Supplement Material

Here enclosed we provide the compilation of U-series age data used to establish coral age frequencies given in Figures 2a,b, and Figure DR2 for reef framework-forming corals (*L. pertusa* and *M. oculata*) from similar depth ranges within the northeast Atlantic and the Mediterranean Sea as shown in Figure A4. We further provide detailed data tables and a figure on the initial U-isotopic composition of cold-water corals (Figure A1). In addition we supply two characteristic photos taken on a) northern most coral reefs and b) on coral graveyards of the Temperate east Atlantic (Figure DR3)

Methodology:

The aragonite skeleton of scleractinian cold-water corals can be accurately dated by means of AMS ^{14}C and mass spectrometric $^{230}Th/U$ dating (Adkins et al., 1998Cheng, 2000 #676). Here, we have applied a recently developed rapid age screening technology for $^{230}Th/U$ dating of cold water corals (Douville et al., 2010). All fossil coral fragments used for ICPMS – U-series dating have been rigorously cleaned according to the previously published procedures (Douville et al., 2010). Coral age data was measured and compiled from 11 coral reef like settings in the north-east Atlantic and numerous further coral sites were fossil framework forming corals had been collected using dredges and ROV's (Figure 1a). The data is provided throughout Tables DR1 and DR2. The total number of U-series ages for the NEA is 160.

Within the temperate Atlantic, four reef settings have been investigated in Gulf of Cadiz (Renard Ridge off Morocco) and further south in the Banda mound province off Mauritania (Table DR3). Numerous ages have been measured and compiled from dredge collections from the Bay of Biscay, the Galicia Bank, and exposed coral patches of seamount settings, including further ages measured on mound settings off Morocco (Table DR4). The total number of ages for is 122.

Finally, coral ages are provided for settings in the eastern Mediterranean off Menorca and the Strait of Gibraltar including 31 recently published U-series ages of framework forming species (McCulloch et al., 2010) (Table DR5). The total number of ages from the Mediterranean Sea amounts to 42. Thus, overall 160 ages are given for the NEA and 164 ages for the temperate Atlantic (n= 324). U-series dating of corals from all regions has been achieved using the recently developed ICP-QMS technology published by Douville et al. (Chemical Geology 2010) or using the former TIMS technology published by Frank et al. (Frank et al., 2004). All other ages are compiled from publications cited underneath the data tables.

All selected corals indicated very minor physico-chemical alteration or dissolution which may disturb U-series and radiocarbon ages. Absence of strong U-series system opening is confirmed by the initial U-isotopic composition of all samples shown in Figure A1. More than 90% of the reconstructed $\delta^{234}U_0$ values are within a narrow band of ±10‰ compared to modern seawater (Figure A1). In addition, non-carbonate contribution of ^{230}Th as indicated by the presence of ^{232}Th is in >90% of the age estimates negligible. In cases, data has been corrected for either residual detritus Th or seawater Th contribution using the approaches of Frank et al. 2004 (EPSL). Overall we consider the ages reliable and accurate. Please note that the initial U-isotopic composition of cold-water corals reveal, within the limited range of variability, systematic variations throughout the past 100,000 years. During this time interval U-series system opening seems rather negligible and thus U-isotopic variations may reflect changes of seawater U-isotopic composition as proposed by (Esat and Yokoyama, 2006). This aspect of the data is subject to a publication in preparation by Norbert Frank, Eric Douville and Eline Salle at LSCE. For the frequency record in Figure 2 we used solely ages from the past 100,000 years at 2,500 years time steps were in particular in the TEA a significant number of measurements exist. The number N of ages was multiplied by a factor of 10 reflecting a minimum estimate of coeval coral species based on the large amount of coral fragments at similar depth within the selected sediment cores sections and dredge collections. In Figure A4 we present the coral age to water depth relationship to highlight that no significant depth – age pattern is shown in the data. All sites are related to the mean habitat depth of modern coral occurrences and minor depth deviations visible beyond 100,000 years age most likely reflect the decline number of studied sites from coral reef settings.

SST, IRD and productivity reconstructions shown in Figure 2 are based on sediment core records for which we provide detailed references here: (1) GIK23414/5-9 (Didié and Bauch, 2000; Weinelt et al., 2003), (2) SU81-18 (Bard et al., 2000), (3) D11957 (Lebreiro et al., 1997), (4) GIK15637-1 (Kiefer, 1998).

Table DR1: Summary of U-series and radiocarbon ages for northeast Atlantic framework corals on mounds (Porcupine Seabight and Rockall Bank). This data is partly published in (de Haas et al., 2009) and is discussed in detail by (Frank et al., 2009) and (Douville et al., 2010). Lp – *Lophelia pertusa*; Mo – *Madrepora oculata*; M – Mound setting, S – Surface sampling (Dredge/ROV)

Coral ID (SedCore/depth)	Sp.	M/S	Age [years]	$\delta^{234}U_0$ [‰]	^{232}Th [ppb]	Dating Tool / Laboratory	Depth in core [cm]	Reference
MD01-2454 liv P1	Lp	M	17.5 ±6	144.77 ±4.01	0.058 ±0.001	TIMS / Gif-sur-Yvette	0	Frank et al. 2010
MD01-2454 liv P2	Lp	M	15 ±15	149.08 ±3.56	1.202 ±0.012	TIMS / Gif-sur-Yvette	0	Frank et al. 2010
MD01-2454 TopA	Lp	M	83 ±32	146.20 ±6.10	0.405 ±0.024	TIMS / Gif-sur-Yvette	0	Frank et al. 2010
MD01-2454 Top	Lp	M	360 ±140	142.00 ±3.00	3.050 ±0.031	TIMS / Gif-sur-Yvette	0	Frank et al. 2010
MD01-2454 6-7cm	Lp	M	680 ±140	145.60 ±4.00	2.685 ±0.015	TIMS / Gif-sur-Yvette	6.5	Frank et al. 2010
MD01 2454G 7-9cm	Lp	M	890.5 ±89	148.64 ±5.30	1.400 ±0.016	TIMS / Gif-sur-Yvette	8	Frank et al. 2010
MD01 2454G 13-16cm	Lp	M	750 ±70	151.60 ±2.50	1.000 ±0.004	TIMS / Gif-sur-Yvette	14.5	Frank et al. 2010
MD01 2454G 20-22cm	Lp	M	1128 ±81	142.27 ±5.27	2.389 ±0.006	TIMS / Gif-sur-Yvette	21	Frank et al. 2010
MD01-2454G-31	Lp	M	1456 ±100	145.72 ±2.07	3.539 ±0.012	TIMS / Gif-sur-Yvette	31	Frank et al. 2010
MD01-2454G-36-38cm	Lp	M	2460 ±80	146.30 ±4.10	0.971 ±0.004	TIMS / Gif-sur-Yvette	37	Frank et al. 2010
MD01-2454G-40-42cm	Lp	M	2270 ±82	140.50 ±4.30	0.673 ±0.004	TIMS / Gif-sur-Yvette	41	Frank et al. 2010
MD01-2454G-42-45cm	Lp	M	2750 ±125	148.00 ±4.40	1.014 ±0.006	TIMS / Gif-sur-Yvette	43.5	Frank et al. 2010
MD01-2454 50-52cm (14C)	Lp	M	2370 ±110	calibrated 14C age (R=450yr)		TIMS / Gif-sur-Yvette	51	Frank et al. 2010
MD01-2454G 60-62cm	Lp	M	2560 ±130	148.77 ±4.70	0.384 ±0.012	TIMS / Gif-sur-Yvette	61	Frank et al. 2010
MD01-2454 70-72cm top (14C)	Lp	M	2460 ±110	calibrated 14C age (R=450yr)		TIMS / Gif-sur-Yvette	71	Frank et al. 2010
MD01-2454G 85-86c578	Lp	M	3350 ±300	155.41 ±3.15	7.106 ±0.014	TIMS / Gif-sur-Yvette	85.5	Frank et al. 2010
MD01-2454G 90cm	Lp	M	3190 ±230	145.88 ±4.28	5.680 ±0.011	TIMS / Gif-sur-Yvette	90	Frank et al. 2010
MD01 2454G 100cm	Lp	M	3522.75 ±91	142.07 ±4.03	1.737 ±0.005	TIMS / Gif-sur-Yvette	100	Frank et al. 2010
MD01 2454G 100cm dup.	Lp	M	3509.5 ±91	146.21 ±2.89	1.737 ±0.005	TIMS / Gif-sur-Yvette	100	Frank et al. 2010
MD01 2454G 113-117cm	Lp	M	3600 ±130	149.35 ±4.64	2.878 ±0.012	TIMS / Gif-sur-Yvette	115	Frank et al. 2010
MD01-2454G-121	Lp	M	3830.5 ±27	147.88 ±2.20	0.142 ±0.001	TIMS / Gif-sur-Yvette	121	Frank et al. 2010
MD01 2454G 138-140cm	Lp	M	4975.75 ±78	143.24 ±3.13	0.761 ±0.003	TIMS / Gif-sur-Yvette	139	Frank et al. 2010
MD01 2454G 138-140cm dub.	Lp	M	4960.5 ±77	146.21 ±2.79	0.761 ±0.003	TIMS / Gif-sur-Yvette	139	Frank et al. 2010
MD01-2454G 143-145	Lp	M	4868.5 ±42	153.73 ±2.92	0.632 ±0.001	TIMS / Gif-sur-Yvette	144	Frank et al. 2010
MD01-2454 150	Lp	M	5039.5 ±61	147.80 ±3.14	0.669 ±0.001	TIMS / Gif-sur-Yvette	150	Frank et al. 2010
MD01-2454G 160-168cm top	Lp	M	5270 ±110	148.85 ±2.61	0.276 ±0.006	TIMS / Gif-sur-Yvette	164	Frank et al. 2010
MD01-2454G 175-180cm	Lp	M	5670 ±38	146.45 ±2.91	0.360 ±0.001	TIMS / Gif-sur-Yvette	177.5	Frank et al. 2010
MD01-2454G 189cm	Lp	M	6080 ±150	152.61 ±3.61	0.534 ±0.002	TIMS / Gif-sur-Yvette	189	Frank et al. 2010
MD01-2454G 192-194cm	Lp	M	5620 ±240	147.70 ±4.84	6.805 ±0.011	TIMS / Gif-sur-Yvette	193	Frank et al. 2010
MD01-2454G 204-205cm	Lp	M	6990 ±210	146.60 ±3.53	0.920 ±0.022	TIMS / Gif-sur-Yvette	204.5	Frank et al. 2010
MD01-2454G 204-205-1 cm	Lp	M	6690 ±160	150.64 ±3.38	0.856 ±0.007	TIMS / Gif-sur-Yvette	204.5	Frank et al. 2010
MD01-2454G 210-217cm	Lp	M	7679 ±72	154.07 ±4.70	0.833 ±0.002	TIMS / Gif-sur-Yvette	213.5	Frank et al. 2010
MD01-2454G 220cm	Lp	M	7730 ±230	150.68 ±4.13	2.741 ±0.013	TIMS / Gif-sur-Yvette	220	Frank et al. 2010
MD01-2454G 225-227cm	Lp	M	8430 ±200	147.11 ±3.92	2.052 ±0.007	TIMS / Gif-sur-Yvette	226	Frank et al. 2010
MD01-2454 273	Lp	M	9400 ±160	148.55 ±3.18	3.719 ±0.007	TIMS / Gif-sur-Yvette	273	Frank et al. 2010
MD01-2454 core cutter 1	Lp	M	10880 ±340	148.41 ±3.31	5.861 ±0.018	TIMS / Gif-sur-Yvette	273	Frank et al. 2010
MD01-2459G top	Lp	M	4367.75 ±95	151.38 ±6.75	0.402 ±0.002	TIMS / Gif-sur-Yvette	0	Frank et al. 2010
MD01-2459G 46-53cm top	Lp	M	7540 ±180	147.41 ±4.11	0.259 ±0.001	TIMS / Gif-sur-Yvette	49.5	Frank et al. 2010
MD01-2459G 94-99cm (14C)	Lp	M	8534.5 ±84	calibrated 14C age (R=450yr)		AMS-Artemis / Saclay	96.5	Frank et al. 2010
MD01 2459G 110-114 cm	Lp	M	8760 ±190	150.37 ±13.81	0.740 ±0.002	TIMS / Gif-sur-Yvette	112	Frank et al. 2010
MD01-2459G 130-140cm top (14C)	Lp	M	8600 ±95	calibrated 14C age (R=450yr)		AMS-Artemis / Saclay	135	Frank et al. 2010
MD01-2459 150	Lp	M	8520 ±100	152.03 ±3.06	1.763 ±0.003	TIMS / Gif-sur-Yvette	150	Frank et al. 2010
MD01-2459G 157-165cm top (14C)	Lp	M	8550 ±100	calibrated 14C age (R=450yr)		AMS-Artemis / Saclay	161	Frank et al. 2010
MD01 2459G 201-208cm	Lp	M	8920 ±170	148.42 ±5.40	0.274 ±0.002	TIMS / Gif-sur-Yvette	204.5	Frank et al. 2010
MD01-2459 300	Lp	M	9290 ±210	147.33 ±2.35	4.337 ±0.006	TIMS / Gif-sur-Yvette	300	Frank et al. 2010
MD01-2459 450	Lp	M	9742.25 ±74	148.13 ±3.06	0.080 ±0.000	TIMS / Gif-sur-Yvette	450	Frank et al. 2010
MD01-2455G top	Mo	M	187 ±32	144.00 ±11.00	0.600 ±0.006	TIMS / Gif-sur-Yvette	0	Frank et al. 2010
MD01-2455G 0-5cm	Mo	M	240 ±120	150.40 ±4.20	2.670 ±0.032	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G 7-8cm	Mo	M	200 ±200	147.20 ±5.40	8.534 ±0.014	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G 20	Mo	M	680 ±250	150.18 ±3.89	6.484 ±0.013	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G 45-46	Mo	M	2880 ±220	149.16 ±5.31	3.866 ±0.015	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G 70	Mo	M	10670 ±460	144.93 ±4.41	8.864 ±0.017	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G 91	Mo	M	9370 ±220	143.79 ±4.62	3.362 ±0.005	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G 126-127	Mo	M	11270 ±170	143.58 ±3.65	3.568 ±0.007	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G 150	Mo	M	10270 ±320	148.28 ±3.07	7.734 ±0.015	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G 155-157	Mo	M	10650 ±230	147.71 ±4.03	0.681 ±0.002	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G 166-167	Mo	M	2240 ±68	144.31 ±3.46	0.647 ±0.001	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G 193	Mo	M	5420 ±140	151.04 ±6.07	0.133 ±0.004	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2455G cc 1	Mo	M	7979.5 ±280	149.33 ±3.52	3.585 ±0.020	TIMS / Gif-sur-Yvette	2.5	Frank et al. 2010
MD01-2463G top	Lp	M	260.75 ±33	148.13 ±9.52	0.800 ±0.010	TIMS / Gif-sur-Yvette	0	Frank et al. 2010
MD01-2463G 10cm (14C)	Lp	M	851 ±99	calibrated 14C age (R=450yr)		AMS-Tandetron / Gif-sur-Yvette	10	Frank et al. 2010
MD01-2463G 100cm (14C)	Lp	M	6811 ±88	calibrated 14C age (R=450yr)		AMS-Tandetron / Gif-sur-Yvette	100	Frank et al. 2010
MD01-2463G 139-142cm	Lp	M	9810 ±220	154.49 ±2.37	3.583 ±0.010	TIMS / Gif-sur-Yvette	140.5	Frank et al. 2010
MD01-2463G 178-179cm	Lp	M	9700 ±350	154.01 ±2.72	9.451 ±0.014	TIMS / Gif-sur-Yvette	178.5	Frank et al. 2010
MD01 2363G 242/246cm	Lp	M	221090 ±8500	161.83 ±4.83	11.178 ±0.034	ICP-QMS / Gif-sur-Yvette	244	this study
MD01 2363G 274/280cm	Lp	M	221100 ±13000	162.51 ±3.74	7.614 ±0.032	ICP-QMS / Gif-sur-Yvette	276	this study
MD01 2363G 301/308cm	Lp	M	220000 ±7800	150.84 ±4.56	0.545 ±0.002	ICP-QMS / Gif-sur-Yvette	303.5	this study
MD01 2363G 356/358cm	Lp	M	247000 ±13000	151.51 ±6.03	1.175 ±0.003	ICP-QMS / Gif-sur-Yvette	357	this study
MD01 2363G 363/366cm	Lp	M	255000 ±25000	150.35 ±7.55	19.475 ±0.106	ICP-QMS / Gif-sur-Yvette	364.5	this study
MD01 2363G 390cm	Lp	M	243000 ±11000	148.50 ±4.68	48.542 ±0.134	ICP-QMS / Gif-sur-Yvette	390	this study
MD01 2363G 450cm	Lp	M	264000 ±16000	175.30 ±5.37	10.021 ±0.031	ICP-QMS / Gif-sur-Yvette	450	this study
MD01 2363G 515/517 cm	Lp	M	366000 ±36000	200.44 ±5.16	17.679 ±0.046	ICP-QMS / Gif-sur-Yvette	516	this study
MD01 2363G 600cm	Lp	M	340000 ±33000	165.30 ±4.96	38.105 ±0.088	ICP-QMS / Gif-sur-Yvette	600	this study
MD01 2363G 750cm	Lp	M	338000 ±35000	154.93 ±6.78	0.738 ±0.003	ICP-QMS / Gif-sur-Yvette	750	this study
MD01 2363G 900cm	Lp	M	324000 ±25400	144.18 ±4.61	6.942 ±0.024	ICP-QMS / Gif-sur-Yvette	900	this study
MD01 2363G 1075cm	Lp	M	554000 ±160000	191.16 ±4.45	1.225 ±0.005	ICP-QMS / Gif-sur-Yvette	1075	this study
MD01-2451G 6cm	Lp	M	3230 ±110	145.18 ±2.79	0.391 ±0.005	TIMS / Gif-sur-Yvette	6	Frank et al. 2010
MD01-2451G 27cm	Lp	M	6110 ±150	147.24 ±3.83	0.341 ±0.004	TIMS / Gif-sur-Yvette	27	Frank et al. 2010
MD01-2451G 31cm	Lp	M	6520 ±140	154.07 ±2.88	1.610 ±0.006	TIMS / Gif-sur-Yvette	31	Frank et al. 2010
MD01-2451G 223cm	Lp	M	78790 ±490	140.33 ±2.93	3.791 ±0.011	TIMS / Gif-sur-Yvette	223	Frank et al. 2010
MD01-2451G 248cm	Lp	M	109200 ±770	152.38 ±4.39	0.392 ±0.009	TIMS / Gif-sur-Yvette	248	Frank et al. 2010
MD01-2451G 326cm	Lp	M	189000 ±2300	160.74 ±4.58	0.595 ±0.027	TIMS / Gif-sur-Yvette	326	Frank et al. 2010
MD01-2451G 407cm	Lp	M	230400 ±2900	190.69 ±10.03	1.153 ±0.005	TIMS / Gif-sur-Yvette	407	Frank et al. 2010
MD01-2451G 326cm	Lp	M	183400 ±4900	148.00 ±10.00	Uex = 1.018	TIMS / Gif-sur-Yvette	326	Frank et al. 2010
MD01-2451G 407cm	Lp	M	211000 ±10000	148.00 ±10.03	Uex = 1.05	TIMS / Gif-sur-Yvette	407	Frank et al. 2010

Table DR2: U-series and radiocarbon ages for the northeast Atlantic reef framework corals. Data sources: ENAM (Frank et al., 2005; Frank et al., 2004), GeoB 6729-1 (Dorschel et al., 2005), 2709-2740 (Schröder-Ritzrau et al., 2005); GeoB 9213-1 and GeoB 9214-1 (Eisele et al., 2008) plus additional new ICPMS data; M2001-41BX (de Haas et al., 2009); M03-23 (Mienis et al., 2009). BoNo (Lindberg and Mieniert, 2005); Sula Ridge radiocarbon data provided by Paal Mortensen (Hovland and Mortensen, 1999); POS325-472 – López-Correa this study. Lp – *Lophelia pertusa*; Mo – *Madrepora oculata*; M – Mound setting, S – Surface sampling (Dredge/ROV)

Coral ID (SedCore/depth)	Sp.	M/S	Age [years]	$\delta^{234}U_0$ [‰]	^{232}Th [ppb]	Dating Tool / Laboratory	Depth in core [cm]	Reference
ENAM 9915BX 0-top	Lp	M	5 ±6	146.60 ±4.00	0.173 ±0.002	TIMS / Gif-sur-Yvette	0	Frank et al. 2004
ENAM 9915BX 20 -Top	Lp	M	31 ±12	146.00 ±3.40	0.238 ±0.002	TIMS / Gif-sur-Yvette	20	Frank et al. 2004
ENAM 9915BX 50 - Top	Lp	M	746 ±22	146.20 ±3.00	0.483 ±0.005	TIMS / Gif-sur-Yvette	50	Frank et al. 2004
ENAM 9910	Mo	S	643 ±22	145.30 ±3.30	0.523 ±0.005	TIMS / Gif-sur-Yvette	0	Frank et al. 2004
ENAM 9928	Mo	S	10480 ±140	146.70 ±3.50	0.352 ±0.004	TIMS / Gif-sur-Yvette	0	Frank et al. 2004
GEOB6729-1	Lp	M	53100 ±510	131.20 ±3.00		MC-ICPMS/Kiel	0	Schröder-Ritzrau et al. 2005
2419	Lp	S	460 ±60	146.60 ±3.40	1.590 ±0.028	TIMS / Heidelberg	0	Schröder-Ritzrau et al. 2005
2420	Lp	S	1050 ±190	148.30 ±3.50	17.100 ±0.162	TIMS / Heidelberg	0	Schröder-Ritzrau et al. 2005
3140	Mo	S	7720 ±100	152.60 ±4.10	2.181 ±0.005	TIMS / Heidelberg	0	Schröder-Ritzrau et al. 2005
2307	Lp	S	8890 ±160	147.30 ±2.00	2.741 ±0.012	TIMS / Heidelberg	0	Schröder-Ritzrau et al. 2005
2350	Lp	S	8560 ±390	147.10 ±6.60	0.390 ±0.030	TIMS / Heidelberg	0	Schröder-Ritzrau et al. 2005
2491	Lp	S	1540 ±160	146.60 ±2.80	7.163 ±0.035	TIMS / Heidelberg	0	Schröder-Ritzrau et al. 2005
2706	Lp	S	560 ±70	147.10 ±6.60	0.505 ±0.004	TIMS / Heidelberg	0	Schröder-Ritzrau et al. 2005
2127	Lp	S	3010 ±90	150.40 ±3.30	1.903 ±0.012	TIMS / Heidelberg	0	Schröder-Ritzrau et al. 2005
GEOB9213-1	Lp	M	9170 ±150	145.50 ±1.90	62.600 ±0.200	MCICPMS / Kiel		Frank et al. 2004
GEOB9214-1	Lp	M	8680 ±160	145.20 ±1.90	95.940 ±0.200	MCICPMS / Kiel		Frank et al. 2004
GEOB9213-2	Lp	M	299300 ±11700	145.00 ±2.00	35.510 ±0.110	MCICPMS / Kiel		Frank et al. 2004
GEOB9214-2	Lp	M	268700 ±8800	145.00 ±2.00	22.740 ±0.090	MCICPMS / Kiel		Frank et al. 2004
GEOB9214-1	Lp	M	10350 ±90	147.70 ±2.60	0.473 ±0.001	ICP-QMS / Gif-sur-Yvette		this study
GEOB9214-1-281	Lp	M	128600 ±1170	151.79 ±1.70	1.640 ±0.002	ICP-QMS / Gif-sur-Yvette	281	this study
GEOB9223-1-427	Lp	M	125640 ±690	149.04 ±0.95	5.650 ±0.004	ICP-QMS / Gif-sur-Yvette	427	this study
GEOB9223-1-448	Lp	M	99390 ±980	153.14 ±2.63	3.484 ±0.003	ICP-QMS / Gif-sur-Yvette	448	this study
GEOB9213-1-385	Lp	M	276900 ±4630	145.18 ±1.37	15.427 ±0.013	ICP-QMS / Gif-sur-Yvette	385	this study
GEOB9213-1-577,5	Lp	M	225170 ±4610	129.10 ±2.57	29.601 ±0.049	ICP-QMS / Gif-sur-Yvette	577.5	this study
M2001-41BX	Lp	M	357 ±80	calibrated 14C age (R=400yr)		AMS-Artemis / Saclay		de Haas et al. 2009
M2001-41BX	Lp	M	150 ±110	calibrated 14C age (R=400yr)		AMS-Artemis / Saclay		de Haas et al. 2009
M2001-41BX	Lp	M	760 ±110	calibrated 14C age (R=400yr)		AMS-Artemis / Saclay		de Haas et al. 2009
ALK 232 - GKG 1021 2b	Lp	S	2693.75 ±55	143.55 ±3.57	16.182 ±0.081	TIMS / Gif-sur-Yvette		this study
ALK 232 - GKG 1022 1b	Lp	S	64 ±17	146.42 ±3.10	23.478 ±0.117	TIMS / Gif-sur-Yvette		this study
ALK 232 - BG 1147	Lp	S	34 ±2	152.08 ±3.00	51.818 ±0.259	TIMS / Gif-sur-Yvette		this study
ALK 232 - BG 1155	Lp	S	7.5 ±3	150.04 ±3.91	12.736 ±0.042	TIMS / Gif-sur-Yvette		this study
BoNo10	Lp	S	1150 ±210	150.30 ±4.00	81.887 ±0.205	TIMS / Gif-sur-Yvette		Lindberg et al. 2005
BoNo28	Lp	S	1321 ±12	148.10 ±1.90	1.894 ±0.006	TIMS / Gif-sur-Yvette		Lindberg et al. 2005
BoNo41	Lp	S	1244 ±38	145.40 ±2.60	8.146 ±0.051	TIMS / Gif-sur-Yvette		Lindberg et al. 2005
BoNo47	Lp	S	554 ±25	147.30 ±2.60	3.523 ±0.027	TIMS / Gif-sur-Yvette		Lindberg et al. 2005
Sula Ridge Reef	Lp	M	8060 ±130	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
(Hovland & Mortensen 1999)	Lp	M	8500 ±125	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	8620 ±70	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	6250 ±400	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	7190 ±360	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	7260 ±290	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	7380 ±660	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	8150 ±950	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	0 ±50	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	6025 ±105	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	6585 ±95	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	6485 ±90	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	1990 ±80	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	2000 ±80	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	2400 ±100	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	2935 ±50	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	2760 ±85	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	2925 ±50	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
	Lp	M	3050 ±50	calibrated 14C age (R=400yr)				Hovland and Mortensen 1999
POS325-472	Lp	M	9190 ±50	calibrated 14C age (R=400yr)		AMS / Poznan		this study
2709	Lp	S	2110 ±50	154.90 ±2.80	1.060 ±0.004	TIMS / Heidelberg		Schröder-Ritzrau et al. 2005
2711	Lp	S	2980 ±90	151.10 ±4.40	0.696 ±0.004	TIMS / Heidelberg		Schröder-Ritzrau et al. 2005
3237	Lp	S	1480 ±100	147.70 ±2.00	4.012 ±0.008	TIMS / Heidelberg		Schröder-Ritzrau et al. 2005
2660	Lp	S	1060 ±180	149.90 ±2.60	6.102 ±0.040	TIMS / Heidelberg		Schröder-Ritzrau et al. 2005
2740	Mo	S	100 ±50	150.90 ±1.90	0.355 ±0.001	TIMS / Heidelberg		Schröder-Ritzrau et al. 2005
GeoB 6729-1	Lp	M	93134.33 ±267	138.00 ±3.20	5.567 ±0.056	MCICPMS/Kiel	88	Dorschel et al. 2007
GeoB 6729-1	Lp	M	123706.1 ±970	148.00 ±7.00	12.472 ±0.125	MCICPMS/Kiel	158	Dorschel et al. 2007
GeoB 6729-1	Lp	M	175739.4 ±7252	126.00 ±4.30	3.024 ±0.030	MCICPMS/Kiel	188	Dorschel et al. 2007
GeoB 6729-1	Lp	M	175891.2 ±1813	135.00 ±10.00	4.245 ±0.042	MCICPMS/Kiel	268	Dorschel et al. 2007
GeoB 6729-1	Lp	M	206452.7 ±2547	108.00 ±5.60	10.780 ±0.108	MCICPMS/Kiel	358	Dorschel et al. 2007
M2003-23	Lp	M	51 ±10	146.50 ±3.00	0.314	TIMS/Amsterdam	12.5	Minies et al. 2010
M2003-23	Mo	M	1330 ±40	163.50 ±3.00	1.694	TIMS/Amsterdam	40.5	Minies et al. 2010
M2003-23	Mo	M	5570 ±80	149.80 ±3.00	0.473	TIMS/Amsterdam	68.5	Minies et al. 2010
M2003-23	Lp	M	10800 ±80	165.70 ±3.00	7.033	TIMS/Amsterdam	120	Minies et al. 2010
M2003-23	Lp	M	246000 ±5000	176.30 ±3.00	3.461	TIMS/Amsterdam	227	Minies et al. 2010
M2003-23	Lp	M	363000 ±12000	261.10 ±3.00	14.689	TIMS/Amsterdam	318	Minies et al. 2010

Table DR3: U-series ages and radiocarbon calibrated age data for the Banda mounds off Mauritania (this study and (Eisele et al., accepted)) and mound settings from the Gulf of Cadiz (Spanish Margin and Renard Ridge off Morocco) (this study and (Wienberg et al., 2010; Wienberg et al., 2009)). Details on the local mound evolution (species variablity, present day mapping and habitat structure, sedimentology and local paleo-environments can be found in the cited publications. Lp – *Lophelia pertusa*; Mo – *Madrepora oculata*; M – Mound setting, S – Surface sampling (Dredge/ROV)

Coral ID (SedCore/depth)	Sp.	M/S	Latitude [°N]	Longitude [°W]	Water depth [m]	Age [years]	$\delta^{234}U_0$ [‰]	^{232}Th [ppb]	Dating Tool / Laboratory	Depth in core [cm]	Reference
GeoB 11569-2 1L	Lp	M	17.67	-16.67	440	14240 ±220	141.07 ±2.23	0.991 ±0.002	ICP-QMS / Gif-sur-Yvette	13	Eisele et al. 2011
GeoB 11569-2 3L	Lp	M	17.67	-16.67	440	32330 ±960	145.12 ±3.46	3.834 ±0.013	ICP-QMS / Gif-sur-Yvette	40.5	Eisele et al. 2011
GeoB 11569-2 4L	Lp	M	17.67	-16.67	440	40230 ±1500	146.54 ±3.46	2.688 ±0.008	ICP-QMS / Gif-sur-Yvette	51.5	Eisele et al. 2011
GeoB 11569-2 4L(2)	Lp	M	17.67	-16.67	440	39500 ±1550	147.93 ±5.73	2.680 ±0.006	ICP-QMS / Gif-sur-Yvette	51.5	Eisele et al. 2011
GeoB 11569-2 5L	Lp	M	17.67	-16.67	440	33880 ±730	152.02 ±2.08	6.151 ±0.013	ICP-QMS / Gif-sur-Yvette	73	Eisele et al. 2011
GeoB 11569-2 6L	Lp	M	17.67	-16.67	440	36400 ±1200	147.40 ±3.45	10.130 ±0.037	ICP-QMS / Gif-sur-Yvette	88.5	Eisele et al. 2011
GeoB 11569-2 6L(2)	Lp	M	17.67	-16.67	440	38900 ±2900	145.61 ±8.59	10.160 ±0.044	ICP-QMS / Gif-sur-Yvette	88.5	Eisele et al. 2011
GeoB 11569-2 7L	Lp	M	17.67	-16.67	440	38000 ±1700	147.69 ±4.42	13.020 ±0.220	ICP-QMS / Gif-sur-Yvette	103	Eisele et al. 2011
GeoB 11569-2 7L(2)	Lp	M	17.67	-16.67	440	38000 ±1550	146.87 ±4.22	13.160 ±0.110	ICP-QMS / Gif-sur-Yvette	103	Eisele et al. 2011
GeoB 11569-2 8L	Lp	M	17.67	-16.67	440	45100 ±2300	152.56 ±4.90	3.900 ±0.100	ICP-QMS / Gif-sur-Yvette	116.5	Eisele et al. 2011
GeoB 11569-2 9L	Lp	M	17.67	-16.67	440	32800 ±1500	149.33 ±4.05	1.590 ±0.010	ICP-QMS / Gif-sur-Yvette	145	Eisele et al. 2011
GeoB 11569-2 9L(2)	Lp	M	17.67	-16.67	440	32600 ±1100	142.96 ±5.81	1.584 ±0.005	ICP-QMS / Gif-sur-Yvette	145	Eisele et al. 2011
GeoB 11569-2 10L	Lp	M	17.67	-16.67	440	41600 ±1200	145.70 ±5.62	6.363 ±0.014	ICP-QMS / Gif-sur-Yvette	154	Eisele et al. 2011
GeoB 11569-2 10L(2)	Lp	M	17.67	-16.67	440	39560 ±800	140.76 ±2.37	6.344 ±0.014	ICP-QMS / Gif-sur-Yvette	154	Eisele et al. 2011
GeoB 11569-2 12L	Lp	M	17.67	-16.67	440	59700 ±7800	144.96 ±3.30	1.832 ±0.164	ICP-QMS / Gif-sur-Yvette	175	Eisele et al. 2011
GeoB 11569-2 12L(2)	Lp	M	17.67	-16.67	440	58800 ±4000	133.88 ±5.02	1.946 ±0.067	ICP-QMS / Gif-sur-Yvette	175	Eisele et al. 2011
GeoB 11569-2 14L	Lp	M	17.67	-16.67	440	57400 ±950	146.15 ±2.17	2.035 ±0.004	ICP-QMS / Gif-sur-Yvette	220	Eisele et al. 2011
GeoB 11569-2 17L	Lp	M	17.67	-16.67	440	58300 ±3300	141.75 ±3.00	2.233 ±0.048	ICP-QMS / Gif-sur-Yvette	305.5	Eisele et al. 2011
GeoB 11569-2 19L	Lp	M	17.67	-16.67	440	65360 ±650	136.99 ±1.93	4.439 ±0.006	ICP-QMS / Gif-sur-Yvette	330	Eisele et al. 2011
GeoB 11569-2 21L	Lp	M	17.67	-16.67	440	61200 ±3100	139.64 ±4.44	3.683 ±0.023	ICP-QMS / Gif-sur-Yvette	369	Eisele et al. 2011
GeoB 11569-2 22L	Lp	M	17.67	-16.67	440	59700 ±490	136.44 ±2.04	6.420 ±0.013	ICP-QMS / Gif-sur-Yvette	381	Eisele et al. 2011
GeoB 11569-2 23L	Lp	M	17.67	-16.67	440	63300 ±3300	140.94 ±1.95	7.660 ±0.150	ICP-QMS / Gif-sur-Yvette	400	Eisele et al. 2011
GeoB 11569-2 23L(2)	Lp	M	17.67	-16.67	440	62000 ±2100	145.49 ±4.15	7.594 ±0.044	ICP-QMS / Gif-sur-Yvette	400	Eisele et al. 2011
GeoB 11569-2 24L	Lp	M	17.67	-16.67	440	59500 ±2700	142.44 ±3.83	2.874 ±0.027	ICP-QMS / Gif-sur-Yvette	424.5	Eisele et al. 2011
GeoB 11569-2 25L	Lp	M	17.67	-16.67	440	58600 ±1400	136.17 ±2.65	3.818 ±0.011	ICP-QMS / Gif-sur-Yvette	440.5	Eisele et al. 2011
GeoB 11569-2 26L	Lp	M	17.67	-16.67	440	59800 ±530	133.44 ±1.76	1.832 ±0.002	ICP-QMS / Gif-sur-Yvette	457	Eisele et al. 2011
GeoB 11569-2 28L	Lp	M	17.67	-16.67	440	61300 ±1500	147.47 ±2.81	6.287 ±0.012	ICP-QMS / Gif-sur-Yvette	500.5	Eisele et al. 2011
GeoB 12103	Lp	M	35.35	-6.87	591	22830 ±400	139.80 ±2.03	0.636 ±0.003	ICP-QMS / Gif-sur-Yvette	34	Wienberg et al. 2010
GeoB 12103	Lp	M	35.35	-6.87	591	25430 ±470	138.36 ±2.92	3.873 ±0.010	ICP-QMS / Gif-sur-Yvette	88	Wienberg et al. 2010
GeoB 12103	Lp	M	35.35	-6.87	591	24800 ±300	140.08 ±1.76	0.378 ±0.001	ICP-QMS / Gif-sur-Yvette	101	Wienberg et al. 2010
GeoB 12103	Lp	M	35.35	-6.87	591	29730 ±1300	140.89 ±3.29	2.644 ±0.011	ICP-QMS / Gif-sur-Yvette	200	Wienberg et al. 2010
GeoB 12103	Lp	M	35.35	-6.87	591	30400 ±960	138.31 ±2.18	0.192 ±0.003	ICP-QMS / Gif-sur-Yvette	317	Wienberg et al. 2010
GeoB 12103	Lp	M	35.35	-6.87	591	49630 ±800	139.40 ±2.40	19.205 ±0.071	ICP-QMS / Gif-sur-Yvette	444	Wienberg et al. 2010
GeoB 9070	Lp	M	35.37	-6.87	594	23500 ±120	146.80 ±1.10	4.428 ±0.010	MCICPMS / Kiel	47	Wienberg et al. 2010
GeoB 9070	Mo	M	35.37	-6.87	594	43680 ±280	145.70 ±1.80	51.216 ±0.070	MCICPMS / Kiel	298	Wienberg et al. 2010
GeoB 9070	Mo	M	35.37	-6.87	594	166000 ±2400	82.30 ±1.70	15.090 ±0.030	MCICPMS / Kiel	520	Wienberg et al. 2010
GeoB 12104	Lp	M	35.35	-6.87	590	23570 ±180	135.00 ±1.66	7.780 ±0.016	ICP-QMS / Gif-sur-Yvette	8	Wienberg et al. 2010
GeoB 12104	Lp	M	35.35	-6.87	590	311200 ±16000	168.30 ±2.20	2.161 ±0.012	ICP-QMS / Gif-sur-Yvette	373	Wienberg et al. 2010
GeoB 12104	Mo	M	35.35	-6.87	590	342290 ±25000	187.10 ±2.60	2.003 ±0.008	ICP-QMS / Gif-sur-Yvette	491	Wienberg et al. 2010
GeoB 12102	Mo	M	35.35	-6.87	585	57930 ±740	140.77 ±2.74	0.316 ±0.001	ICP-QMS / Gif-sur-Yvette	28	Wienberg et al. 2010
GeoB 12102	Lp	M	35.35	-6.87	585	118160 ±1100	143.80 ±1.90	1.075 ±0.003	ICP-QMS / Gif-sur-Yvette	166	Wienberg et al. 2010
GeoB 12102	Lp	M	35.35	-6.87	585	152270 ±5120	172.40 ±2.90	0.306 ±0.003	ICP-QMS / Gif-sur-Yvette	238	Wienberg et al. 2010
GeoB 12102	Mo	M	35.35	-6.87	585	151560 ±3370	139.20 ±3.00	0.491 ±0.002	ICP-QMS / Gif-sur-Yvette	376	Wienberg et al. 2010
GeoB 12102	Mo	M	35.35	-6.87	585	164020 ±2000	158.30 ±1.80	0.495 ±0.002	ICP-QMS / Gif-sur-Yvette	493	Wienberg et al. 2010
GeoB 12101	Mo	M	35.32	-6.80	545	430760 ±57000	165.20 ±15.00	8.092 ±0.026	ICP-QMS / Gif-sur-Yvette	451	Wienberg et al. 2010
GeoB 12106	Mo	M	34.98	-7.08	758	295860 ±23300	152.00 ±2.80	3.421 ±0.004	ICP-QMS / Gif-sur-Yvette	117	Wienberg et al. 2010
MD08-3212	Lp	M	35.28	-6.78	525	11080 ±230	145.99 ±1.01	20.305 ±0.034	ICP-QMS / Gif-sur-Yvette	7.5	this study
MD08-3212	Lp	M	35.28	-6.78	525	14330 ±690	158.47 ±2.39	6.167 ±0.037	ICP-QMS / Gif-sur-Yvette	21	this study
MD08-3212	Lp	M	35.28	-6.78	525	34860 ±920	146.34 ±2.84	9.838 ±0.035	ICP-QMS / Gif-sur-Yvette	37.5	this study
MD08-3212	Lp	M	35.28	-6.78	525	35130 ±1360	136.41 ±2.82	2.934 ±0.016	ICP-QMS / Gif-sur-Yvette	42.5	this study
MD08-3212	Lp	M	35.28	-6.78	525	311200 ±16400	109.69 ±2.63	23.007 ±0.058	ICP-QMS / Gif-sur-Yvette	57.5	this study
MD08-3231	Lp	M	35.32	-6.80	550	14782 ±400	141.25 ±1.83	8.593 ±0.025	ICP-QMS / Gif-sur-Yvette	2.5	this study
MD08-3231	Lp	M	35.32	-6.80	550	22052 ±750	132.72 ±1.98	2.694 ±0.014	ICP-QMS / Gif-sur-Yvette	17.5	this study
MD08-3231	Lp	M	35.32	-6.80	550	25491 ±400	134.18 ±2.72	5.771 ±0.016	ICP-QMS / Gif-sur-Yvette	32.5	this study
MD08-3231	Lp	M	35.32	-6.80	550	24727 ±280	132.08 ±2.90	0.427 ±0.002	ICP-QMS / Gif-sur-Yvette	47.5	this study
MD08-3231	Lp	M	35.32	-6.80	550	28900 ±500	136.11 ±2.44	13.416 ±0.026	ICP-QMS / Gif-sur-Yvette	65	this study
MD08-3231	Lp	M	35.32	-6.80	550	29551 ±460	135.02 ±2.72	0.483 ±0.001	ICP-QMS / Gif-sur-Yvette	95	this study
MD08-3231	Lp	M	35.32	-6.80	550	28839 ±330	130.55 ±2.26	0.364 ±0.002	ICP-QMS / Gif-sur-Yvette	125	this study
MD08-3231	Lp	M	35.32	-6.80	550	27792 ±400	134.28 ±2.58	29.911 ±0.109	ICP-QMS / Gif-sur-Yvette	155	this study
MD08-3231	Lp	M	35.32	-6.80	550	35169 ±1260	133.66 ±3.20	11.756 ±0.092	ICP-QMS / Gif-sur-Yvette	185	this study
MD08-3231	Lp	M	35.32	-6.80	550	35199 ±570	132.48 ±3.00	70.354 ±0.480	ICP-QMS / Gif-sur-Yvette	215	this study
MD08-3231	Lp	M	35.32	-6.80	550	37353 ±700	137.59 ±3.27	0.432 ±0.004	ICP-QMS / Gif-sur-Yvette	245	this study
GeoB 9031	Mo	M	36.08	-7.38	897	20920 ±120	148.00 ±1.80	21.400 ±0.055	MCICPMS / Kiel	10	Wienberg et al. 2010
GeoB 9031	Mo	M	36.08	-7.38	897	37250 ±230	146.70 ±2.30	4.796 ±0.009	MCICPMS / Kiel	93	Wienberg et al. 2010
GeoB 9031	Mo	M	36.10	-7.38	897	45940 ±330	136.50 ±1.40	8.880 ±0.020	MCICPMS / Kiel	150	Wienberg et al. 2010
GeoB 9018	Mo	M	36.18	-7.30	702	14650 ±90	155.80 ±1.90	21.019 ±0.052	MCICPMS / Kiel	3	Wienberg et al. 2010
GeoB 9018	Mo	M	36.18	-7.30	702	294000 ±7000	167.70 ±3.30	3.021 ±0.006	MCICPMS / Kiel	123	Wienberg et al. 2010
GeoB 9018	Mo	M	36.18	-7.30	702	283800 ±8500	138.00 ±3.30	23.536 ±0.064	MCICPMS / Kiel	272	Wienberg et al. 2010
GeoB 9032	Mo	M	36.10	-7.40	843	17150 ±150	147.20 ±1.60	62.090 ±0.190	MCICPMS / Kiel	20	Wienberg et al. 2009
GeoB 9032	Mo	M	36.10	-7.40	843	41170 ±250	145.50 ±1.80	25.840 ±0.070	MCICPMS / Kiel	47	Wienberg et al. 2009
GeoB 9022-1	Lp	M	36.18	-7.30	676	27620 ±490	calibrated 14C age (R=400yr)		AMS Kiel	0	Wienberg et al. 2009
GeoB 9022-1 #2	Mo	S	36.18	-7.30	676	31190 ±230	151.94 ±1.77	2.297 ±0.002	ICP-QMS / Gif-sur-Yvette	0	Wienberg et al. 2010
GeoB 9022-1 #10	Lp	S	36.18	-7.30	676	35370 ±290	143.50 ±1.55	2.216 ±0.002	ICP-QMS / Gif-sur-Yvette	0	Wienberg et al. 2010
GeoB 9022-1	Lp	M	36.18	-7.30	676	32170 ±910	calibrated 14C age (R=400yr)		AMS Kiel	0	Wienberg et al. 2009
GeoB 9022-1	Mo	M	36.18	-7.30	676	32480 ±910	calibrated 14C age (R=400yr)		AMS Kiel	0	Wienberg et al. 2009
GeoB 9022-1	Mo	M	36.18	-7.30	676	29000 ±240	calibrated 14C age (R=400yr)		AMS Kiel	0	Wienberg et al. 2009
GeoB 9022-1	Mo	M	36.18	-7.30	676	34330 ±530	calibrated 14C age (R=400yr)		AMS Kiel	0	Wienberg et al. 2009
GeoB 9022-1	Mo	M	36.18	-7.30	676	42370 ±780	calibrated 14C age (R=400yr)		AMS Kiel	0	Wienberg et al. 2009
GeoB 9022-1	Mo	M	36.18	-7.30	676	42470 ±850	calibrated 14C age (R=400yr)		AMS Kiel	0	Wienberg et al. 2009

Table DR4: U-series ages for reef framework and solitary corals from various seamounts in the temperate Atlantic, including data from the Bay of Biscay, the Galicia Bank, and further mound sediments on the Morocco Margin. Compiled data (2088/2087 - (Schröder-Ritzrau et al., 2005). Samples B08 are subject of a publication have been recently obtained from the Gulf de Gascogne and first ICP-QMS U-series dating (this study) indicate reef activity during the past 10,000 years. Lp – *Lophelia pertusa*; Mo – *Madrepora oculata*; M – Mound setting, S – Surface sampling (Dredge/ROV)

Coral ID (SedCore/depth)	Sp.	M/S	Latitude [°N]	Longitude [°W]	Water depth [m]	Age [years]	$\delta^{234}U_0$ [‰]	^{232}Th [ppb]	Dating Tool / Laboratory	Depth in core [cm]	Reference
2088 - Conception Seam.	Lp	S	29.82	-12.67	819	12520 ±280	155.30 ±4.90	1.912 ±0.006	TIMS / Heidelberg		Schröder-Ritzrau et al. 2005
2087 - Glacia Bank	Lp	S	42.78	-11.78	823	110 ±25	146.10 ±2.30	0.109 ±0.002	TIMS / Heidelberg		Schröder-Ritzrau et al. 2005
B08 1301 BC	Lp	S	46.92	-5.25	289	7353 ±448	146.23 ±6.92	7.906 ±0.048	ICPMS / GIF-sur-Yvette		de Mol et al. 2010
B08 1305 BC A	Lp	S	46.92	-5.25	289	7779 ±709.5	164.30 ±39.14	4.635 ±0.056	ICPMS / GIF-sur-Yvette		de Mol et al. 2010
B08 1305 BC B	Lp	S	46.92	-5.25	289	9066 ±245	153.45 ±4.35	1.988 ±0.007	ICPMS / GIF-sur-Yvette		de Mol et al. 2010
B08 03 B	Lp	S	46.92	-5.25	289	8889 ±309	172.49 ±19.95	0.602 ±0.005	ICPMS / GIF-sur-Yvette		de Mol et al. 2010
B08 03 C	Lp	S	46.92	-5.25	289	1409 ±167.5	150.41 ±14.58	1.159 ±0.009	ICPMS / GIF-sur-Yvette		de Mol et al. 2010
B08 1306 BC B	Lp	S	46.92	-5.38	700-900	1210 ±126	146.80 ±5.14	1.634 ±0.007	ICPMS / GIF-sur-Yvette		de Mol et al. 2010
B08 1306 BC C	Lp	S	46.92	-5.38	700-900	2269 ±296	152.23 ±5.76	6.941 ±0.020	ICPMS / GIF-sur-Yvette		de Mol et al. 2010
B08 1306 BC A	Lp	S	46.92	-5.38	700-900	1310 ±520	152.18 ±14.48	15.023 ±0.250	ICPMS / GIF-sur-Yvette		de Mol et al. 2010
M2005-BX 31	Lp	M	35.28	-6.78	570	15120 ±230	150.30 ±0.19	1.200 ±0.004	ICPMS / GIF-sur-Yvette	10-27	this study
M2005-15	Lp	M	35°18	06°48	570	21980 ±440	calibrated 14C age (R=400yr)		AMS Kiel	19	Wienberg et al. 2009
M2005-15	Mo	M	35°18	06°48	570	12600 ±150	calibrated 14C age (R=400yr)		AMS Kiel	19	Wienberg et al. 2009
M2005-BX 15	Lp	M	35.28	-6.78	570	19070 ±130			MC-ICPMS - Kiel	15-22	this study
M2004-02	Mo	M	35.28	-6.78	520	9150 ±710	153.20 ±3.01	0.103 ±0.014	ICPMS / GIF-sur-Yvette	49	this study
M2004-02	Lp	M	35.28	-6.78	520	19360 ±540	146.60 ±2.52	0.625 ±0.008	ICPMS / GIF-sur-Yvette	85	this study
M2004-02	Lp	M	35.28	-6.78	520	19870 ±520	143.86 ±3.94	0.695 ±0.006	ICPMS / GIF-sur-Yvette	105	this study
M2004-02	Lp	M	35.28	-6.78	520	21370 ±420	144.98 ±2.30	4.666 ±0.013	ICPMS / GIF-sur-Yvette	141	this study
M2004-02	Lp	M	35.28	-6.78	520	22750 ±260	141.84 ±2.93	2.209 ±0.006	ICPMS / GIF-sur-Yvette	147	this study
M2004-02	Lp	M	35.28	-6.78	520	24030 ±260	140.60 ±3.35	11.534 ±0.031	ICPMS / GIF-sur-Yvette	176	this study
M2004-02	Lp	M	35.28	-6.78	520	34900 ±430	143.77 ±2.50	0.310 ±0.001	ICPMS / GIF-sur-Yvette	247	this study
M2004-02	Mo	M	35.28	-6.78	520	36270 ±430	137.98 ±1.62	3.049 ±0.008	ICPMS / GIF-sur-Yvette	273	this study
M2004-02	Lp	M	35.28	-6.78	520	142080 ±1920	144.38 ±2.35	2.908 ±0.009	ICPMS / GIF-sur-Yvette	313	this study
M2004-02	Lp	M	35.28	-6.78	520	175010 ±2790	139.89 ±2.53	14.820 ±0.026	ICPMS / GIF-sur-Yvette	343	this study
M2004-02	Lp	M	35.28	-6.78	520	242070 ±8350	169.28 ±2.72	0.506 ±0.003	ICPMS / GIF-sur-Yvette	363	this study
M2004-02	Lp	M	35.28	-6.78	520	261600 ±6640	155.92 ±2.87	3.116 ±0.007	ICPMS / GIF-sur-Yvette	403	this study
M2004-02	Lp	M	35.28	-6.78	520	262800 ±7460	134.33 ±3.32	3.119 ±0.008	ICPMS / GIF-sur-Yvette	403	this study
M2004-05	Lp	M	35.28	-6.78	543	113000 ±1550	154.67 ±2.94	12.941 ±0.033	ICPMS / GIF-sur-Yvette	109	this study
M2004-05	Lp	M	35.28	-6.78	543	120500 ±2100	162.08 ±2.47	11.488 ±0.067	ICPMS / GIF-sur-Yvette	167.5	this study
M2004-05	Lp	M	35.28	-6.78	543	129800 ±870	278.79 ±4.38	291.542 ±0.966	ICPMS / GIF-sur-Yvette	234	this study
B09 1404 bc	Lp	M	35.28	-6.78	524	40600 ±760	148.95 ±3.15	3.121 ±0.011	ICPMS / GIF-sur-Yvette	0	this study
B09 1405 bc	Lp	M	35.30	-6.80	551	19640 ±500	153.92 ±2.67	3.536 ±0.008	ICPMS / GIF-sur-Yvette	10	this study
B09 1405 bc	Lp	M	35.30	-6.80	551	15200 ±380	152.08 ±3.04	1.614 ±0.007	ICPMS / GIF-sur-Yvette	15	this study
B09 1405 bc	Lp	M	35.30	-6.80	551	14340 ±510	155.88 ±2.74	0.665 ±0.003	ICPMS / GIF-sur-Yvette	30	this study
B09 1406 bc	Lp	M	35.28	-6.78	530	12430 ±810	154.57 ±3.62	5.087 ±0.024	ICPMS / GIF-sur-Yvette	10	this study
B09 1406 bc	Lp	M	35.28	-6.78	530	12030 ±350	152.97 ±1.72	0.875 ±0.004	ICPMS / GIF-sur-Yvette	15	this study
B09 1408 bc	Lp	M	35.28	-6.78	533	14140 ±590	153.90 ±2.35	0.195 ±0.002	ICPMS / GIF-sur-Yvette	38	this study
B09 1408 bc	Lp	M	35.28	-6.78	533	15100 ±380	155.87 ±2.88	1.191 ±0.005	ICPMS / GIF-sur-Yvette	0	this study
B09 1409 bc	Lp	M	35.28	-6.78	532	195700 ±4580	153.39 ±3.34	4.959 ±0.014	ICPMS / GIF-sur-Yvette	20	this study
BC15	Lp	S	44.65	-8.00	Capo d'Ortegal	9580 ±240	157.39 ±2.02	1.264 ±0.003	ICPMS / GIF-sur-Yvette		this study
8304a	Lp	S	36.18	-7.30	-	8200 ±130	156.50 ±3.50	1.690 ±0.010	TIMS / Gif-sur-Yvette	0	this study
8304b	Lp	S	36.18	-7.30	-	2600 ±140	150.20 ±4.20	4.040 ±0.040	TIMS / Gif-sur-Yvette	0	this study
MD04-2804G	Lp	M	35.28	-6.78	530	287000 ±15000	141.00 ±10.00	62.400 ±4.567	TIMS / Gif-sur-Yvette	10	this study
MD04-2804G	Lp	M	35.28	-6.78	530	318000 ±30000	149.00 ±20.00	60.675 ±8.081	TIMS / Gif-sur-Yvette	50	this study
EW 9205	Lp	S	10.00	-42.00	-	13910 ±1400	141.20 ±4.00	1.500 ±0.020	ICPMS / GIF-sur-Yvette		this study
GeoB 12712	Mo	M	35°22	06°54	716	345500 ±870	147.80 ±3.50	2.025 ±0.010	ICP-QMS /Gif	8	this study
GeoB 12712	Mo	M	35°22	06°54	716	250000 ±4700	170.50 ±6.60	4.051 ±0.010	ICP-QMS /Gif	101	this study
GeoB 12712	Lp	M	35°22	06°54	716	493000 ±100000	297.20 ±92.90	2.233 ±0.011	ICP-QMS /Gif	172	this study
GeoB 12712	Mo	M	35°22	06°54	716	381000 ±38000	174.10 ±24.90	0.622 ±0.004	ICP-QMS /Gif	244	this study
GeoB 12712	Mo	M	35°22	06°54	716	482000 ±57000	250.30 ±48.10	0.634 ±0.001	ICP-QMS /Gif	384	this study
GeoB 12712	Lp	M	35°22	06°54	716	500000 ±90000	232.80 ±68.40	0.347 ±0.001	ICP-QMS /Gif	488	this study
GeoB 12722	Mo	M	35°19	07°01	882	32370 ±390	136.40 ±3.70	1.025 ±0.004	ICP-QMS /Gif	21	this study
GeoB 12722	Lp	M	35°19	07°01	882	164800 ±2800	164.10 ±5.00	7.314 ±0.016	ICP-QMS /Gif	378	this study
GeoB 12722	Lp	M	35°19	07°01	882	194300 ±6400	166.90 ±9.00	0.833 ±0.003	ICP-QMS /Gif	426	this study
GeoB 12740	Mo	M	35°00	07°05	739	14340 ±320	144.00 ±1.90	63.630 ±0.209	ICP-QMS /Gif	2	this study
GeoB 12740	Mo	M	35°00	07°05	739	25020 ±440	139.40 ±2.60	103.466 ±0.613	ICP-QMS /Gif	133	this study
GeoB 12740	Mo	M	35°00	07°05	739	32720 ±720	135.00 ±3.00	1.010 ±0.008	ICP-QMS /Gif	209	this study
GeoB 12740	Mo	M	35°00	07°05	739	41260 ±380	135.80 ±3.10	17.044 ±0.025	ICP-QMS /Gif	350	this study
GeoB 12743	Mo	M	35°04	07°09	827	27490 ±580	141.00 ±3.30	4.760 ±0.010	ICP-QMS /Gif	5	this study
GeoB 12743	Mo	M	35°04	07°09	827	30660 ±400	137.80 ±2.70	2.096 ±0.005	ICP-QMS /Gif	39	this study
GeoB 12743	Mo	M	35°04	07°09	827	53700 ±1800	144.70 ±7.50	4.397 ±0.014	ICP-QMS /Gif	143	this study
GeoB 9018	Mo	M	36°11	07°18	702	16110 ±45	calibrated 14C age (R=400yr)		AMS Kiel	3	Wienberg et al. 2009
GeoB 9031	Mo	M	36°06	07°23	897	22690 ±36	calibrated 14C age (R=400yr)		AMS Kiel	10	Wienberg et al. 2009
GeoB 9070	Lp	M	35°22	06°51	594	22530 ±280	calibrated 14C age (R=400yr)		AMS Kiel	47	Wienberg et al. 2009
GeoB 9070	Mo	M	35°22	06°51	594	43320 ±850	calibrated 14C age (R=400yr)		AMS Kiel	298	Wienberg et al. 2009
GeoB 12712	Mo	M	35°22	06°54	716	31710 ±110	calibrated 14C age (R=400yr)		AMS Woods Hole	10	this study
GeoB 12740	Mo	M	35°00	07°05	739	13600 ±100	calibrated 14C age (R=400yr)		AMS Woods Hole	2	this study
GeoB 12740	Mo	M	35°00	07°05	739	27340 ±350	calibrated 14C age (R=400yr)		AMS Woods Hole	133	this study
GeoB 12740	Mo	M	35°00	07°05	739	32000 ±150	calibrated 14C age (R=400yr)		AMS Woods Hole	209	this study
GeoB 12743	Mo	M	35°04	07°09	827	25060 ±150	calibrated 14C age (R=400yr)		AMS Woods Hole	5	this study
GeoB 12743	Mo	M	35°04	07°09	827	34200 ±220	calibrated 14C age (R=400yr)		AMS Woods Hole	39	this study

Table DR5: U-series ages for reef framework corals from the Mediterranean Sea including 31 recently published ages by (McCulloch et al., 2010). Lp – *Lophelia pertusa*; Mo – *Madrepora oculata*; M – Mound setting, S – Surface sampling (Dredge/ROV)

Coral ID (SedCore/depth)	Sp.	M/S	Latitude [°N]	Longitude [°W]	Water depth [m]	Age [years]	$\delta^{234}U_0$ [‰]	^{232}Th [ppb]	Dating Tool / Laboratory	Depth in core [cm]	Reference
COBAS-109L	Lp	S	40.00	5.00	366–340	12890 ±80	150.40 ±1.30	6.200 -	MC-CIPMS - Canberra		McCulloch et al. 2010
COBAS-105L	Lp	S	40.00	5.00	382	12710 ±30	151.30 ±0.90	15.800 -	MC-CIPMS - Canberra		McCulloch et al. 2010
COBAS-105M	Mo	S	40.00	5.00	382	12270 ±90	149.70 ±1.70	8.100 -	MC-CIPMS - Canberra		McCulloch et al. 2010
COBAS-99M	Mo	S	40.00	5.00	293	7060 ±60	151.00 ±1.40	4.200 -	MC-CIPMS - Canberra		McCulloch et al. 2010
COBAS-33LO	Lp	S	36.20	-3.00	429–136	11090 ±80	151.00 ±0.90	5.700 -	MC-CIPMS - Canberra		McCulloch et al. 2010
COBAS-33LY	Lp	S	36.20	-3.00	429–136	11250 ±70	150.40 ±0.70	5.900 -	MC-CIPMS - Canberra		McCulloch et al. 2010
B74-3M	Mo	S	36.80	-2.00	940–260	9150 ±60	150.20 ±1.60	5.000 -	MC-CIPMS - Canberra		McCulloch et al. 2010
M51-1-493LS	Lp	S	36.40	-2.50	1041–881	10980 ±53	147.00 ±4.40	6.360 -	MC-CIPMS - Canberra		McCulloch et al. 2010
LM99-124L	Lp	S	43.00	10.00	441–377	12250 ±50	149.00 ±1.90	7.050 -	MC-CIPMS - Canberra		McCulloch et al. 2010
LM99-124MO	Mo	S	43.00	10.00	441–377	9230 ±60	148.00 ±1.50	5.950 -	MC-CIPMS - Canberra		McCulloch et al. 2010
LM99-136M	Mo	S	43.00	10.00	366–358	328 ±15	148.10 ±1.50	0.240 -	MC-CIPMS - Canberra		McCulloch et al. 2010
LM99-141M	Mo	S	43.00	10.00	406–377	6300 ±40	151.00 ±1.10	3.720 -	MC-CIPMS - Canberra		McCulloch et al. 2010
PS88-20L	Lp	S	40.00	14.00	274	12580 ±38	148.50 ±0.90	4.700 -	MC-CIPMS - Canberra		McCulloch et al. 2010
CS96-57M	Mo	S	37.00	12.50	227–50	16040 ±110	154.10 ±1.40	10.870 -	MC-CIPMS - Canberra		McCulloch et al. 2010
CS96-242L	Lp	S	36.50	13.50	558–322	11950 ±50	150.80 ±1.00	7.490 -	MC-CIPMS - Canberra		McCulloch et al. 2010
CS96-32Ma	Mo	S	36.50	13.50	704–328	482090 ±25000	114.20 ±6.10	55.170 -	MC-CIPMS - Canberra		McCulloch et al. 2010
CS96-32Mb	Mo	S	36.50	13.50	704–328	384000 ±16000	107.00 ±5.30	47.360 -	MC-CIPMS - Canberra		McCulloch et al. 2010
MS-71L	Lp	S	35.80	13.50	863–606	47970 ±170	144.40 ±1.00	23.300 -	MC-CIPMS - Canberra		McCulloch et al. 2010
CR-22L	Lp	S	40.00	17.50	1102–985	12510 ±67	149.30 ±1.20	6.460 -	MC-CIPMS - Canberra		McCulloch et al. 2010
CR-69L	Lp	S	39.30	18.50	786–760	12630 ±74	150.50 ±1.10	6.480 -	MC-CIPMS - Canberra		McCulloch et al. 2010
COR2-75L	Lp	S	39.00	18.50	818–829	38 ±3	150.90 ±2.10	0.200 -	MC-CIPMS - Canberra		McCulloch et al. 2010
YD97-DR3M	Mo	S	42.00	17.50	316–246	483 ±9	148.60 ±0.80	0.300 -	MC-CIPMS - Canberra		McCulloch et al. 2010
YD97-DR4BISL	Lp	S	42.00	17.50	585–348	1940 ±12	147.20 ±1.00	1.000 -	MC-CIPMS - Canberra		McCulloch et al. 2010
YD97-DR4L	Lp	S	42.00	17.50	585–348	1590 ±20	141.20 ±0.80	0.800 -	MC-CIPMS - Canberra		McCulloch et al. 2010
YD97-DR4M	Mo	S	42.00	17.50	585–348	329 ±4	147.20 ±1.40	0.200 -	MC-CIPMS - Canberra		McCulloch et al. 2010
YD97-DR5M	Mo	S	35.00	26.00	346	5160 ±20	149.30 ±1.10	3.000 -	MC-CIPMS - Canberra		McCulloch et al. 2010
SE06-13-L	Lp	S	35.30	28.00	423–286	17622 ±47	148.50 ±0.90	12.300 -	MC-CIPMS - Canberra		McCulloch et al. 2010
GECO-18M	Mo	S	35.30	28.00	550–453	12000 ±56	150.50 ±1.00	5.900 -	MC-CIPMS - Canberra		McCulloch et al. 2010
GECO-77M	Mo	S	35.30	23.00	506	14160 ±135	152.20 ±1.20	6.800 -	MC-CIPMS - Canberra		McCulloch et al. 2010
GECO-85M	Mo	S	35.30	23.00	762–403	12350 ±72	151.00 ±0.90	8.300 -	MC-CIPMS - Canberra		McCulloch et al. 2010
GECO-85M2	Mo	S	35.00	22.60	762–403	12290 ±56	150.40 ±1.30	7.700 -	MC-CIPMS - Canberra		McCulloch et al. 2010
Cobas 99.LO	Lp	S	40.00	5.00	350-550	10890 ±190	179.91 ±5.55	5.963 ±0.022	TIMS / Gif-sur-Yvette		this study
Cobas 109.LO	Lp	S	40.00	5.00	350-550	13480 ±180	147.87 ±6.20	0.533 ±0.004	TIMS / Gif-sur-Yvette		this study
Cobas 25.MO	Mo	S	40.00	5.00	350-550	5827 ±90	151.68 ±4.53	6.657 ±0.016	TIMS / Gif-sur-Yvette		this study
Cobas 115.MO	Mo	S	40.00	5.00	350-550	772 ±200	147.10 ±4.80	0.503 ±0.009	TIMS / Gif-sur-Yvette		this study
VB7R	Lp	S	36.30	-4.00	-	4970 ±440	148.76 ±2.60	1.488 ±0.009	ICPMS / GIF-sur-Yvette		this study
VB7R	Mo	S	36.30	-4.00	-	5600 ±250	152.10 ±2.25	0.318 ±0.002	ICPMS / GIF-sur-Yvette		this study
VB7R	Lp	S	36.30	-4.00	-	11230 ±330	150.68 ±2.59	0.457 ±0.001	ICPMS / GIF-sur-Yvette		this study
3048 - NW Cabliers Bank	Lp	S	35.90	-2.57	622.5	8500 ±120	153.10 ±2.40	1.989 ±0.007	TIMS / Heidelberg		this study

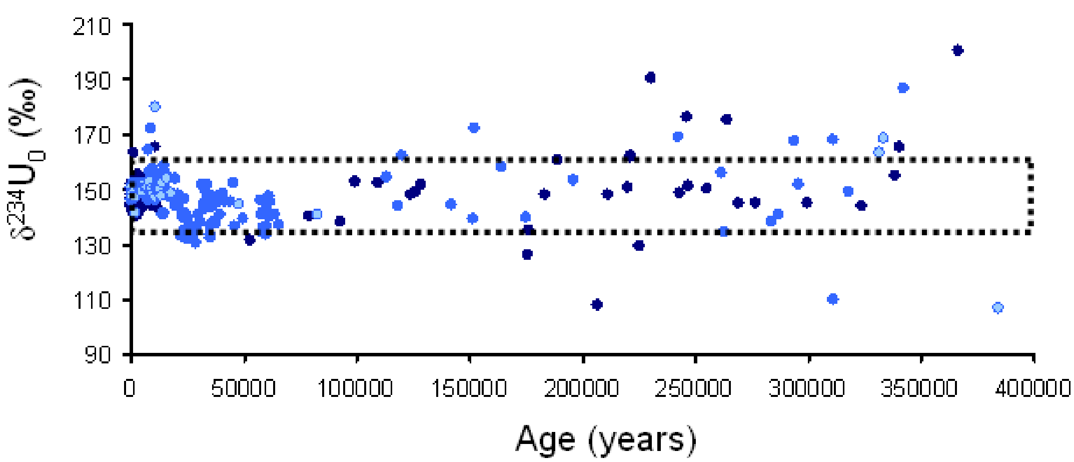

Figure DR1: Initial U-isotopic composition of corals versus coral ages. About 90% of the data is within ±10‰ of modern seawater values. Variability increases through time as corals are more affected by physico-chemical alteration and by U-series open system behavior. However, the observed variability does not alter the age frequency patterns

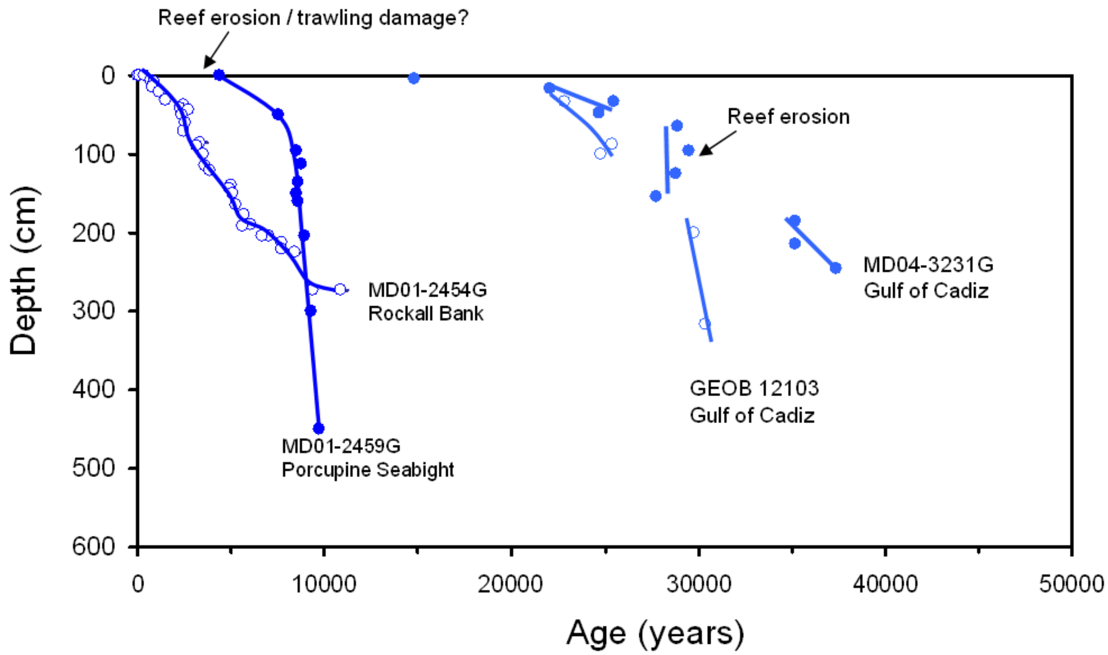

Figure DR2: Similar coral growth records in the NEA and TEA. Accumulation rates of Holocene NEA reefs are similar to the ones of glacial TEA reefs, exceeding 30cm per thousand years vertical coral fragment accumulation.

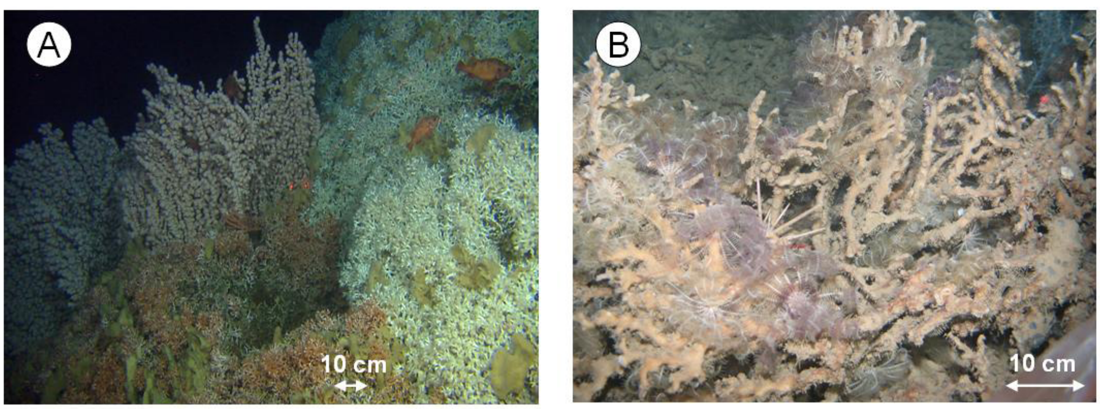

Figure DR3: Characteristic photos of present day reef surfaces in the NEA and TEA. (a) An active NEA reef (northern Norway) and (b) a coral rubble mound surface (coral graveyard) observed in the TEA (Gulf of Cadiz).

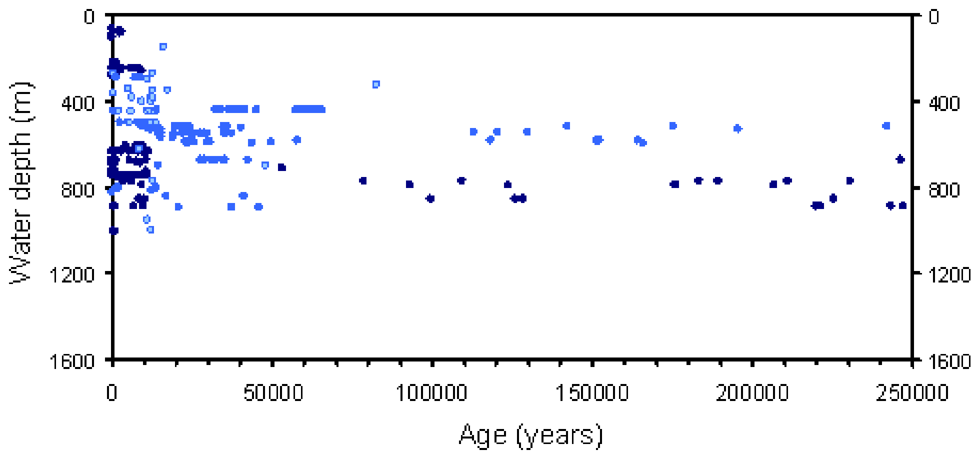

Figure DR4: Relationship between coral age and water depth. Light blue dots: TEA and Mediterranean Sea. Dark blue dots: NEA. For both regions coral ages are obtained from sites that correspond to the modern main habitat depth of L. pertusa and M. oculata corals. No systematic changes of the water depth can be recognized through time and there is significant overlap of the data for the first 11,000 years. Beyond 45,000 years an apparent 200m depth difference appears in the data that does reflect a sampling bias due to the few available sediment cores from mound settings in the TEA and NEA.

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