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On the freshening of the northwestern Weddell Sea continental shelf

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For the last five decades the Antarctic Peninsula faces the strongest atmospheric warming on Earth with severe consequences for its glaciers, ice shelves, and the sea ice covering the surrounding marginal seas. As more data becomes available it is obvious that the fringing ocean also experiences significant changes. We analysed hydrographic data from the northwestern Weddell Sea continental shelf of three austral winters (1989, 1997, and 2006) and two austral summers (2006-07 and 2008-09). A progressive freshening of the whole water column with a difference of 0.1 in 17 years was observed, which is comparable to the freshening observed on the Ross Sea continental shelf. During summer a thermal front exists at 64 S separating cold southern waters from warm northern waters which have similar characteristics as the deep waters of the central basin of Bransfield Strait. From possible causes for the freshening, i.e. enhanced melting at the base of Larsen Ice Shelf, increased iceberg decay on the shallow shelf off the tip of the Antarctic Peninsula, southward retreat of the summer sea ice edge, and more precipitation in this sector, we only can exclude the iceberg melting. However, we tend to favour sea ice retreat and increased precipitation as causes because they seem to act together, linked by the same atmospheric process.