Thu_206_CR-4_394

Ice Retreat History in Pine Island Bay, Revealed by Sedimentary Be-10 Records

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Reconstruction of the past dynamics of the Antarctic ice sheets by studying records from their margin is essential to evaluate their stability and their contribution to future sea level rise. Recently, the first direct evidence for a paleo-subglacial lake on the Antarctic continental shelf was reported from a sediment core from a small bedrock basin in Pine Island Bay (PIB), West Antarctica. Here we report further evidence for this paleo-subglacial lake based on down-core changes in Be-10 concentrations in the sediments. Very low Be-10 concentration in the lower part of the core indicate limited input of meteoric Be-10, suggesting deposition of the corresponding sediments in isolation from the open ocean. The Be-10 concentration shows a drop within a sand, silt and mud interval in the middle part of the core that was interpreted to result from deposition during the transition from the subglacial lake to a sub-ice shelf cavern caused by grounding line retreat in PIB around 11 kyrs B.P.. The Be-10 concentration increases significantly toward the top of the core, indicating the establishment of an open marine setting later during the Holocene. In addition, we report new Be-10 data from marine sediment cores in other parts of PIB. Our results demonstrate that Be-10 concentration changes in marine sediments from glaciated margins are a valuable recorder of ice sheet - ice shelf transitions.