

Climate signals in Late Holocene sediments from Maxwell Bay and English Strait (South Shetland Islands, Antarctica)

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Climate fluctuations of the past two millennia such as the Little Ice Age and the Medieval Warm Period are reported mainly from the Northern Hemisphere. Evidence from Antarctica is comparably sparse and reveals regional and temporal differences, which are particularly evident at the western and eastern sides of the Antarctic Peninsula.

High-resolution coastal-marine sediment cores from the northernmost tip of the West Antarctic Peninsula reveal periods dominated by finer sediments between periods that lack the finer sediment component. In Maxwell Bay this fine sediment (grain size mode around 16 μm) has been traced back to sediment related to the occurrence of glacial meltwater. It was found in sheltered places and meltwater creeks of Potter Cove, a small tributary fjord to Maxwell Bay. In the sediment core this sediment occurs predominantly between 600 and 1250 AD (Medieval Warm Period) whereas it is only sparsely affecting the record between 1450 and 1900 AD (Little Ice Age). The temporal pattern is very similar to global-temperature reconstructions and even resembles temperature reconstructions from the Northern Hemisphere. To avoid local effects that may occur in Maxwell Bay more sediment cores were taken from bays and straits further south of King George Island during Cruise PS97 of RV "Polarstern" in 2016. A core from English Strait reveals completely different sedimentary conditions with no detectable meltwater signal (16 μm). However, the mean grain size record resembles that of the cores from Maxwell Bay. The lack of a clear-cut meltwater sediment class as it occurs further north is likely the result of a much smaller hinterland (Greenwich and Robert islands) when compared to Maxwell Bay between Nelson Island and the much bigger King George Island where glaciers and ice sheets discharge large quantities of very turbid meltwater directly into the bay. It is concluded that during the warmer climate periods a large amount of meltwater was released along the NW Antarctic Peninsula. The related plume sediments were distributed downstream to overprint coastal sediments even though the amount was likely not sufficient to produce a discrete sediment class.