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Further evidence for historical decline of Antarctic sea ice prior to satellite survey era?

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The decline in Arctic summer sea ice which accelerated during the present century to reach a yet unequaled minimum extent in 2012 as monitored by the satellite-based sea ice survey since the late 1970s is thought to represent one of the most striking examples of current climate change related to the anthropogenic global warming. In contrast, Antarctic sea ice extent has remained nearly unchanged during the past 40 years, according to the satellite survey. The statistical analysis of microfossil (diatom) signals indicative of sea ice occurrence retrieved from a large set of surface samples covering the Pacific, Atlantic and the eastern Indian sectors of the Southern Ocean suggests that Antarctic winter sea ice extent was more extended than the sea ice field documented by satellite surveys. The surface samples generally integrate signals deposited over 100-200 years. Most substantial offsets between the sedimentary proxy and satellite derived data on sea ice extent were encountered on latitudinal transects across the Pacific sector. Independent support for a 20th century decline of Antarctic sea ice fields by up to 25% prior to satellite survey comes from the analysis of whaling positions [1, 2], ice core proxies [3] and combinations of observations with numerical modeling [4]. Proxy records from Holocene sediment cores allow for further extension of sea ice records beyond the short instrumental record. These records indicate that the more extended Antarctic winter sea ice derived from the surface sediment record is a common feature in the present interglacial (Holocene) period, except for the earliest Holocene when the sea ice field was even smaller than present. The proxy results are suitable for validation of reanalysis and numerical model data and will allow for a better understanding of Antarctic sea ice sensitivity in response to natural and anthropogenic processes.

[1] de la Mare, W. K. 2009. Clim. Change 92,461-493; [2] Cotté, C., Guinet, C. 2007. Deep-Sea Res. I, 243-252; [3] Abram et al. 2010. J. Geophys. Res. 115, doi:10.1029/2010JD014644; [4] Rayner et al. 2003. J. Geophys. Res. 108, doi:10.1029/2002JD002670.