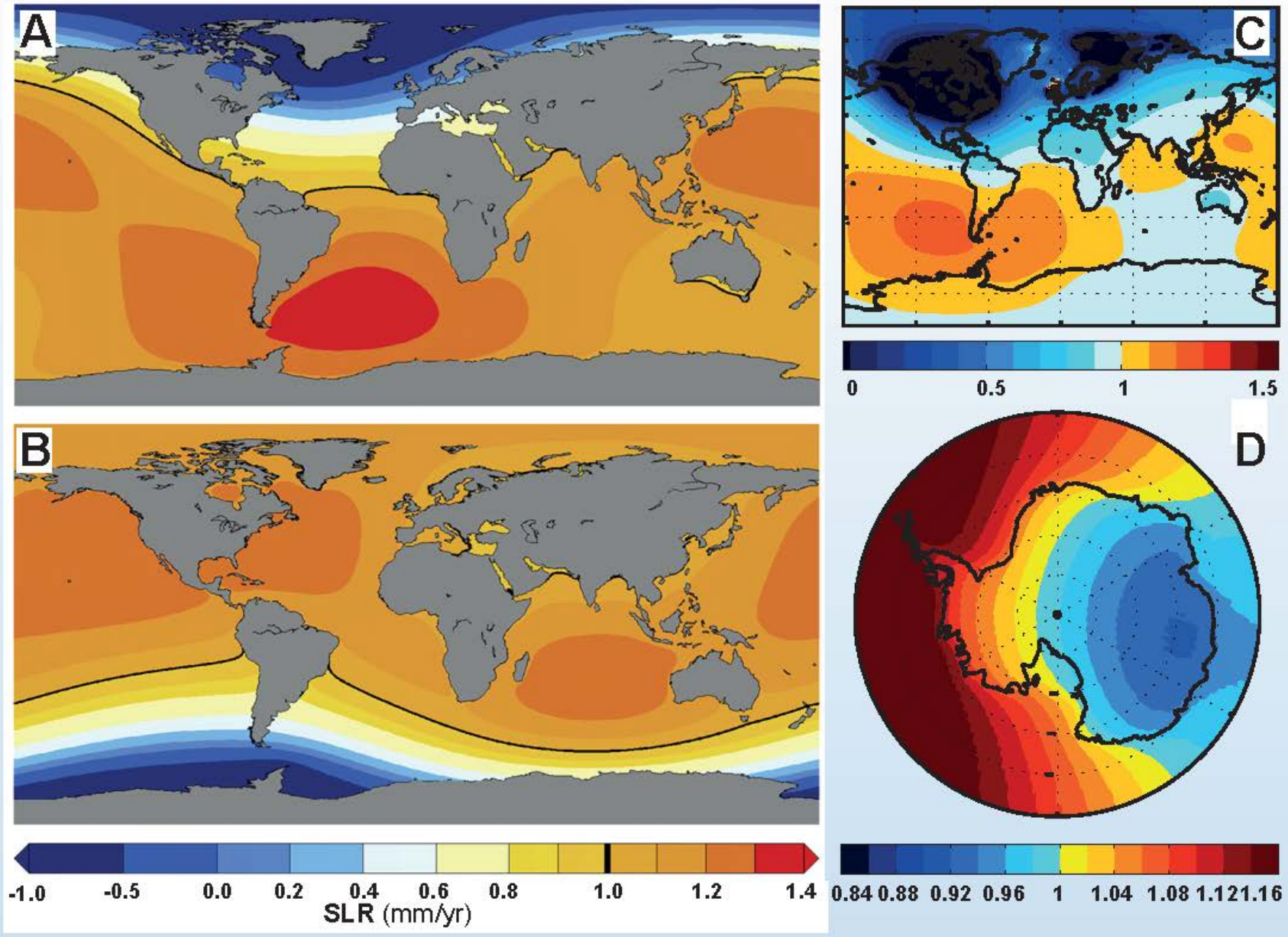


- Plan A (Sites in the SE Weddell Sea; mainly the grey box) are logistically challenging due to sea ice
- Hence, Plan B includes sites further north, which are still not entirely outside the sea-ice zone
- We are now asked to provide a Plan C entirely outside the area. How should we do that?

Underlying map after Fogwill et al. (2014)

Weber et al. (2015) IODP proposal 848)

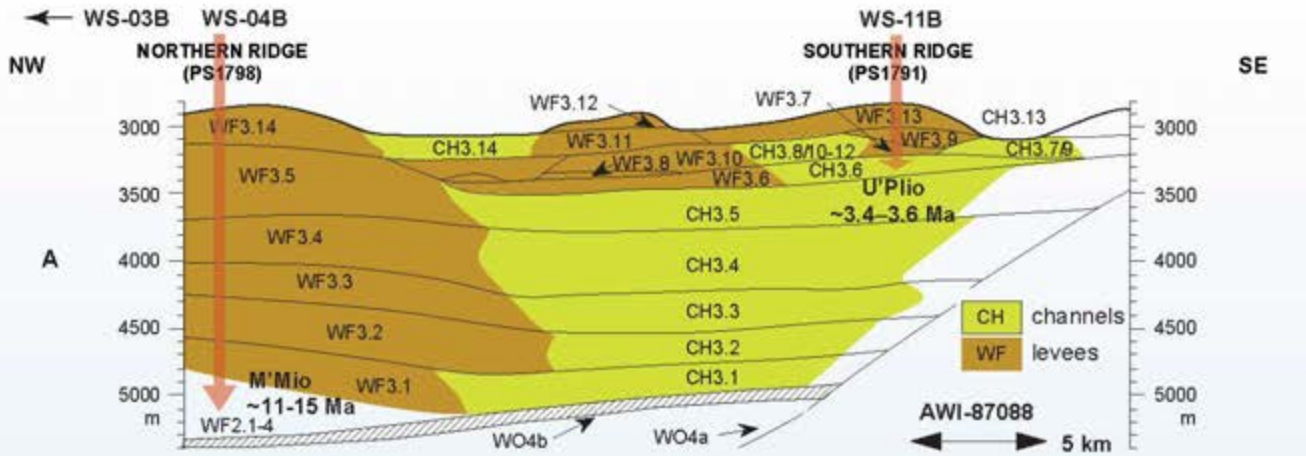
Sea-Level Fingerprint from Northern Hemisphere ice

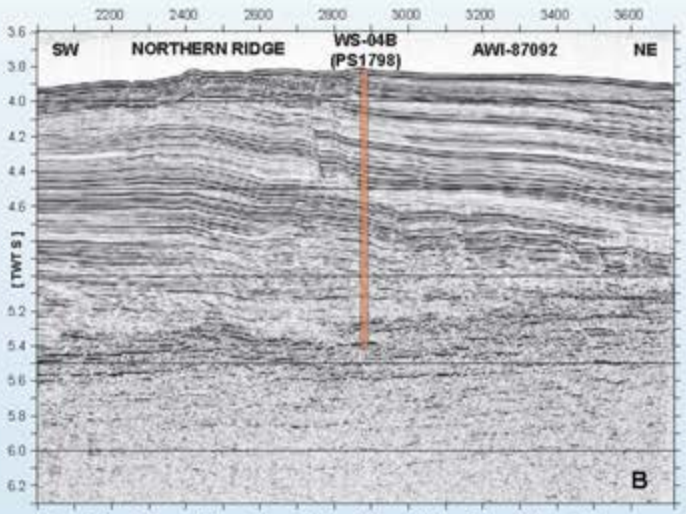


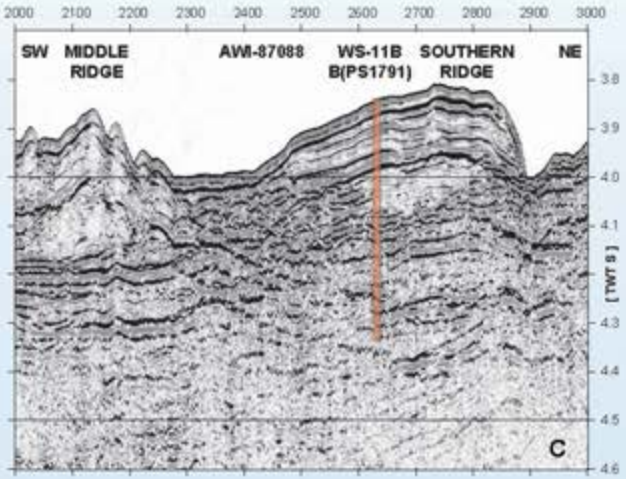
Tamisiea and Mitrovica (2011; Oceanography)

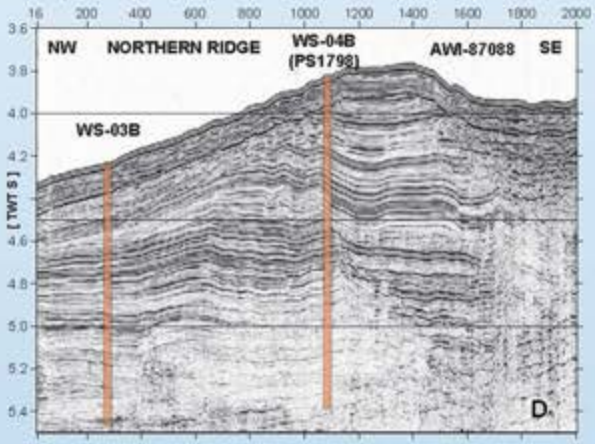
Weber et al. (2011; Science)

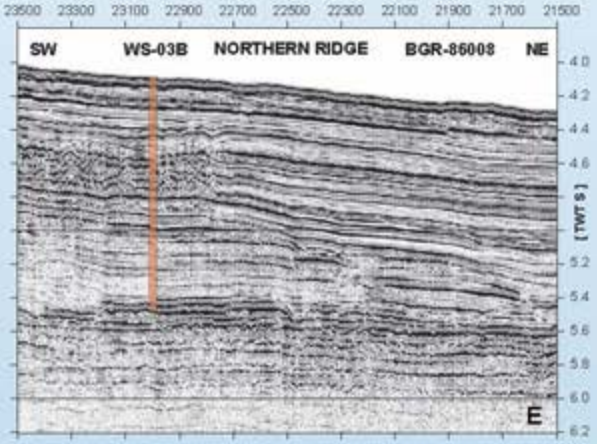
Pre-Site Survey Data











- Channel-ridge structures shall be drilled on multiple locations in the southeastern Weddell Sea.
- The southern and middle ridge require rather shallow drillings of 400-600 m to reach the presumed Lower Pliocene.
- The northern ridge requires deeper (≥ 1 km) drilling to reach the Mid-Miocene (reflector c).

Weber et al. (2015)
IODP proposal 848)

Specific Objectives 848-Full: Weddell Sea

Scientific objectives focus on Miocene-Pleistocene reconstruction of AIS dynamics, sea-level development, and changes in ocean-atmosphere circulation in the Weddell Sea. There should be five drillings (eight additional alternate sites are provided). Topics are:

- **What is the age of reflector W5 (c) and does it document establishment of full glacial conditions in the Weddell Sea Embayment during the Miocene?**
- **Did the EAIS contribute to the sea-level highstand during the Mid-Pliocene warm period?** Were sea-ice coverage, biogenic productivity, and sea surface temperatures different at that time?
- **Is the formation of the southern and middle ridges north of Crary Fan related to the Late Pliocene intensification of Northern Hemisphere glaciation?**
- Did composition and cyclicity recorded in Weddell Sea sediments change during the Mid-Pleistocene Transition?
- What is the glacial-to-interglacial record of EAIS dynamics?
- **What are the changing source signatures of glacially derived material, and can we infer phases of AIS instability or ice-stream flow switching?**
- **Was there a Filchner-Rønne Ice Shelf collapse during warmer-than-today 'super' interglacials** (MIS 5, 11, 31)?
- Can the interhemispheric ice-sheet synchronicity hypothesis be sustained for stadial-to-interstadial changes and previous deglaciations?
- How large was the Weddell Sea sector of the AIS during glacial periods and was the size controlled by hysteresis in the AIS?
- Are decadal-scale glacial AIS dynamics documented from varves caused by solar forcing, atmosphere-ocean interactions, or a combination thereof?
- Can we reconstruct AIS mass loss and ocean-atmosphere history from Iceberg Alley since the Mid-Pliocene?