Supplemental Material: Reconstructing Antarctic winter sea-ice extent during Marine Isotope Stage 5e

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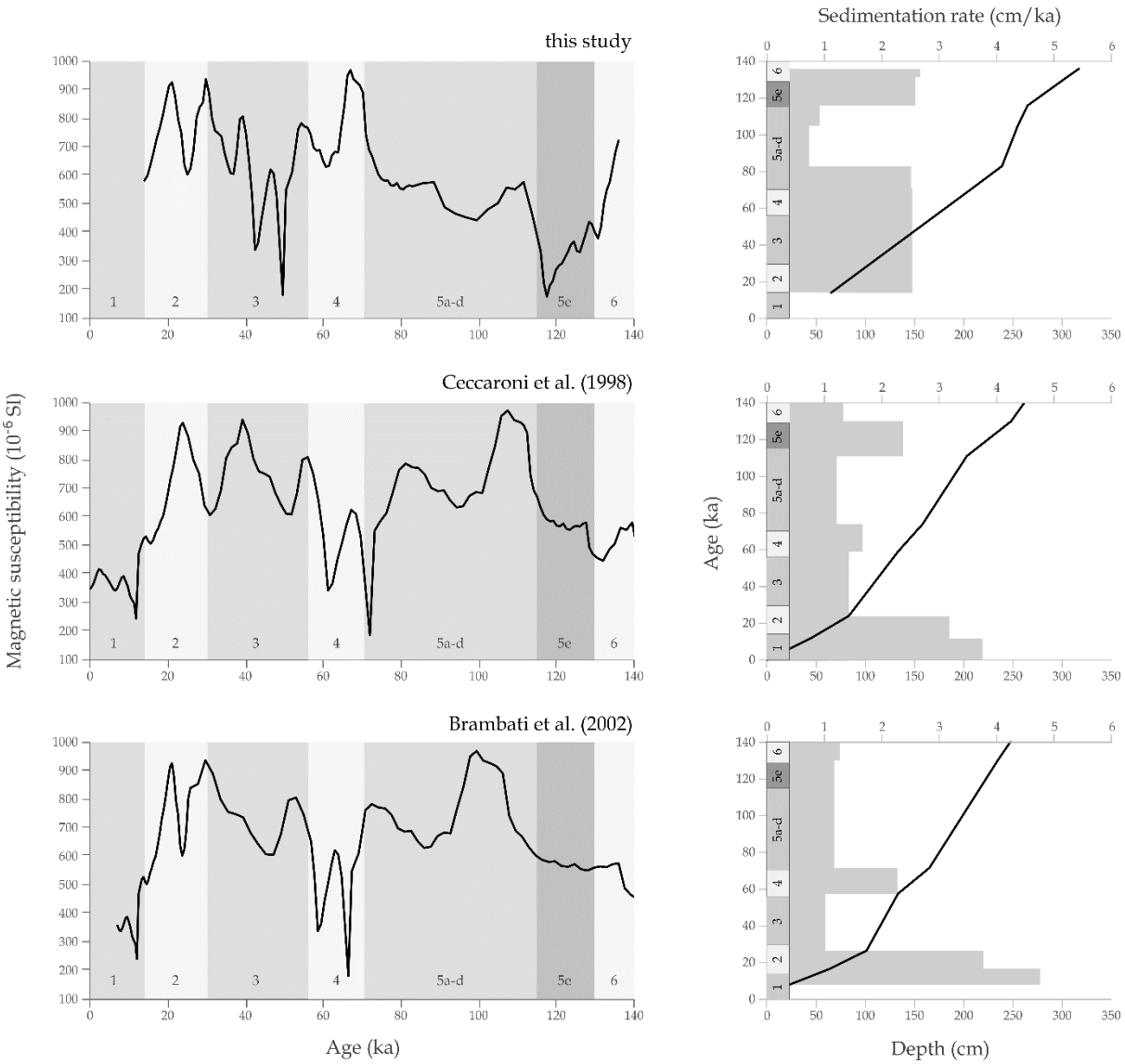

Supplementary Figure 1: Graphs of magnetic susceptibility (MS) against age (**LHS**) and age-depth plots (**RHS**) for the three alternative age models for core ANTA91-8. The top row is the age model presented in this study, the middle row is the age model from Ceccaroni et al. (1998) and the bottom 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.

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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

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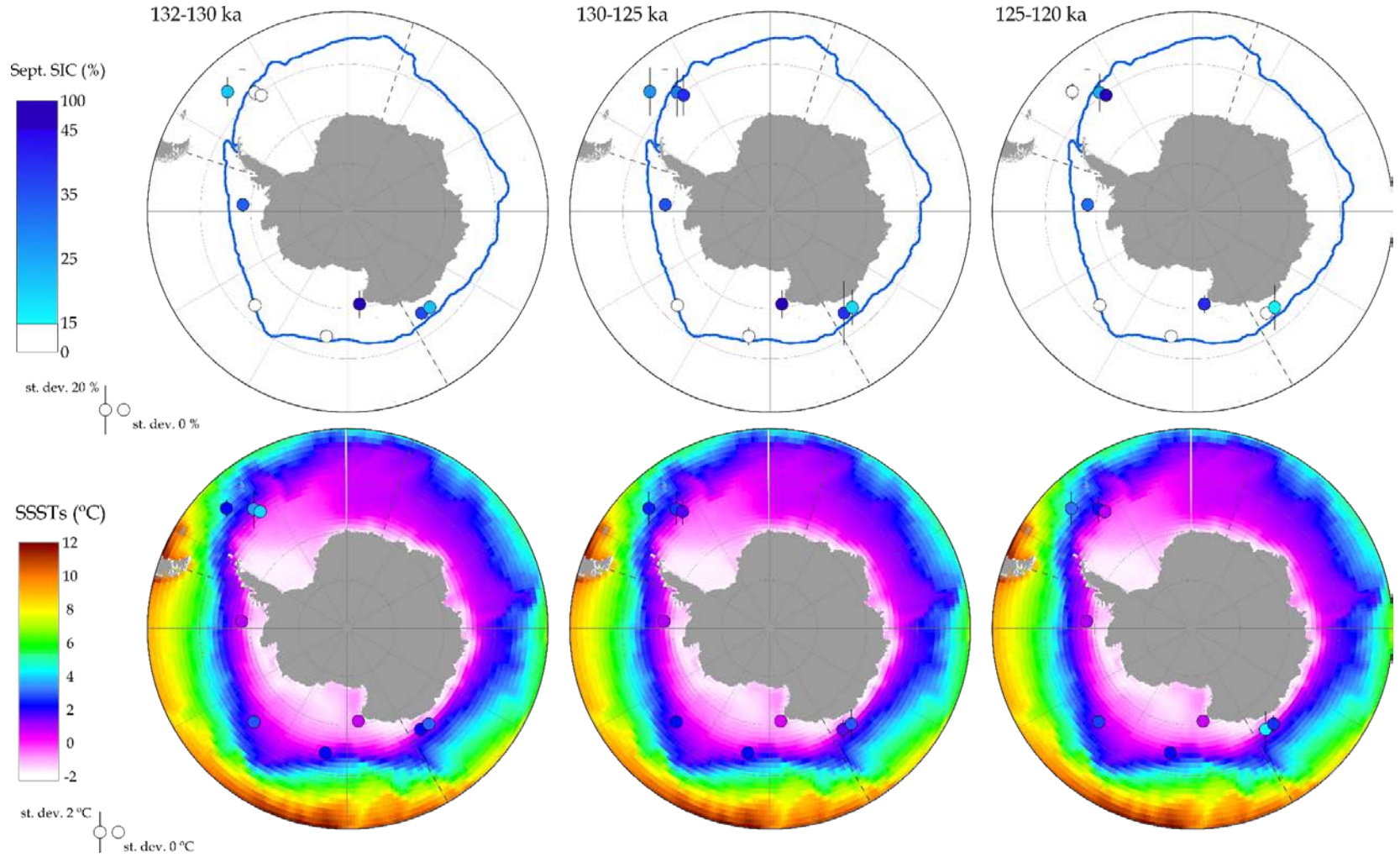
Supplementary Table 1: MIS 5e minimum and average Sept. SICs and maximum and average SSSTs for the nine analysed marine sediment cores. The ages for the minimum Sept. SIC and maximum SSST are also given. Modern (1981-2010) Sept. SICs are from Fetterer et al. (2017) and modern (1980-2019) SSSTs are from Hersbach et al. (2019). This data is supplemental to Figure 5 in the main manuscript.



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Supplementary Figure 2: 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 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 time slices are chosen following the approach of Chadwick et al. (*in review*).

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Ceccaroni L., Frank M., Frignani M., Langone L., Ravaioli M. & Mangini A. 1998. Late Quaternary fluctuations of biogenic component fluxes on the continental slope of the Ross Sea, Antarctica. *Journal of Marine Systems*, **17**: 515-525.

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