Supplementary online material for:

"Deglacial intermediate water reorganization: new evidence from the Indian Ocean" Sarah Romahn, Andreas Mackensen, Jeroen Groeneveld, Jürgen Pätzold

Table S1: AMS radiocarbon analyses details.

Measured ^{14}C radiocarbon ages were converted into calibrated ages before present (BP) by applying a reservoir age correction of ΔR = 140 yrs (Southon et al., 2002) using the Calib 6.0 software (Stuiver et al., 2005), based on the Marine09 calibration curve. A was applied to the ca

Label	Core depth (cm)	Planktic foraminifera species	measured ^{14}C AMS age (yr)	error (yr)	calibrated Calendar age (yr BP)	error (yr) (1 σ)
KIA 46245	20	*G.ruber, G. sacculifer, G. aequilateralis*	1375	± 25	766	± 39
KIA 43717	88	*G. sacculifer, G. aequilateralis, G. conglobatus*	2555	+35 / -30	2049	± 53
KIA 43716	112	*G. sacculifer, G. aequilateralis, G. conglobatus*	3175	± 35	2794	± 42
KIA 43715	160	*G. sacculifer, G. aequilateralis, G. conglobatus*	3995	± 30	3814	± 55
KIA 44976	272	*G.ruber, G. sacculifer, G. aequilateralis*	6225	± 35	6505	± 55
KIA 43714	308	*G. sacculifer, G. aequilateralis, G. conglobatus*	7820	± 45	8128	± 66
KIA 46244	344	*G.ruber, G. sacculifer, G. aequilateralis*	8305	± 40	8645	± 68
KIA 44977	420	*G.ruber, G. sacculifer, G. aequilateralis*	9795	± 50	10526	± 45
KIA 44978	444	*G.ruber, G. sacculifer, G. aequilateralis*	10520	± 55	11552	± 51
KIA 46243	461	*G.ruber, G. sacculifer, G. aequilateralis*	11685	± 55	13032	± 87
KIA 44979	468	*G.ruber, G. sacculifer, G. aequilateralis*	12590	± 60	13895	± 77
KIA 46242	488	*G.ruber, G. sacculifer, G. aequilateralis*	13980	± 70	16626	± 151
KIA 43713	500	*G. sacculifer, G. aequilateralis, G. conglobatus*	15700	+ 130 / -120	18195	± 112
KIA 44424	504	*G.ruber, G. sacculifer, G. aequilateralis*	15710	± 80	18201	± 86
KIA 46241	524	*G.ruber, G. sacculifer, G. aequilateralis*	21090	± 140	24558	± 225
KIA 44980	572	*G.ruber, G. sacculifer, G. aequilateralis*	34460	+770 / -700	38790	± 165

Figure S1: salinity profile from CTD station GeoB12616-6,

The CTD profile was measured during the Meteor Cruise No. M75 on 16 February 2008 at 06°57.62S 40°23.66E in the western Indian Ocean (Savoye et al., 2013). SAMW: Subantarctic Mode Water; AAIW: Antarctic Intermediate Water; RSW: Red Sea Water.

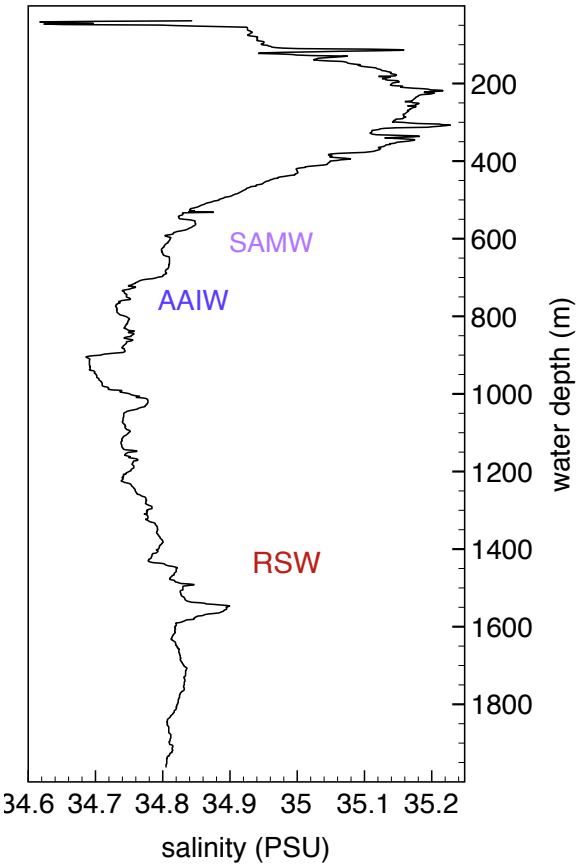

Figure S2: Linear Sedimentation Rate

The sedimentation rate varies strongly between the Holocene (average of 46 cm/kyr, highest beween ~ 8.7 and 8.2 kyr with 70 cm/kyr) and the glacial (below 10 cm/kyr).

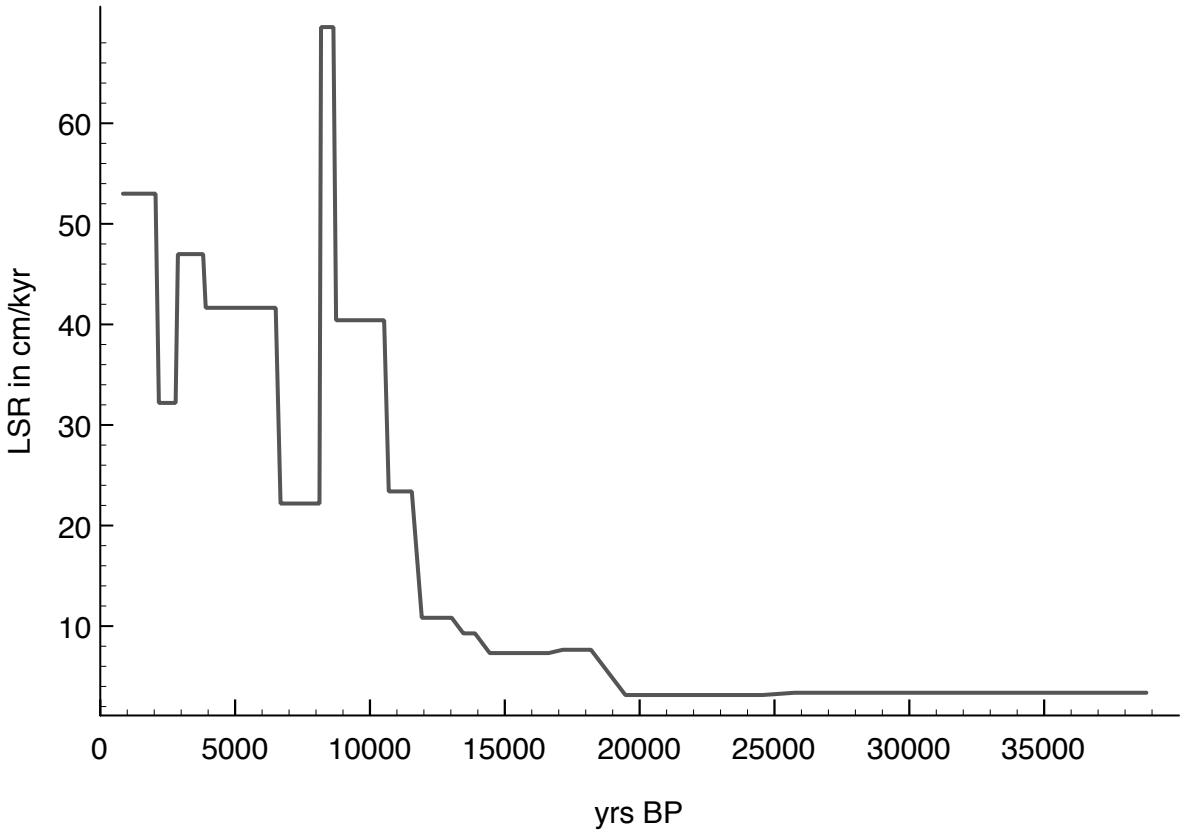

Figure S3: additional duplicate $\delta^{18}O$ analyses

We performed additional duplicate measurements for the core section representing the deglacial to validate the record. We calculated an average $\delta^{18}O$ value for each sampling point. Figure S3 shows the individual measurements (crosses) as well as the calculated average data (open circles).

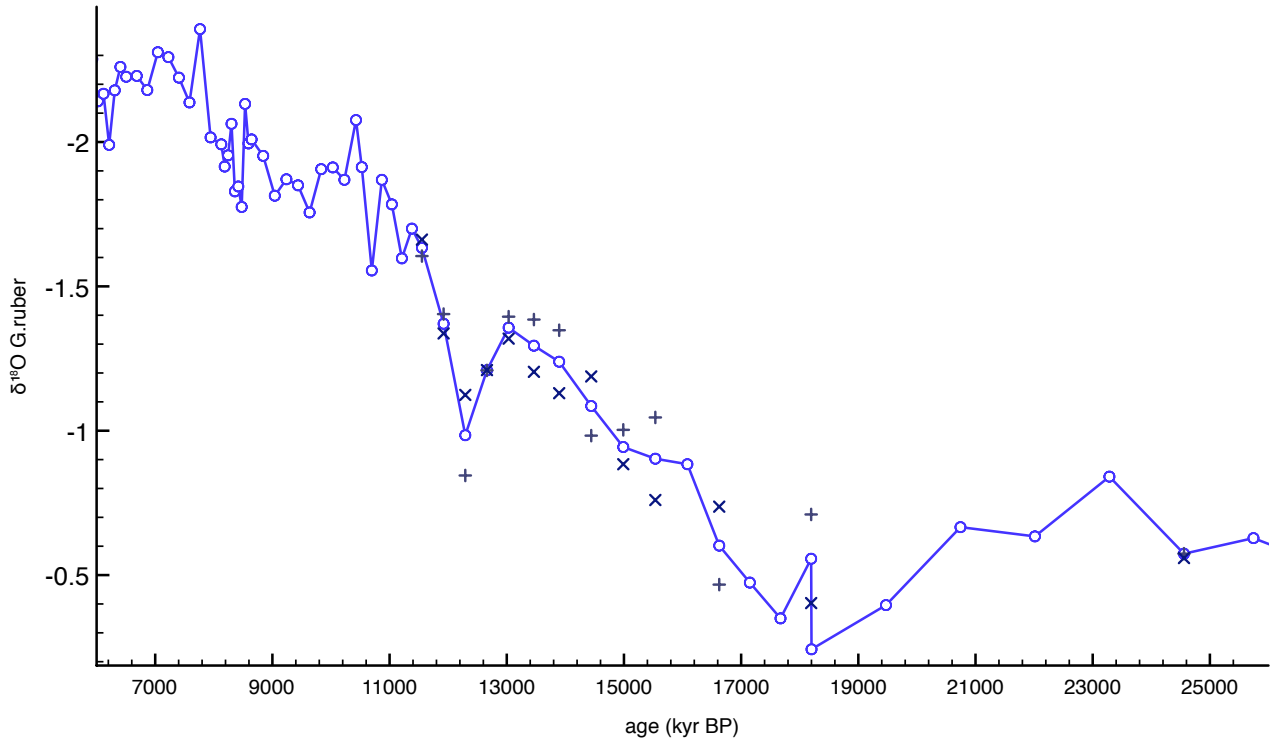

Table S2: uppermost core samples SST based on Mg/Ca.

SST (T in °C) were calculated using the equation given by Anand et al. (2003):
Mg/Ca (mmol/mol) = 0.38 exp (0.090 T)
with with a standard deviation of ±1.1 - 1.4°C (Dekens et al., 2002; Anand et al., 2003).

Core depth(cm)	calibrated age (yr BP)	SST in °C
4	younger than 766	30.0
8	younger than 766	28.4
20	766	28.6
28	917	29.1

Generally, the core top of sediment records with average sedimentation rate is used to represent modern values. But for GeoB12615-4, the AMS radiocarbon analysis of the 20 cm sample and the resulting age model suggest a very high sedimentation rate in the uppermost section of the core. Therefore we consider the uppermost 28 cm of the sediment record (not older than ~1000 yrs BP) to be representative for modern conditions, analogue to core top data in other records.

Table S3: stable isotope and Mg/Ca ratios of core GeoB12615-4

core depth (cm)	age (kyr BP)	$\delta^{18}O$ *P.ariminensis* (‰VPDB)	$\delta^{13}C$ *P.ariminensis* (‰VPDB)	$\delta^{18}O$ *G. ruber* (‰VPDB)	$\delta^{13}C$ *G. ruber* (‰VPDB)	Mg/Ca (mmol/mol)	SST (°C)
4				-2.26	1.50	5.63	30.0
8				-2.25	1.35	4.90	28.4
12				-2.14	1.66		
16				-2.13	1.26		
20	766	1.03	1.49	-1.97	1.22	4.99	28.6
24	841	0.99	1.52	-2.12	1.39		
28	917	0.96	1.47	-1.99	1.21	5.24	29.1
32	992	1.01	1.51	-2.12	1.16		
36	1068	1.02	1.43	-2.01	1.57	4.93	28.5
40	1143	1.05	1.45	-2.05	1.28		
44	1219	1.09	1.46	-1.89	1.18	5.00	28.6
48	1294	1.04	1.44	-2.05	1.36		
52	1370	1.05	1.46	-2.04	1.17	5.30	29.3
56	1445	1.09	1.43	-1.89	1.46		
60	1521	1.02	1.37	-2.31	1.27	4.82	28.2
64	1596	1.03	1.44	-2.15	1.26		
68	1672	1.04	1.44			4.94	28.5
72	1747	1.04	1.48	-2.02	1.29		
76	1823	0.96	1.49	-2.10	1.37	4.70	28.0
80	1898	0.98	1.42				
84	1974	1.06	1.49	-2.08	1.31	4.79	28.1
88	2049	0.99	1.46	-2.18	1.39		
92	2173	1.06	1.50	-2.30	1.28	5.19	29.0
96	2297	0.97	1.45	-2.37	1.35		
100	2422	0.95	1.42	-2.21	1.21	4.73	28.0
104	2546	1.04	1.45	-1.99	1.59		
108	2670	0.96	1.46	-2.28	1.26	4.62	27.8
112	2794	1.09	1.47	-2.08	1.39	4.75	28.1
116	2879	1.02	1.53	-2.06	1.44		
120	2964	0.88	1.31	-2.17	1.11	4.81	28.2
124	3049	1.01	1.31	-1.99	1.34		
128	3134	1.00	1.43	-2.06	1.47	4.66	27.8
132	3219	1.06	1.43				
136	3304	0.95	1.43	-2.11	1.45		
140	3389	1.07	1.45	-2.31	1.25		
144	3474	1.03	1.41	-2.09	1.46	4.73	28.7
148	3559	0.99	1.48	-2.23	1.46		
152	3644	0.96	1.38	-2.41	1.29	4.77	28.1
156	3729	1.11	1.46				

160	3814	1.08	1.48	-2.16	1.47	4.85	28.3
164	3910	1.13	1.51	-2.07	1.51		
168	4006	1.02	1.48	-2.26	1.65	4.83	28.3
172	4102	1.14	1.46	-2.20	1.32		
176	4198	1.10	1.47	-2.10	1.39	4.49	27.4
180	4294	1.06	1.39	-2.21	1.46		
184	4390	1.11	1.41	-2.17	1.58	4.90	28.4
188	4486	1.17	1.32	-2.27	1.14		
192	4582			-2.35	1.48	4.59	27.7
196	4678	1.05	1.50	-2.15	1.54		
200	4774	1.22	1.49	-2.21	1.40	4.88	28.4
204	4870	1.14	1.45	-2.17	1.60		
208	4966			-2.16	1.61	4.67	27.9
212	5062	1.03	1.45	-2.13	1.01		
216	5158	1.09	1.50	-2.22	1.24	4.73	28.0
220	5254	1.07	1.44	-2.00	1.30		
224	5350	1.00	1.46	-1.98	1.42	4.59	27.7
228	5446	1.11	1.43	-2.06	1.44		
232	5542	1.07	1.41	-2.09	1.42	4.66	27.9
236	5638	1.11	1.48	-2.02	1.15		
240	5734	1.09	1.42	-2.06	1.30	4.81	28.2
244	5830	1.08	1.40	-2.07	1.49		
248	5926	1.10	1.30	-2.29	1.23	5.04	28.7
252	6022	1.14	1.43	-2.14	1.12		
256	6118	0.99	1.32	-2.17	1.34	4.93	28.5
260	6214	0.97	1.34	-1.99	1.39		
264	6310	1.10	1.37	-2.18	1.36	4.51	27.5
268	6406	1.01	1.45	-2.26	1.23		
272	6505	1.06	1.44	-2.23	1.26	4.57	27.6
276	6685	1.03	1.41	-2.23	1.18	4.38	27.2
280	6865	1.08	1.33	-2.18	1.29	4.65	27.8
284	7045	1.07	1.43	-2.31	1.36		
288	7225	1.13	1.40	-2.29	1.40	4.33	27.0
292	7405	1.08	1.36	-2.22	1.43		
296	7585	1.09	1.34	-2.14	1.48	4.93	28.5
300	7765	1.10	1.31	-2.39	1.08		
304	7945	1.16	1.29	-2.02	1.28	4.77	28.1
308	8128	1.16	1.26	-1.99	1.35	4.72	28.3
312	8186	1.25	1.30	-1.92	0.98	4.85	28.3
316	8244	1.27	1.23	-1.95	1.12	4.82	28.2
320	8302	1.33	1.16	-2.06	0.94	4.66	27.8
324	8360	1.28	1.17	-1.83	0.86	4.77	28.1
328	8418	1.22	1.13	-1.85	0.75	4.50	27.5
332	8476	1.20	1.12	-1.78	0.57	4.56	27.6
336	8534			-2.13	1.07	4.75	28.1
340	8592	1.30	1.12	-2.00	0.81	4.56	27.6
344	8645	1.27	1.20	-2.01	1.04	4.89	28.4

348	8744	1.31	1.15				
352	8843	1.19	1.19	-1.95	0.89	4.44	27.3
356	8942	1.28	1.21				
361	9041	1.28	1.15	-1.81	0.89	4.56	27.6
364	9140						
368	9239	1.25	1.07	-1.87	1.03	4.83	28.2
372	9338	1.29	1.16				
376	9437			-1.85	1.08	4.65	27.8
380	9536	1.36	1.19				
384	9635	1.33	1.12	-1.76	0.82	4.80	28.2
388	9734						
392	9833	1.36		-1.91	0.90	4.38	27.2
396	9932						
400	10031	1.32	1.17	-1.91	1.02	4.64	27.8
404	10130	1.30	1.04				
408	10229			-1.87	0.92	4.66	27.9
412	10328						
416	10427			-2.08	0.59	4.84	28.3
420	10526	1.35	1.09	-1.91	0.64		
424	10697	1.39	0.95	-1.56	0.87	4.90	28.4
428	10868	1.30	0.98	-1.87	0.77	4.61	27.7
432	11039	1.40	1.02	-1.78	0.93	4.70	27.9
436	11210	1.46	1.02	-1.60	0.72	4.74	28.1
440	11381	1.49	1.00	-1.70	0.69	4.68	27.9
444	11552	1.55	1.10	-1.63	0.95	4.76	28.1
448	11922	1.56	1.12	-1.37	0.97	4.58	27.7
452	12292	1.66	1.15	-0.98	0.83	4.51	27.5
456	12662	1.71	1.16	-1.21	0.89	4.36	27.1
461	13032	1.76	1.21	-1.36	0.89	4.19	26.7
464	13463	1.84	1.21	-1.29	0.88	4.29	26.9
468	13895	1.86	1.16	-1.24	0.88	4.21	26.7
472	14442	1.89	1.15	-1.09	0.79	4.37	27.1
476	14989	1.96	1.13	-0.94	0.92	4.45	27.3
480	15536	1.91	1.16	-0.90	0.95	4.32	27.0
484	16083	1.99	1.15	-0.88	0.95	4.36	27.1
488	16626	2.20	1.27	-0.60	0.88		
492	17149	2.29	1.29	-0.47	1.02	4.07	26.4
496	17672	2.44	1.46	-0.35	0.85		
500	18195	2.45	1.40	-0.56	0.82	3.70	25.3
504	18201	2.49	1.48	-0.24	0.84		
508	19472	2.52	1.47	-0.40	1.15	3.82	25.7
512	20743	2.32	1.53	-0.67	1.02	3.63	25.1
516	22014	2.48	1.47	-0.63	0.70	3.97	26.1
520	23285	2.46	1.52	-0.84	1.11	3.95	26.0
524	24558	2.51	1.35	-0.57	1.04	3.69	25.3
528	25744	2.64	1.37	-0.63	0.91	3.88	25.8
532	26930	2.47	1.50	-0.54	1.21	3.97	26.1

536	28116	2.43	1.58	-0.51	0.99	3.78	25.5
540	29302	2.54	1.51	-0.66	1.11	4.04	26.1
544	30488	2.51	1.55	-0.74	1.08	3.78	25.5
548	31674	2.29	1.56	-0.92	1.04	3.81	25.6
552	32860	2.28	1.49				
556	34046	2.20	1.45	-1.06	1.18	3.87	25.8
560	35232	2.34	1.53	-0.95	0.91	3.83	25.7
564	36418	2.06	1.43	-0.91	1.04	3.82	25.6
568	37604	2.03	1.33	-1.14	1.01		
572	38790					3.82	25.6

References

Anand, P., Elderfield, H., and Conte, M. H.: Calibration of Mg/Ca thermometry in planktonic foraminifera from a sediment trap time series, Paleoceanography, 18, PA1050, doi:10.1029/2002PA000846, 2003.

Dekens, P. S., Lea, D. W., Pak, D. K., and Spero, H. J.: Core top calibration of Mg/Ca in tropical foraminifera: Refining paleotemperature estimation, Geochem. Geophys. Geosyst, 3, 1022, 2002.

Savoye, B., Ridderinkhof, H., Pätzold, J., and Schneider, R.: Western Indian Ocean Climate and Sedimentation - Cruise No. M75 - December 29, 2007 – April 08, 2008 - Port Louis (Mauritius) - Cape Town (South Africa), METEOR Berichte,196, 2013.

Southon, J., Kashgarian, M., Fontugne, M., Metivier, B., and Yim, W. W. S.: Marine Reservoir Corrections for the Indian Ocean and Southeast Asia, Radiocarbon, 44, 167-180, 2002.

Stuiver, M., Reimer, P.J., Reimer, R.W., CALIB 5.0. (WWW program and documentation), 2005.