Appendix DR1. Description of data sources and methods, Table DR1, Figures DR1-DR14

The carbonate compensation depth in the South Atlantic Ocean since the Late Cretaceous

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DATA SOURCES AND METHODS

DSDP and ODP data, such as lithologies, carbonate contents, and bulk densities for this project were extracted from DSDP and ODP drill site reports (see reference list in this document) via <http://deepseadrilling.org> and <http://www-odp.tamu.edu/> (accessed February–July 2020), and the LIMS database (<http://web.iodp.tamu.edu/LORE/>, accessed February–July 2020). Age-depth relationships were taken from the Neptune Sandbox Berlin (NSB) database (<http://nsb-mfn-berlin.de/>, accessed February–July 2020).

For three drill sites on continental crust (Table DR1), we use a rift-end age of 120 Ma for the Falkland Plateau (Jones et al., 2004), and 100 Ma for the Angola Continental Margin (Heine et al., 2013).

Table DR1. DSDP and ODP drill sites used in this study.

Site name	Long. (°)	Lat (°)	Locality	Water depth (m)	Sediment thickness penetrated (m)*	Oceanic basement age (Ma)†	Basement reached	Age model
DSDP 14-144	-54.3420	9.4530	Demerara Rise	2957	327	95	No	EGI
DSDP 36-327A	-46.7837	-50.8713	Falkland Plateau	2400	469.5	—	No	NSB
DSDP 36-328	-36.6588	-49.8112	Malvinas Outer Basin	5095	397	114	No	EGI
DSDP 39-354	-44.1963	5.8992	Ceara Rise	4045	900	71	No	NSB
DSDP 39-355	-30.6005	-15.7098	Brazil Basin	4901	461.5	79	Yes	NSB
DSDP 39-356	-41.0880	-28.2870	Sao Paolo Plateau	3175	741	107	No	NSB
DSDP 39-357	-35.5598	-30.0042	Rio Grande Rise	2086	797	93	No	NSB
DSDP 40-361	15.4485	-35.0662	Cape Basin	4549	1314	125	No	EGI
DSDP 40-362	10.5325	-19.7575	Walvis Ridge	1325	1081	118	No	NSB
DSDP 40-363	9.0467	-19.6458	Walvis Ridge	2248	715	111	No	EGI
DSDP 40-364	11.9717	-11.5720	Angola Continental Margin	2448	1086	—	No	EGI
DSDP 41-366/366A	-19.8513	5.6780	Sierra Leone Rise	2853	850.5	78	No	NSB
DSDP 71-511	-46.9717	-51.0047	Falkland Plateau	2589	632	—	No	EGI
DSDP 71-513A	-24.6400	-47.5832	Mid-Atlantic Ridge	4373	380.5	34	Yes	NSB
DSDP 71-514	-26.8550	-46.0462	Mid-Atlantic Ridge	4318	150.8	36	No	NSB
DSDP 72-516/516F	-35.2852	-30.2763	Rio Grande Plateau	1313	1270.6	92	Yes	EGI
DSDP 72-517	-38.0412	-30.9468	southwestern Atlantic	2963	50.9	97	No	NSB
DSDP 73-519	-11.6662	-26.1367	Mid-Atlantic Ridge	3769	151.6	12	Yes	NSB

DSDP 73-522	-5.1297	-26.1140	Mid-Atlantic Ridge	4441	146.7	35	No	NSB
DSDP 73-524	3.5123	-29.4842	Walvis Ridge region	4796	348.5	91	No	NSB
DSDP 74-525A	2.9853	-29.0707	Walvis Ridge	2467	574.6	87	Yes	NSB
ODP 108-664D	-23.2275	0.1073	central equatorial Atlantic	3801.7	296.8	10	No	NSB
ODP 114-699A	-30.6770	-51.5420	Northeast Georgia Rise	3705.5	518.1	87	No	NSB
ODP 114-700B	-30.2781	-51.5330	Georgia Basin	3601	489	82	No	NSB
ODP 114-704B	7.4205	-46.8800	Meteor Rise	2532.3	671.7	66	No	NSB
ODP 154-925A	-43.4889	4.2042	Ceara Rise	3042.2	930.4	76	No	NSB
ODP 154-927A	-44.4805	5.4627	Ceara Rise	3313.7	312.5	72	No	NSB
ODP 154-929A/929E	-43.7399	5.9762	Ceara Rise	4356.1	808.9	69	No	NSB
ODP 159-960C	-2.7332	3.5839	Cote d'Ivoire-Ghana Marginal Ridge	2034.9	352.8	98	No	EGI
ODP 159-961A	-3.0586	3.4424	Cote d'Ivoire-Ghana Marginal Ridge	3292	308.7	97	No	NSB
ODP 177-1088B/1088C	13.5628	-41.1361	Agulhas Ridge	2081.2	233.4	105	No	NSB
ODP 177-1089B	9.8941	-40.9364	Agulhas Ridge	4623.8	264.9	98	No	NSB
ODP 177-1090B	8.8997	-42.9137	Agulhas Ridge	3699.4	397.5	87	No	NSB
ODP 177-1091A	5.9187	-47.0947	Meteor Rise	4360.5	310.9	53	No	NSB
ODP 177-1092A	7.0799	-46.4118	Agulhas Basin	1976.3	188.5	67	No	NSB
ODP 177-1093A/1093B	5.8654	-49.9766	north of Shona Ridge	3623.9	597.7	43	No	NSB
ODP 177-1094A	5.1304	-53.1802	Bouvet Fracture Zone region	2807.6	158.6	23	No	NSB
ODP 207-1258A	-54.7333	9.4333	Demerara Rise	3192.2	447.5	98	No	EGI
ODP 207-1260A	-54.5439	9.2658	Demerara Rise	2548.8	491.9	98	No	NSB
ODP 208-1262B	1.5770	-27.1858	Angola Basin	4753.6	209.9	70	No	NSB
ODP 208-1263A	2.7795	-28.5328	Walvis Ridge	2717.1	345.6	86	No	NSB
ODP 208-1264A	2.8455	-28.5327	Walvis Ridge	2507	280.7	86	No	NSB
ODP 208-1265A	2.6393	-28.8350	Walvis Ridge	3059.8	321	86	No	NSB
ODP 208-1266A/1266C	2.3435	-28.5423	Walvis Ridge	3796.6	334.2	84	No	NSB
ODP 208-1267B	1.7110	-28.0982	Angola Basin	4355.1	329	70	No	NSB

*based on deepest hole used; †from Müller et al. (2016)

Fig. DR1. Dry bulk density (DBD) vs wet bulk density (WBD) relationship based on coupled measurements from sites used in this study. This relationship was used to compute the dry bulk density for a small number of samples for which only the wet bulk density was available.

Fig. DR2. Compacted vs decompacted sedimentation rate.

Fig. DR5. Backtracking of drill sites for the southern South Atlantic region with carbonate accumulation rates (CARs) based on decompacted sedimentation rates are shown as colored dots. The curves include the effects of eustasy and the M7 dynamic topography model of Müller et al. (2018).

Fig. DR6. Dynamic topography at 0 Ma in a mantle reference frame based on model M7 of Müller et al. (2018) showing the location of ocean drill sites used in this study. Thick black line denotes mid-ocean ridges, thin black line denotes coastlines, and gray line denotes continent-ocean boundaries. Mercator projection.

Fig. DR7. Dynamic topography at 19 Ma in a mantle reference frame based on model M7 of Müller et al. (2018) showing the location of ocean drill sites used in this study. The drill sites have been reconstructed using the plate model of (Müller et al., 2016). Thick black line denotes mid-ocean ridges, thin black line denotes coastlines, and gray line denotes continent-ocean boundaries. Mercator projection.

Fig. DR8. Dynamic topography at 39 Ma in a mantle reference frame based on model M7 of Müller et al. (2018) showing the location of ocean drill sites used in this study. The drill sites have been reconstructed using the plate model of (Müller et al., 2016). Thick black line denotes mid-ocean ridges, thin black line denotes coastlines, and gray line denotes continent-ocean boundaries. Mercator projection.

Fig. DR9. Dynamic topography at 59 Ma in a mantle reference frame based on model M7 of Müller et al. (2018) showing the location of ocean drill sites used in this study. The drill sites have been reconstructed using the plate model of (Müller et al., 2016). Thick black line denotes mid-ocean ridges, thin black line denotes coastlines, and gray line denotes continent-ocean boundaries. Mercator projection.

Fig. DR10. Dynamic topography at 79 Ma in a mantle reference frame based on model M7 of Müller et al. (2018) showing the location of ocean drill sites used in this study. The drill sites have been reconstructed using the plate model of (Müller et al., 2016). Thick black line denotes mid-ocean ridges, thin black line denotes coastlines, and gray line denotes continent-ocean boundaries. Mercator projection.

Fig. DR11. Change in dynamic topography at individual northern South Atlantic ocean drill sites using the M7 model of Müller et al. (2018), computed in a fixed plate reference frame, capturing the tectonic motion of sites relative to the mantle as well as the effects of mantle convection on surface topography.

Fig. DR12. Change in dynamic topography at individual central South Atlantic ocean drill sites using the M7 model of Müller et al. (2018), computed in a fixed plate reference frame, capturing the tectonic motion of sites relative to the mantle as well as the effects of mantle convection on surface topography.

Fig. DR12. Change in dynamic topography at individual southern South Atlantic ocean drill sites using the M7 model of Müller et al. (2018), computed in a fixed plate reference frame, capturing the tectonic motion of sites relative to the mantle as well as the effects of mantle convection on surface topography.

Fig. DR13. CCD model for the central South Atlantic showing 95% confidence intervals. The relative sparsity of the central South Atlantic stratigraphic data set, both in in space and time, results in some CCD reconstruction times with much larger uncertainties than others. For two time periods, between 65–58 Ma and 42–35 Ma, we do not have a sufficient number of data points to constrain the regression analysis used to determine the CCD for this region. See Fig. 1 for location of drill sites used in the analysis and Figs DR4 and DR11 for backtracking details.

Fig. DR14. CCD model for the equatorial South Atlantic showing 95% confidence intervals. We do not have a sufficient number of data points to constrain the regression analysis used to determine the CCD for the entire time from 74 Ma to 1 Ma. See Fig. 1 for location of drill sites used in the analysis and Figs DR4 and DR11 for backtracking details.

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