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## Antarctic sea ice in a changing planet – insights from palaeoclimate archives.

### Content

Sea ice is currently undergoing major changes. Observations of both Antarctic and Arctic sea ice conditions are limited to the satellite era (post 1970). Prior to the satellite era and historical records (post-1930s), the best method for reconstructing past sea ice conditions comes from paleoclimate archives. Changes in sea ice conditions have been reconstructed from the chemical or isotopic records measured in continental ice cores and from microfossil or geochemical tracers in marine sediment cores. Marine records typically assess changes in sea ice over millennial timescales, with only a few produced at sub-decadal resolution. Conversely, ice core records are all available at annual resolution or higher but the longest ice core record extends just 300 years, which is arguably too short a time period to investigate the full range of natural variability. Amalgamating these archives offers the best potential to enhance our understanding of longer term variability and place the recent changes in an extended context.

Many of the existing marine cores with sea ice records have sufficiently high sedimentation rates ( $\geq 50$  cm/ka) to permit higher resolution reconstructions. By increasing the resolution of marine records, particularly in areas where ice cores exist, we can combine the marine and ice core records to provide a continuous record of sea ice that overlaps with satellite and historical data at the highest resolution and extends back over the last millennia to resolve natural variability.

This project aims to enhance Antarctic sea ice records by combining existing marine and ice core archives. This will include targeting key areas where records can be considered in parallel, adapting the sampling scheme, increasing the resolution of existing marine records and analysing newly discovered chemical proxies in the ice, that more closely align the changes recorded in the marine sediments.

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