



Amundsen Sea, South Pacific: Distribution and depositional patterns as an archive of palaeoclimate and palaeoceanography

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The distribution of sedimentary sequences at the Antarctic continental slope and rise documents sediment transport and deposition via dynamic bottom currents and ice sheets. Analysing seismic reflection data we try to reconstruct sediment input (path and hence provenance, amount) and sediment transport patterns as an indication for climate changes and modifications in palaeoceanography. Depocentres and sedimentation rates of four sedimentary units show distinct differences in location and shape. The oldest unit ASR-I (> 21 Ma) shows a narrow depocentre parallel to the continental slope interpreted to represent low energy material input via a river estuary, which later formed Pine Island Trough East (PITE). Sediment drifts observed in the elevated Marie Byrd Seamount area point towards a significant sea ice cover but not full glacial conditions for the period before 21 Ma.

A strong increase in sediment input documented by a larger depocentre and much higher sedimentation rates is interpreted as evidence for glacial conditions in West Antarctica already during the Early Miocene. Warming as the result of the Mid Miocene Climatic Optimum resulted in a wet ice sheet, and led to a higher sediment supply for the period 21-14.1 Ma. Material was input along a broad front but with a focus via PITE and Abbot Trough (AT). Most of the material was transported into the eastern Amundsen deep sea where it was shaped into levee-drifts by a re-circulating bottom current. Two smaller depocentres seaward of AT and Pine Island Trough West (PITW) and reduced sedimentation rates indicate a cooler and dryer ice sheet resulting from the onset of stronger cooling after 14 Ma. A dynamic ice sheet since 4 Ma showing growth and decline during warm and cold phases is documented by a strong increase in sedimentation rates. Since 4 Ma material input was dominant via AT and PITW, where it interacted with a west-setting bottom current resulting in the continued formation of levee-drifts in the eastern and central Amundsen Sea.