

Supplementary Table 1: Source data of palaeo-climate conditions, ice sheet response and global mean sea level during past warm periods shown in Table 1 of the main manuscript.

Climate Parameter	Sources
CO ₂ values for MIS 5e and MIS 11	Luthi et al. (2008)
CO ₂ value for Pliocene	Pagani et al. (2010); Seki et al. (2010); Martinez-Boti et al., (2015); de la Vega (2020)
Global Mean Temp (MIS 5e)	McKay and Overpeck (2011); Otto-Bliesner et al (2013); Shackelton et al (2020); Turney et al. (2020);
Global Mean Temp (MIS 11)	Masson-Delmotte et al. (2010); Lang and Wolff (2011)
Global Mean Temp (Pliocene)	Haywood et al. (2020)
Arctic Temps (MIS 5e)	CAPE members (2006); NEEM members (2013); Capron et al. (2014)
Arctic Temps (MIS 11) ¹	Melles et al. (2012); Cronin et al. (2013); Cronin et al. (2019)
Arctic Temps (Pliocene) ²	Dowsett et al. (2013)
Antarctic Temps (MIS 5e)	Capron et al. (2014)
Antarctic Temps (MIS 11)	Jouzel et al. (2007)
GrIS extent (MIS 5e)	Dutton et al. (2015a); Alley et al. (2010); Colville et al. (2011); NEEM community members (2013); Hatfield et al. (2016); Yau et al. (2016)
GrIS extent (MIS 11)	Reyes et al. (2014); Hatfield et al. (2016); Robinson et al. (2017); Christ et al. (2023)
GrIS extent (Pliocene)	Dolan et al. (2015); Koenig et al. (2015); Dumitru et al. (2019)
GrIS volume (SLE)	Morlighem et al. (2017)
AIS extent (MIS 5e)	Dutton et al. (2015a); Dutton et al. (2015b); Rohling et al. (2019); Turney et al. (2020); Bartlett et al. (2023); Lau et al. (2023)
AIS extent (MIS 11)	Blackburn et al. (2020)
AIS extent (Pliocene)	Grant et al. (2019)
GMSL values	See Figure 1 and Supplementary Table 1

¹ Data from only a few sites, far fewer data than for MIS 5e

² Data from only five sites, far fewer data than for MIS 5e

Supplementary Table 2: Published estimates of global mean sea level (GMSL) from coastal sedimentary archives during past warm periods shown in Figure 1 of the main manuscript

Citation (Fig. 1)	Source	Location	Low (m)	High (m)	Mid (m)	+ range (m)	- range (m)
1	Veoh (1966)	Indo-Pacific	2.0	9.0	5.5	3.5	3.5
2	Chappell and Shackleton (1986)	Huon	2.0	10.0	6.0	4.0	4.0
3	Chen et al. (1991)	Bahamas			6.0		
4	Stirling et al. (1998)	Western Australia			4.0		
5	Muhs et al. (2002a) QSR	Hawaii & Bermuda	3.0	6.0	4.5	1.5	1.5
6	Muhs et al. (2002b) QR	Bermuda, Bahamas, Hawaii, Australia	4.0	6.0	5.0	1.0	1.0
7	Hearty et al. (2007)	Global	6.0	9.0	7.5	1.5	1.5
8	Blanchon et al. (2009)	Yucatan			6.0		
9	Thompson et al. (2011)	Bahamas			6.0		
10	Muhs et al. (2011)	Florida	6.6	8.3	7.5	0.9	0.9
11	Kopp et al. (2009)	Global	6.6	9.4	8.0	1.4	1.4
12	Dutton et al. (2012)	Global	5.5	9.0	7.3	1.8	1.8
13	O'Leary et al. (2013)	W. Australia (Quobba Ridge)			9.0		
14	Kopp et al. (2013)	Global	6.4	8.8	7.6	1.2	1.2
15	Dutton et al. (2015)	Seychelles	5.9	9.3	7.6	1.7	1.7
16	Polyak et al. (2018)	Mallorca	5	16	10.5	5.5	5.5
17	Dyer et al. (2021)	Bahamas	1.2	5.3	3.8 [†]	2.5 [^]	1.6 [^]
18	Barnett et al. (2023)	northern Europe	3.6	8.7	5.7	3	2.1
19	Dumitru et al. (2023)	Bahamas	0.4	2.7	1.1 [†]	0.7	1.6
20	Raymo & Mitrovica (2012)	Bermuda, Bahamas	6	13	9.5	3.5	3.5
21	Roberts et al. (2012)	South Africa			13	2	2
22	Chen et al. (2014)	South Africa	8	11.5	9.75	1.75	1.75
23	Dowsett & Cronin (1990)	eastern USA (Orangeburg Scarp)			35	18	18
24	Wardlaw & Quinn (1991)	Enewetak Atoll	20	25	22.5	2.5	2.5
25	Miller et al. (2012)	Combination*			22	10 [^]	10 [^]
26	Rovere et al. (2014)	South Africa (De Hoop plain)	1.9	20.5	11.2	9.3	9.3
27	Moucha et al. (2017)	eastern USA (Orangeburg Scarp)			15		
28	Grant et al. (2019)	New Zealand		25			

		(Whanganui Basin)					
29	Dumitru et al. (2019)	Mallorca			20.6	2.8	2.8
30	Hearty et al. (2020)	South Africa (De Hoop plain)			13.3	6.4	6.1
31	Richards et al. (2023)	Australia			16	5.5	5.6

* Estimate derived from back-stripping in Virginia (USA), New Zealand, and Enewetak Atoll (N. Pacific Ocean), benthic foraminiferal $\delta^{18}\text{O}$ values, and Mg/Ca- $\delta^{18}\text{O}$ estimates.

† mode of peak GMSL from 10,000 simulations

^ 95% confidence interval

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