



## **Pleistocene cycles and marine records of West Antarctic Ice Sheet expansion and retreat**

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The Pleistocene is very poorly represented in Antarctic continental shelf settings. Most piston cores do not penetrate last-glacial age diamictites. Moreover, nearly all sedimentary records have been subjected to the erosional effects of multiple expansions of the WAIS. No existing sediment core recovered from the continental shelf preserves a complete record of the last 1.2 Ma. The ANDRILL-MIS drillcore (AND-1B) from the southwestern Ross Sea may contain the best continental shelf record of the Late Pleistocene, but it is not well dated and probably incomplete. The upper 55 m of AND-1B contains sediments devoid of diatoms, including Pleistocene fragments or robust reworked Tertiary forms, suggestive of strong glacial shearing (Scherer et al., 2004, *Geology*). It is characterized by thick diamictites with very rare, thin mudstone units. The absence of diatoms, even in the mudstones, may result from (1) continuously expanded mid-Pleistocene ice (grounded or grounding-line proximal), (2) glacial erosion and removal of interglacial diatomaceous sediments, or (3) interglacial non-deposition of diatomaceous sediments, despite episodic open water with marine productivity. The southeastern Ross Sea, which has a non-winnowed relict glacial surface, despite high primary productivity, provides an analog for scenario 3 (Dunbar et al., 1985). McKay et al. (*GSA Bull.*, 2009) interpret this interval as reflecting a nearly continuous Pleistocene record reflecting a predominance of grounded ice throughout much of the late Pleistocene, with the thin mudstones reflecting exclusively sub-ice shelf interglacial deposits. However, there is evidence of warmer than present interglacial conditions in Southern Ocean sediment cores (numerous references), and in East Antarctic ice cores (Sime et al., 2009, *Nature*). Furthermore, recent modeling of the WAIS suggests late Pleistocene instability, including episodic collapse of the Ross Ice Shelf and interior grounded ice (Pollard & Deconto, 2009, *Nature*). The enigmatic AND-1B record limits interpretation of Late Pleistocene interglacials and WAIS history in the Ross Sea.

Although the Southern Ocean has a rich record of Pleistocene interglacial events, interpretation of WAIS collapse from these records is equivocal, in part due to lower latitude influences and their distance from the WAIS. The best sediment core available to date that is proximal to the WAIS is the Polarstern core PS58/254 from the Amundsen Sea (69°19'S, 108°27'W, water depth 4014 m), offshore from Pine Island Bay (Hillenbrand et al., 2009, *QSR*). The core is well-dated and contains a nearly continuous record of the last ca. 1.2 Ma. Its proximity to Pine Island Bay, the “weak underbelly” of the WAIS (Hughes, 1981), suggests that stratigraphic changes recognized in the core will have been strongly influenced by past WAIS collapse. We will present new diatom results from this core that bear on past WAIS fluctuations via the Pine Island Bay corridor.