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# Reconstructing Antarctic winter sea-ice extent during Marine Isotope Stage 5e

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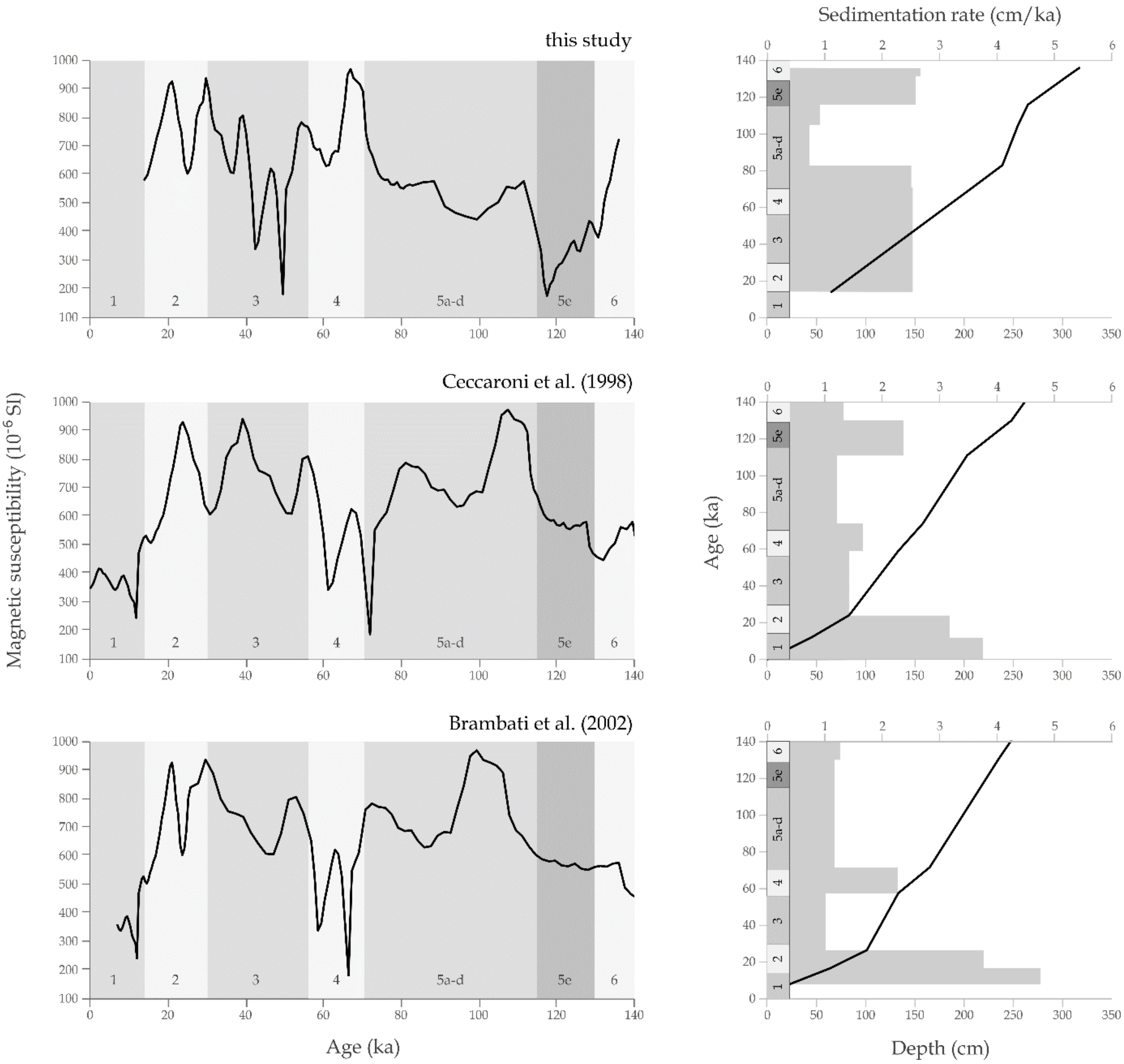


**Figure S1:** Graphs of magnetic susceptibility (MS) against age (**LHS**) and age-depth plots (**RHS**) for the three alternative age models for core ANTA91-8. The top row is the age model presented in this study, the middle row is the age model from Ceccaroni et al. (1998) and the bottom row is the age model from Brambati et al. (2002). The grey shading on the **RHS** plots indicate the sedimentation rates and MIS stages are shown along the y-axes. Grey background shading on the **LHS** graphs indicate the MIS stages.

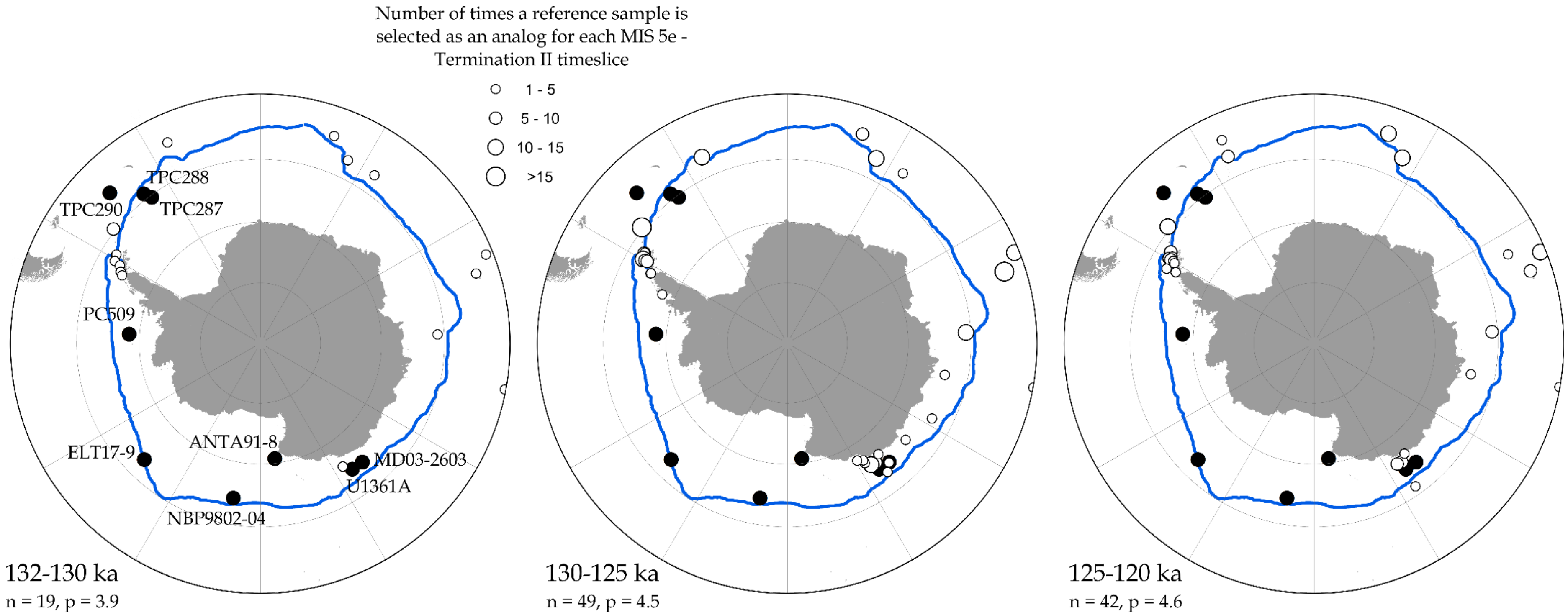


**Figure S2:** Maps of the modern reference samples (white circles) which are selected as analogs for the fossil assemblages in three MIS 5e-Termiantion II time slices (132-130 ka, 130-125 ka and 125-120 ka). Black circles mark the core locations from which the fossil assemblages are taken and the blue line marks the modern 15 % September sea-ice extent (Fetterer et al., 2017). The size of the white circles indicates how many times each reference sample has been selected as an analog within each time slice. n is the number of fossil assemblages within each time slice and p is the average number of analogs (between 0 and 5) which were used to reconstruct the palaeoenvironmental conditions for each fossil sample. The MIS 5e-Termination II time slices are chosen following the approach of Chadwick et al. (2022).

| Core | Minimum Sept. SIC (%) | Age of Sept. SIC min (ka) | Maximum SSST (°C) | Age of SSST max (ka) | Avg. Sept. SIC ± st. dev. (%) | Avg. SSST ± st. dev. (°C) | Modern Sept. SIC (%) | Modern SSST (°C) |
|---|---|---|---|---|---|---|---|---|
| TPC290 | 0.0 | 120.97 ± 2.58 | 6.2 | 121.60 ± 2.58 | 19.4 ± 17.2 | 3.2 ± 1.9 | 0 | 3.9 |
| TPC288 | 3.9 | 130.70 ± 2.59 | 5.4 | 130.70 ± 2.59 | 24.8 ± 18.2 | 2.7 ± 1.6 | 71 | 1.1 |
| TPC287 | 5.2 | 130.36 ± 2.57 | 4.5 | 130.86 ± 2.57 | 33.0 ± 20.4 | 2.2 ± 1.5 | 87 | 0.6 |
| MD03-2603 | 0.0 | 129.50 ± 2.56 | 5.9 | 129.50 ± 2.56 | 18.9 ± 15.2 | 2.8 ± 1.1 | 88 | 0.6 |
| U1361A | 0.0 | 123.71 ± 2.70 | 5.9 | 123.71 ± 2.70 | 27.2 ± 24.6 | 2.6 ± 1.6 | 92 | 0.4 |
| ELT17-9 | 6.9 | 128.52 ± 2.51 | 3.0 | 123.52 ± 2.51 | 12.6 ± 4.4 | 2.5 ± 0.3 | 14 | 1.1 |
| NBP9802-04 | 1.4 | 130.29 ± 2.68 | 2.8 | 130.29 ± 2.68 | 8.4 ± 5.7 | 2.2 ± 0.3 | 66 | 1.1 |
| PC509 | 32.7 | 129.52 ± 2.59 | 1.1 | 130.20 ± 2.59 | 34.1 ± 1.9 | 1.0 ± 0.0 | 90 | 0.1 |
| ANTA91-8 | 34.0 | 124.31 ± 2.60 | 1.1 | 126.61 ± 2.60 | 47.8 ± 11.8 | 0.8 ± 0.3 | 96 | -0.9 |

**Table S1:** MIS 5e minimum and average Sept. SICs and maximum and average SSSTs for the nine analysed marine sediment cores. The ages for the minimum Sept. SIC and maximum SSST are also given. Modern (1981-2010) Sept. SICs are from Fetterer et al. (2017) and modern (1980-2019) SSSTs are from Hersbach et al. (2019). This data is supplemental to Figure 5 in the main manuscript.

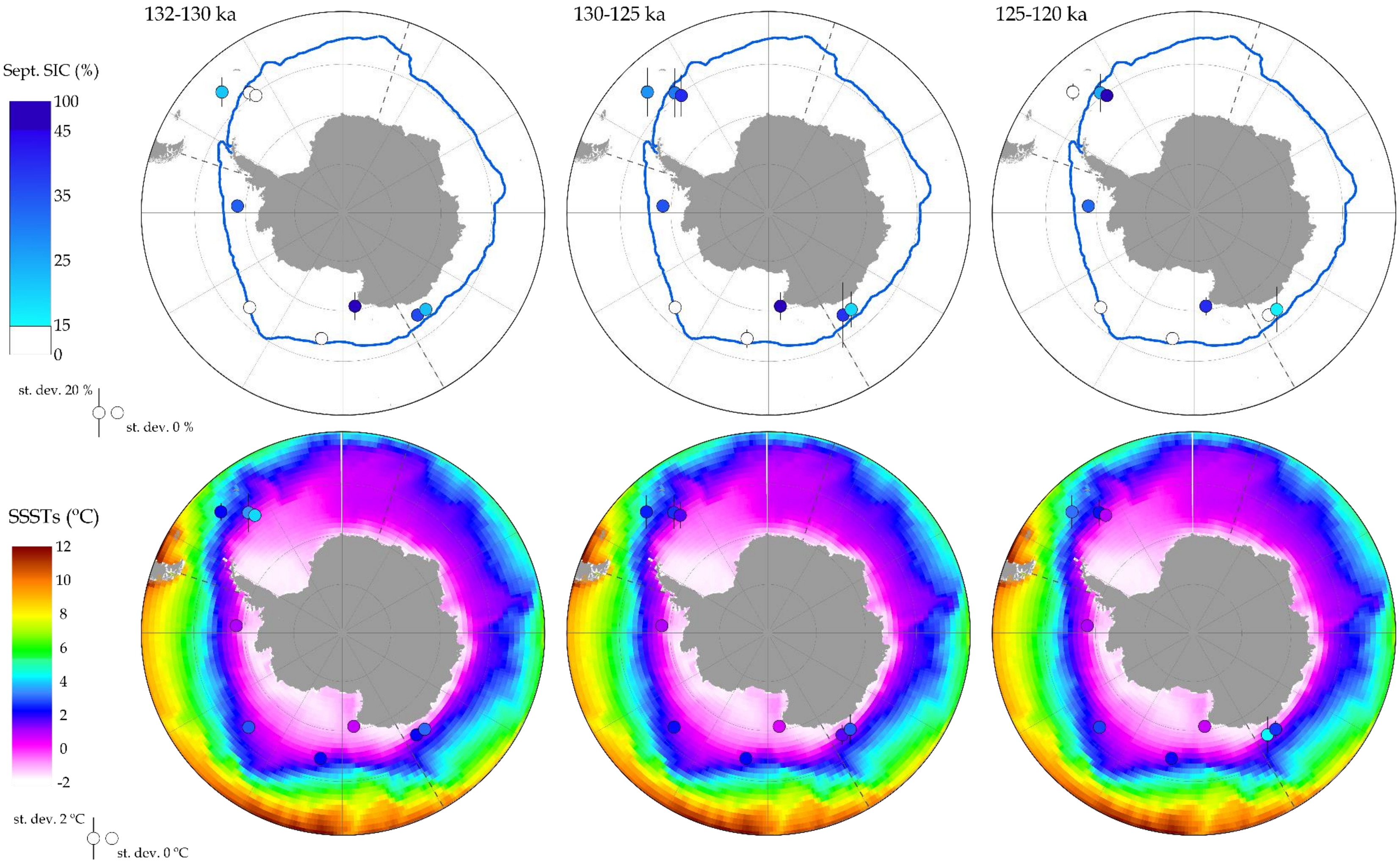


**Figure S3:** Maps of the average Sept. SICs (upper) and SSSTs (lower) in nine marine sediment cores (coloured circles with st. dev. marked by vertical bars) for three MIS 5e-Termination II time slices (132-130 ka, 130-125 ka and 125-120 ka) compared with modern (1981-2010) 15 % September sea-ice extent (blue line) (Fetterer et al., 2017) and modern (1980-2019) SSSTs (background shading) (Hersbach et al., 2019). Dashed black lines mark the Southern Ocean sector boundaries. The MIS 5e-Termination II time slices are chosen following the approach of Chadwick et al. (2022).

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