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Ice core reconstruction of sea ice change in the Amundsen-Ross Seas since 1702 AD

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Antarctic Sea ice has been increasing in recent decades but there are strong regional differences. Declining sea ice extent in the Bellingshausen Sea since 1979 has been linked to the observed warming on the Antarctic Peninsula, while the Ross Sea sector has seen a marked increase in sea ice extent during this period. Here we present a 308-year record of methansulphonic acid (MSA) from the Ferrigno ice core in a coastal West Antarctica. MSA at this site is demonstrated to be a robust proxy for winter sea ice extent (SIE) in the Amundsen-Ross Sea. We demonstrate that the recent increase in sea ice in this region is part of a longer trend, with an estimated $\sim$1 $^{\circ}$ northward expansion in SIE during the 20th century and a total expansion of $\sim$1.3° since 1702. The greatest SIE (inferred from MSA) occurred during the mid-1990s, with five of the past 30 years considered exceptional in the context of the past 300 years.