

SUPPLEMENTARY INFORMATION

Ups and downs in western Crete (Hellenic subduction zone)

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Table S1 - Literature datings available for samples nearby Paleochora or otherwise discussed in the text.

Table S2 - Description of observed shorelines. Main shorelines indicators observed in the stretch of coast between Paleochora and Cape Krios, in sites where at least one dating exists.

Table S3 - Dated samples

Table S4 - ΔR values in the Mediterranean Sea. Values used to calculate the ΔR average for the entire basin (Marine Reservoir Correction Database, <http://calib.qub.ac.uk/marine/>).

Figure S1 - Calibration curves of each calibrated sample (17 panels).

Figure S2 - XRD graphs for each analyzed sample (7 panels).

Figure S3 - Shoreline elevation and age of the associated samples, along with uncertainties, compared with the eustatic curve by Waelbroeck et al. (2002). We-36Cl and We-14C: Wegmann (2008); Sh-14C: Shaw et al. (2008); Ke-14C: Kelletat and Zimmerman (1991).

Table S5 - Two-layer model.

Table S6- Profile geographic coordinates.

Table S7 - Fault parameters.

Figure S4 - Coseismic and steady-state displacement profiles for faults in the front section of subduction zone causing subsidence in Paleochora (2 panels).

Figure S5 - Coseismic and steady-state displacement profiles for faults in the rear section of subduction zone causing uplift in Paleochora (2 panels).

Table S1 - Literature datings available for samples nearby Paleochora or otherwise discussed in the text.

Lab Code	Method	Locality	Sample description	Sample elevation (m a.s.l.)	Shoreline elevation (m a.s.l.)	d13C	Age (ky BP)	Error (±ky)	Reference	Notes	2σ Calibrated Age range (cal yr BP)
HV9506	Radiocarbon	2,5 km west of Paleochora	Algal rim	3.3	3.3	n.d.	3.615	0.105	Kelletat and Zimmermann, 1991	Not enough information to calibrate	n.d.
HV9507	Radiocarbon	2,5 km west of Paleochora	Algal rim	3.3	3.3	n.d.	5.735	0.090	Kelletat and Zimmermann, 1991	Not enough information to calibrate	n.d.
K 2723	ESR	Paleochora	<i>Cladocora caespitosa</i>	2-2.5	n.d.	n.a.	113.000	27	Kelletat et al., 1999		n.a.
K 2724	ESR	Paleochora	<i>Ostrea</i> sp.	2-2.5	n.d.	n.a.	114.000	13	Kelletat et al., 1999		n.a.
AA61340	Radiocarbon	2 km west of Paleochora	Bivalve	n.d.	9	1.76	40.600	1.300	Wegmann, 2008		42190-45870
UCI29784	Radiocarbon	2 km west of Paleochora	Bivalve	n.d.	9	2.6	37.530	0.660	Wegmann, 2008		40930-42910
UCI27790	Radiocarbon	2 km west of Paleochora	Bivalve	n.d.	9	1.8	23.510	0.080	Wegmann, 2008	Alteration of primary shell is reported	27080-27120; 27562-28460*
050906-8	³⁶ Cl	2 km west of Paleochora	Limestone	9	9	n.a.	8.810	0.350	Wegmann, 2008	Latitudinal production coefficient: 0.87; shielding 0.48	n.a.
050906-5	³⁶ Cl	2 km west of Paleochora	Limestone	15	15	n.a.	13.430	2.550	Wegmann, 2008	Latitudinal production coefficient: 0.87; shielding 0.49	n.a.
050906-6	³⁶ Cl	2 km west of Paleochora	Limestone	31	31	n.a.	19.230	0.590	Wegmann, 2008	Latitudinal production coefficient: 0.87; shielding 0.48	n.a.
050906-7	³⁶ Cl	2 km west of Paleochora	Limestone	71	71	n.a.	50.170	1.660	Wegmann, 2008	Latitudinal production coefficient: 0.87; shielding 0.50	n.a.
OX16995	Radiocarbon	Paleochora	Bivalve	20-24	20-24	n.d.	47.300	0.550	Shaw et al., 2008	Out of calibration range for Calib 6.0 (Reimer et al., 2009).	n.d.
MC2427	Radiocarbon	Phalasarna	<i>Dendropoma petraeum</i> and calcareous algae	n.d.	4	n.d.	4.600 [†]	0.09	Pirazzoli et al., 1996		4410-5070

Note: n.d. = not determined. n.a. = not applicable. *There are multiple calibration peaks; the range presented is the full range of all calibration peaks. †Originally measured radiocarbon age = 4.200 ky BP (Pirazzoli et al., 1982); conventional radiocarbon age of 4.600 ky is reported by Pirazzoli et al. (1996) as normalized to a δ¹³C of -25‰ PDB: the correction of 400 y is consistent with that calculated by Beta Analytic for our Holocene samples.

Table S2 - Description of observed shorelines. Main shorelines indicators observed in the stretch of coast between Paleochora and Cape Krios, in sites where at least one dating exists.

Shoreline	Locality	Description	Elevation range of observed features (m a.s.l.)	Dated samples	Possible correlations with literature data based on age ranges	Sea-level proxy elevation (m a.s.l.)
S1	West Kalamia	Two-m-high notch (surf notch), at 10 m elevation, partially filled with remnants of cemented conglomerate. The relative surf bench is overlain by a succession of (from bottom up): round pebbles gravel, a layer rich in bivalves, sandstones, breccia. At 8 m a notch (height: 1.15 m, depth: 0.64 m) with lithophagid holes. Below, several other less-evident shorelines characterized by notches and/or algae rims and lithophagid holes. These features can be followed continuously for several tens of meters in the same site.	4-12	WKB1A, WKB1B, WKB4	Shoreline II or III (Pirazzoli et al., 1996) for S1-high (at 8.34 m); shoreline IV' (Pirazzoli et al., 1996) for S1-low (at 4m)	8.34
S1	East Kalamia	Wide abrasion platform overlain by a conglomerate deposit and a segment of a notch. Another shoreline is visible almost 3 m beneath the notch.	5-10	-		8.41
S1	Krios	A well preserved algal rim with vermetids and associated lithophagid holes with bivalves in living position. Below, traces of marine corrosion. These features can be followed for hundreds of meters.	8-9	-		8.94
S1	Pachia Ammos	About 2-m-thick deposit of alternating gravel with round pebbles and sandstones characterized by ripple marks. Thickness of each layer varies from few centimeters to few decimeters. The top of the exposure consists of a high-energy gravel layer (bigger clasts). In one of the layer clasts consist of bivalve shells.	8.8-11.82	WPAB41	Shoreline IV (Pirazzoli et al., 1996)	--
S1	Paleochora	Notch carved in a pre-existing algal reef, with associated algal rim and vermetids. Also lithophagid holes and sessile bivalves can be found. Maybe displaced.	8-11	-		10.9
S2	West Kalamia	A 3-m-high notch with a polished surface and traces of karst processes.	11.76-15	-		13.10
S2	East Kalamia	A band of lithophagid holes on a subvertical wall with bivalves in living position and a notch carved in limestone.	11-14	EKB23		13.92
S2	Krios	A cave on a limestone cliff with lithophagid holes with bivalves in living position.	10.57-13.27	-		11.77 or 13.27
S3	West Kalamia	A deep (1.20 m) notch cut in limestone well preserved in a cave and also in the outside walls. Lithophagid holes associated with remnants of cemented conglomerate with round pebbles partially filling the notch.	15.70-18	-		16.50
S3	East Kalamia	A band of lithophagid holes on a subvertical wall and a notch carved in limestone, inside and outside a couple of caves. Below the main shoreline several more minor notches can be found.	13.5-17	-		16.4 or 16.99
S3	Krios	A 7-m-thick deposit, generally consisting of a fining-upward succession. The upper part is characterized by (from bottom up): 0.5-0.7 m of conglomerate with round pebbles, 0.1 to 0.3 m of breccias, occasionally coarse sandstones and, finally, up to 1 m of layered sandstones. When exposed, substratum shows lithophagid holes with bivalves in living position, maybe belonging to S2.	11.70-18.88	KB26A		16.5

S4	West Kalamia	<p>Fragments of a notch carved in limestone, quite eroded and with polished surface. The largest and best preserved segment of the notch is visible on both sides of a sea arch for a total length of a few meters. The notch is 3 m high and is partly or totally filled by a cemented conglomerate with round pebbles from few centimeters to few decimeters in size. The same conglomerate is sparsely exposed below the notch down to an elevation of ~32 m. Conglomerates are overlain by sandstones and fine breccias with arenaceous matrix. Rare shell fragments of bivalves are found in the conglomerate cement.</p>	32-38	WKB8, WKB10	34.15
S4	Paleochora	<p>A 200-m-wide platform gently seaward dipping (2°). The platform tread is characterized by a reef mainly constituted by algae, including several other organisms such as bivalves. Shell layers are common. The 1.60-m-thick algae reef overlays a cemented conglomerate with round pebbles that can reach tens of centimeters in diameter.</p>	24-28.4	CA42, CA43	34.15
S5	West Kalamia	<p>Series of aligned caves and segments of a notch, all carved in limestone. Depth and height of the largest caves are ~ 1-2 m. The longest segment of the notch is ~5 m. The height of the notch is 1.50-2 m. Karst concretions are present on the notch and cave surfaces. Lithophagid holes cover the entire height of the notch and the caves up to ~58 m of elevation. Sandstones with fine breccia intercalations are found at an elevation ranging between the base of the notch (~54 m) and ~50 m and overlay fossiliferous conglomerates characterized by round pebbles with diameters ranging from few cm to tens of cm. The top of the conglomerates dips towards the sea. The cliff between 50 and 52 m shows bioerosion features typical of the sublittoral zone.</p>	45-58	WKB5, WKB13, WKB6,	54.57
S6	West Kalamia	<p>A cave and remnants of a few-meters-long notch, both carved in limestone. The notch has a height of about 1 m and is completely filled with conglomerates characterized by round pebbles with an average diameter of about 5 cm. Because of the filling, the position of the notch retreat zone cannot be measured, but it seems to coincide with the top of the conglomerates and to the maximum convexity of the cave. No fossils found.</p>	73-77	-	74.84

Table S3 – Dated samples

Sample Code	Lab code	Locality	Sample description	Sample elevation (m a.s.l.)	Error (± m)	Associated shoreline	Shoreline elevation (m a.s.l.)	XRD	d13C	Conventional Radiocarbon Age (y BP)	2σ Calibrated Age range (y BP)	2σ Calibrated Age range (y AD/BC)
WKB1B	Beta-232642	West Kalamia (35.2381N, 23.6670E)	Shell. Vermetids cemented on the shell fragment WKB1A	5.93	0.1	S1	S1-high; 8.34 S1-low; ~4	N.D.	-0.5	2190±0.040	1519-1933	17-431AD
WKB1A	Beta-232641	West Kalamia (35.2381N, 23.6670E)	Shell. Spondylus sp. fragment found in a coarse sand conglomerate deposit.	5.93	0.1	S1	S1-high; 8.34 S1-low; ~4	Arg+Cal+Qz	-0.9	2260±0.040	1591-2029	80BC-359AD
WPAB41	Poz-26565	Pachia Ammos (35.2349N, 23.676E)	Shell. Bivalve shell found in a conglomerate deposit.	10.31	1.51	S1	S1-high; 8.34 S1-low; ~4	N.D.	-8.4	2348±0.033	1707-2125	176BC-243AD
WKB4	Beta-232643	West Kalamia (35.2381N, 23.6670E)	Shell. Lithophaga sp. shell found in living position.	8.00	0.1	S1	S1-high; 8.34 S1-low; ~4	N.D.	2.5	2710±0.040	2142-2652	703-193BC
KB26A	Poz-26558	Krios (35.2372N, 23.5941E)	Shell. Bivalve shell found in sandstones near the top of a beach deposit.	16.00	1	S3	16.5	Arg+Cal<5%	1.6	5162±0.039	5286-5639*	3690-3337BC
EKB23	Beta-232640	East Kalamia (35.2382N, 23.6683E)	Shell. Lithophaga sp. shell found in living position near the top of a band of lithophaga holes.	13.50	0.4	S2	14	N.D.	-7.6	18400±0.080	21040-21880	N.D.
WKB5	Beta-232644	West Kalamia (35.2381N, 23.6670E)	Shell. Bivalve fragment found in the matrix of a polygenic conglomerate deposit.	48.83	0.7	S5	55	Arg	-3.1	19480±0.090	22320-23030; 23070-23290*	N.D.
WKB13	Beta-234184	West Kalamia (35.2381N, 23.6670E)	Shell. Bivalve fragment found in a conglomerate deposit.	48.83	0.7	S5	55	N.D.	0.1	26930±0.160	30810-31300	N.D.
CA43	Poz-26557	Paleochora (35.2272N, 23.6792E)	Shell. Bivalve fragment found cemented at the top of an algae reef.	26.55	1.85	S4	34	N.D.	-8.9	36993±0.642	40340-42530	N.D.
WKB10	Beta-232647	West Kalamia (35.2381N, 23.6670E)	Shell. Bivalve fragment found in the sandy matrix of a gravel layer partially filling a notch.	33.38	0.1	S4	34	Arg Arg+Cal<5%†	and -1.5	37530±0.330	41380-42450	N.D.
WKB8	Beta-232646	West Kalamia (35.2381N, 23.6670E)	Shell (Glycymeris sp.).	33.03	0.1	S4	34	Arg+Cal<5%	0.2	38250±0.350	41840-42950	N.D.
WKB6	Beta-232645	West Kalamia (35.2381N, 23.6670E)	Shell. Bivalve fragment found loose in the ground near the basis of a conglomerate deposit.	48.14	0.1	S5	55	Arg	-0.5	39190±0.380	42370-43770	N.D.
CA42	Poz-26556	Paleochora (35.2272N, 23.6792E)	Shell. Bivalve found at -1.50 m from top of an algae reef.	25.05	1.85	S4	34	N.D.	-3.5	42402±1.102	43490-47430	N.D.

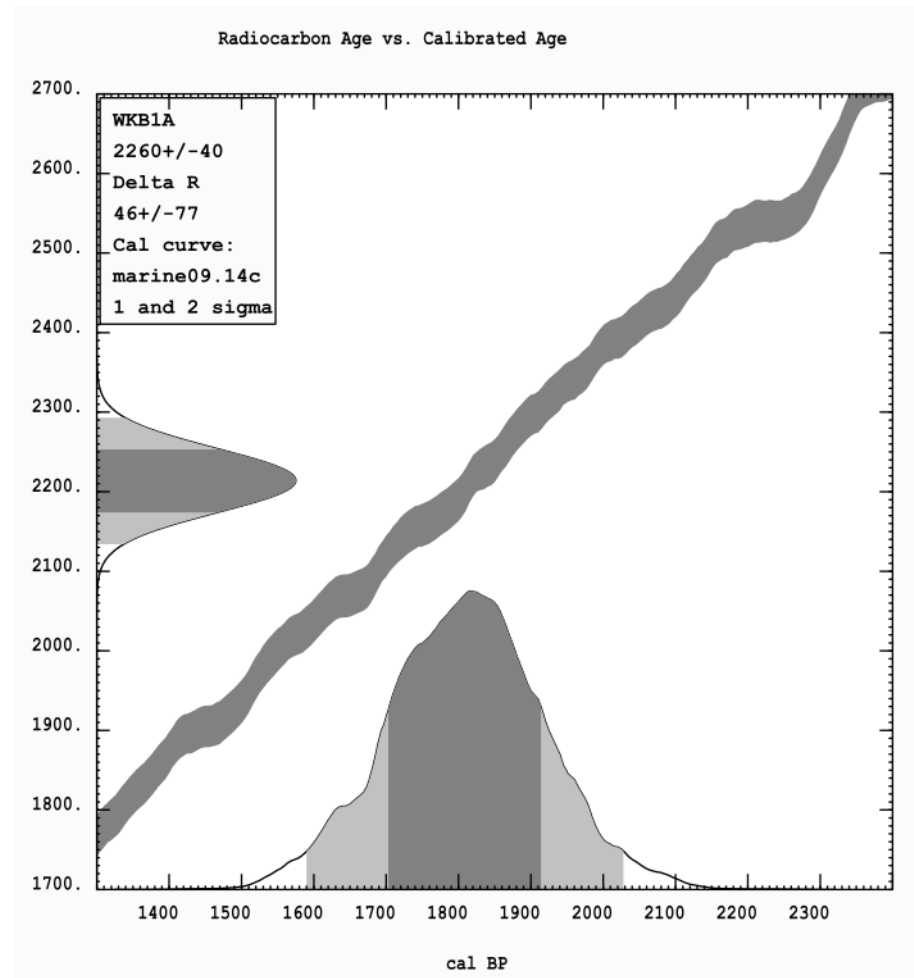
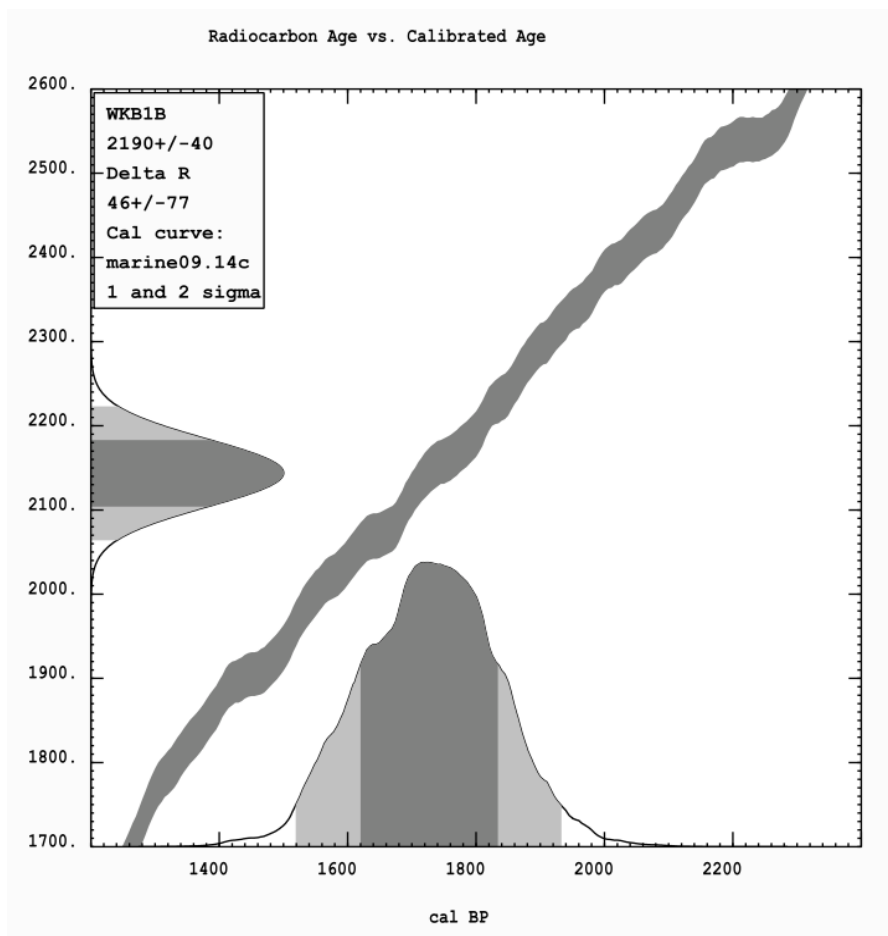
Notes: Results are rounded to the nearest 10 y for samples with standard deviation in the radiocarbon age greater than 50 y. †Four fragments: 1) Arg; 2) and 3) Arg+Cal; 4) no XRD; *Full range of multiple calibration peaks.

Table S4 – ΔR values in the Mediterranean Sea. Values used to calculate the average ΔR for the entire basin (Marine Reservoir Correction Database, <http://calib.qub.ac.uk/marine/>).

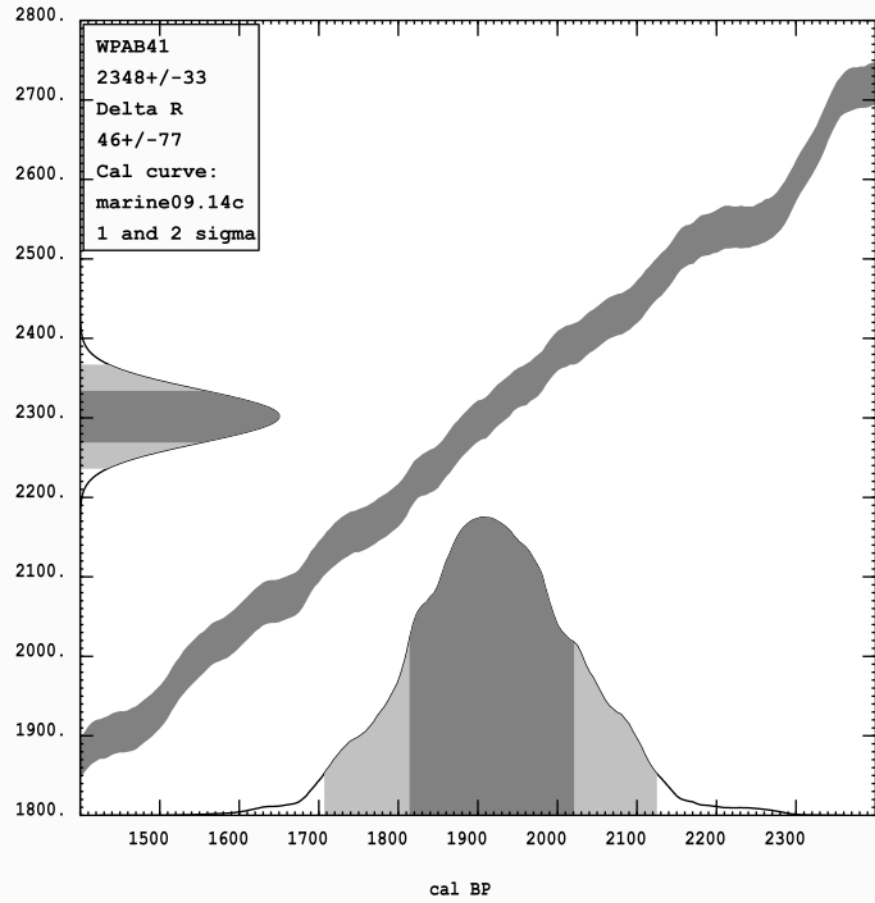
MapNo	Lat	Lon	ΔR	σ
234	40.83	18.33	121	60
238	42.5	17	61	30
223	40.92	14.08	59	40
224	40.92	14.08	147	110
225	38	14	71	50
236	43.83	15.5	-95	35
230	37.75	20.75	158	40
220	42	12	-18	60
221	42	12	31	60
235	44.07	12.57	139	28
237	45	13.5	-61	50
242	37.95	22.63	148	40
241	37.57	22.8	40	40
222	42.67	8.67	46	40
245	40.5	26	151	40
205	43.55	7	-25	40
206	43.5	6.67	-7	35
215	43.17	5.98	-85	35
207	43.17	5.92	7	40
243	40.5	28.58	71	40
208	43.33	3.5	34	35
209	43.33	3.5	74	40
210	42.5	3	121	35
216	42.5	3	111	55
201	36.75	3	148	35
218	36.8	2.92	165	40
219	36.8	2.92	55	40
204	36.58	2.5	33	50
203	36.53	1.92	11	35
1494	32.6432	34.9227	-20	50
1491	32.6432	34.9227	75	50
1493	32.8431	35.0138	-115	50
1495	32.3384	34.8482	47	40
1492	32.3384	34.8482	-70	50
231	33.87	35.5	37	40
232	33.87	35.5	-52	50
217	36.75	-4.42	-22	35

Notes: number of points: 37; weighted mean ΔR : 46; standard deviation (square root of variance): 77; average uncertainty: 7.

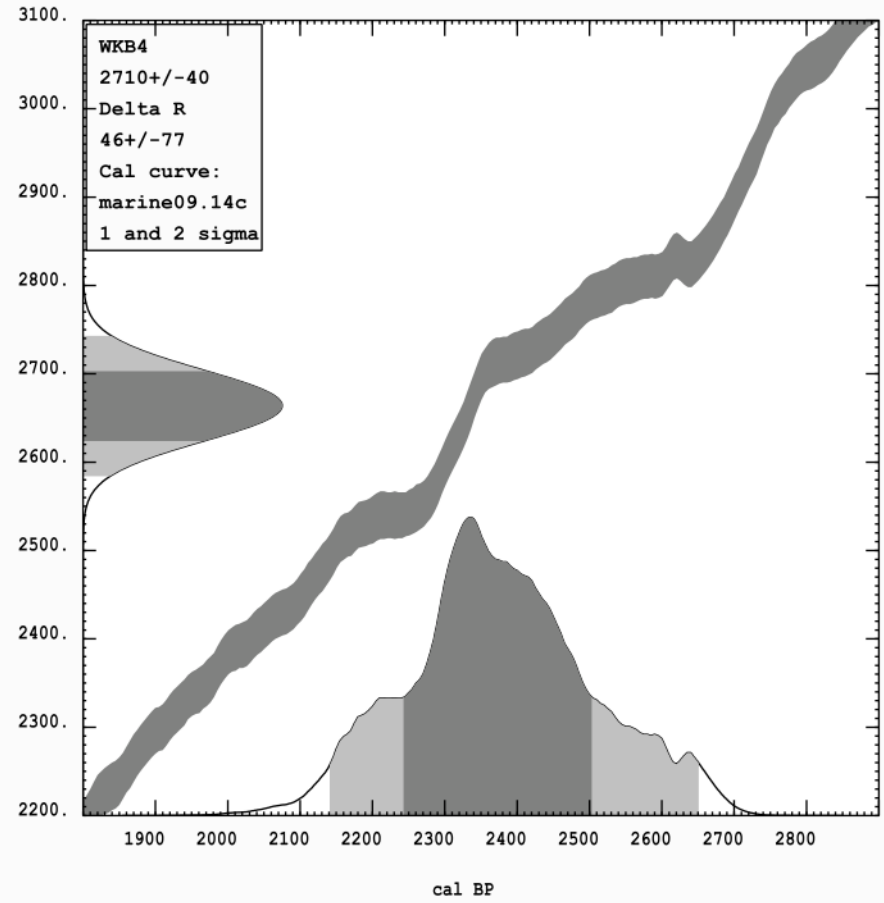
Figure S1 - Calibration curves of each calibrated sample (17 panels).



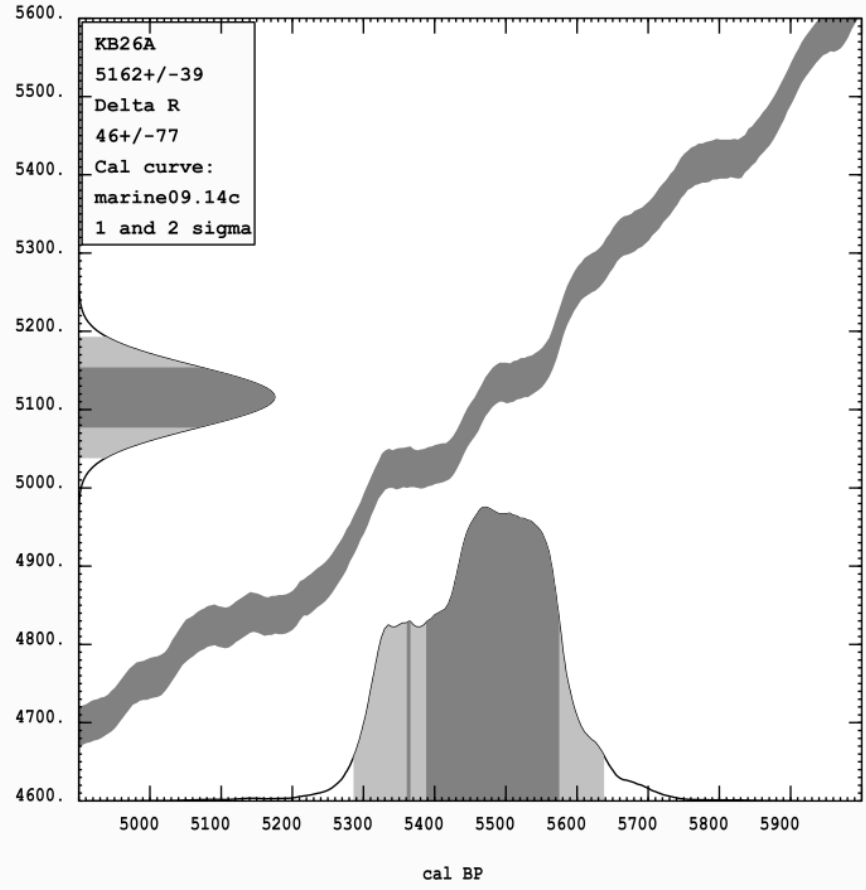
Radiocarbon Age vs. Calibrated Age



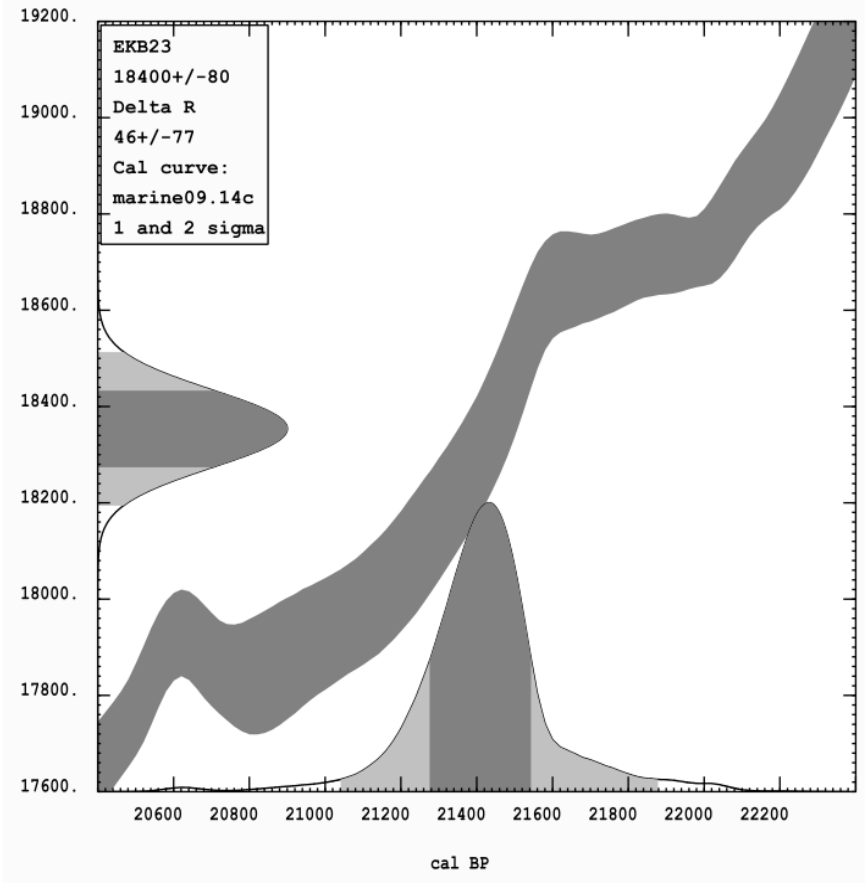
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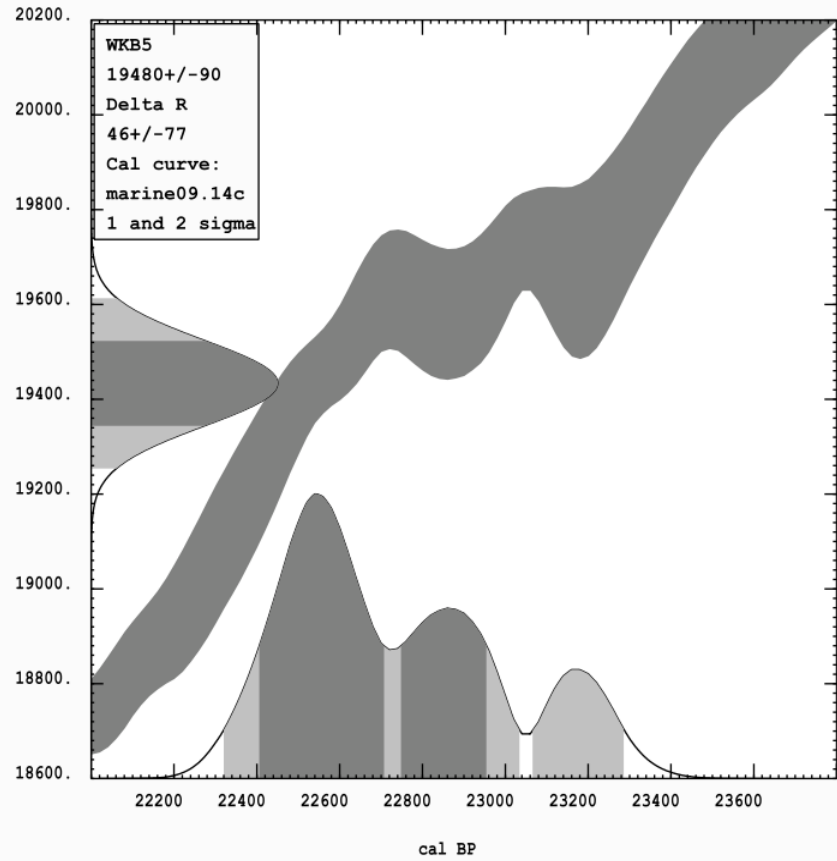
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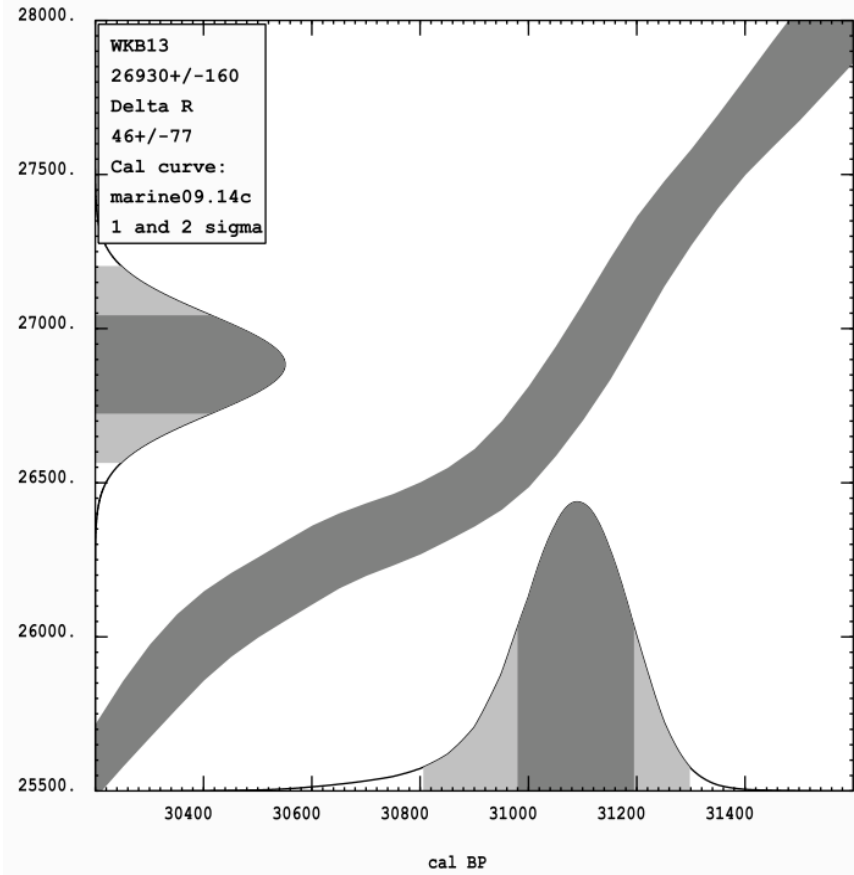
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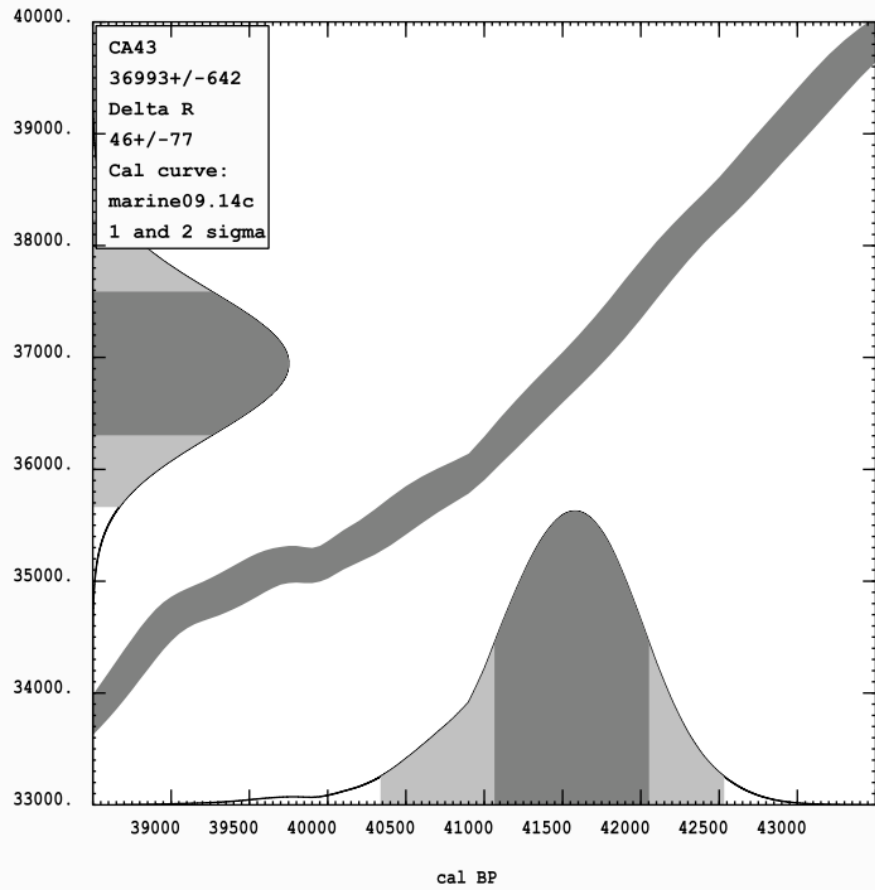
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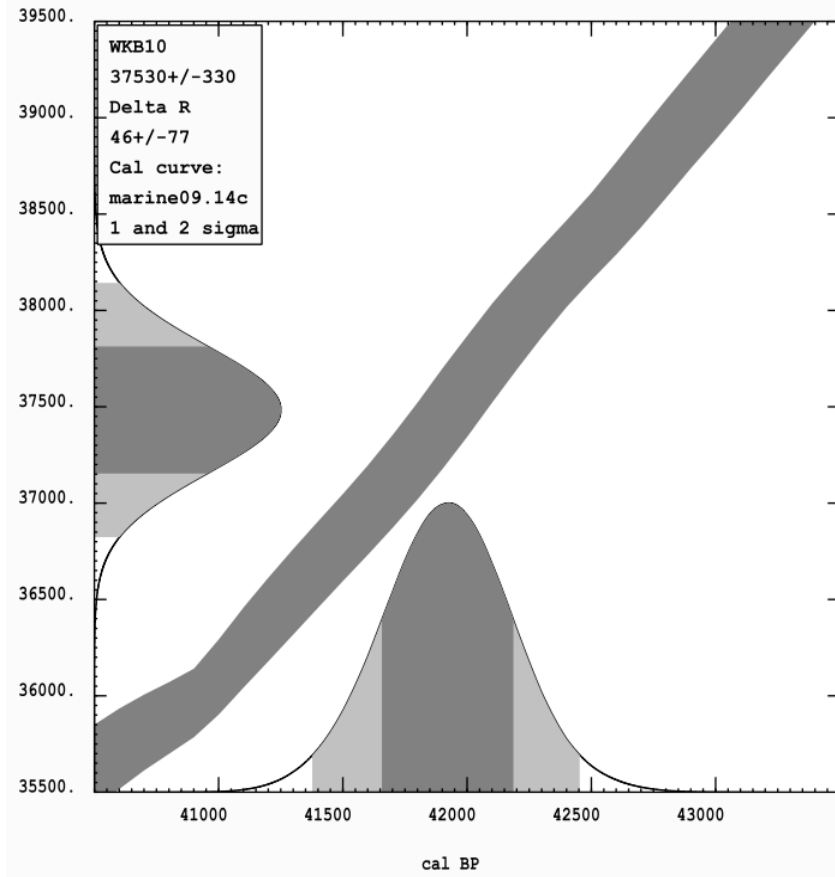
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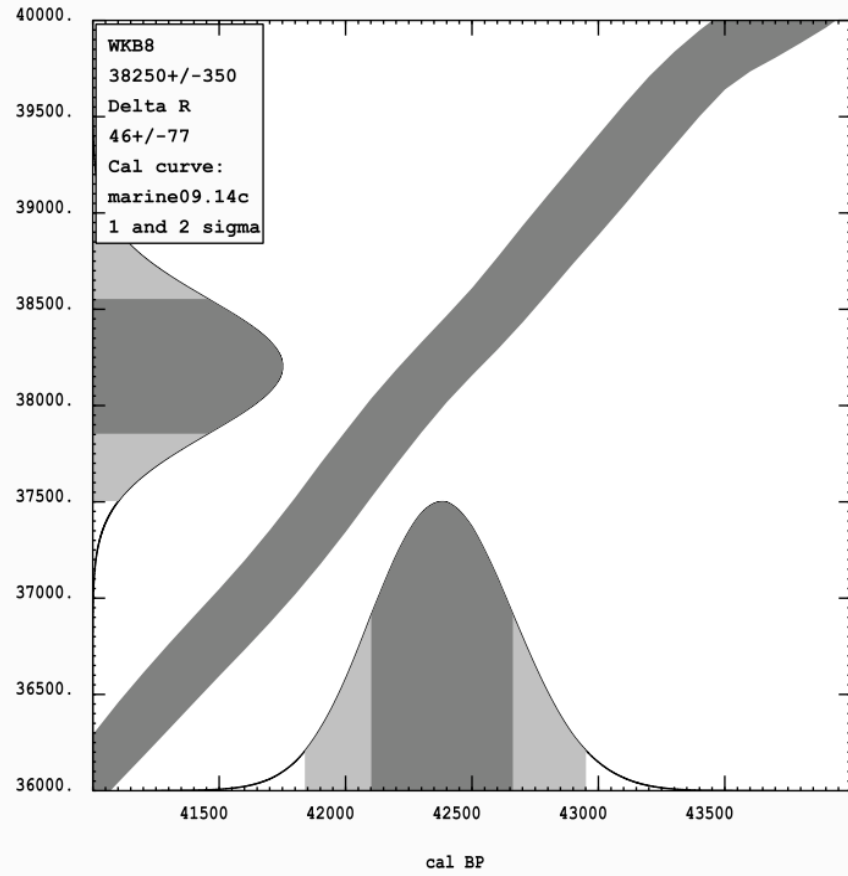
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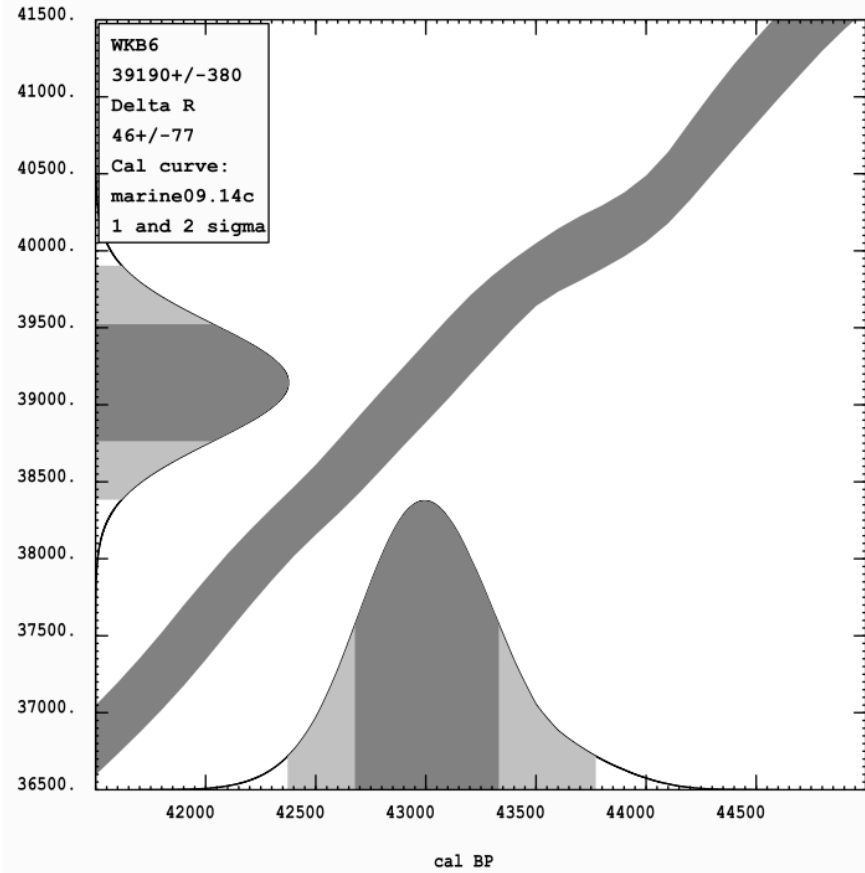
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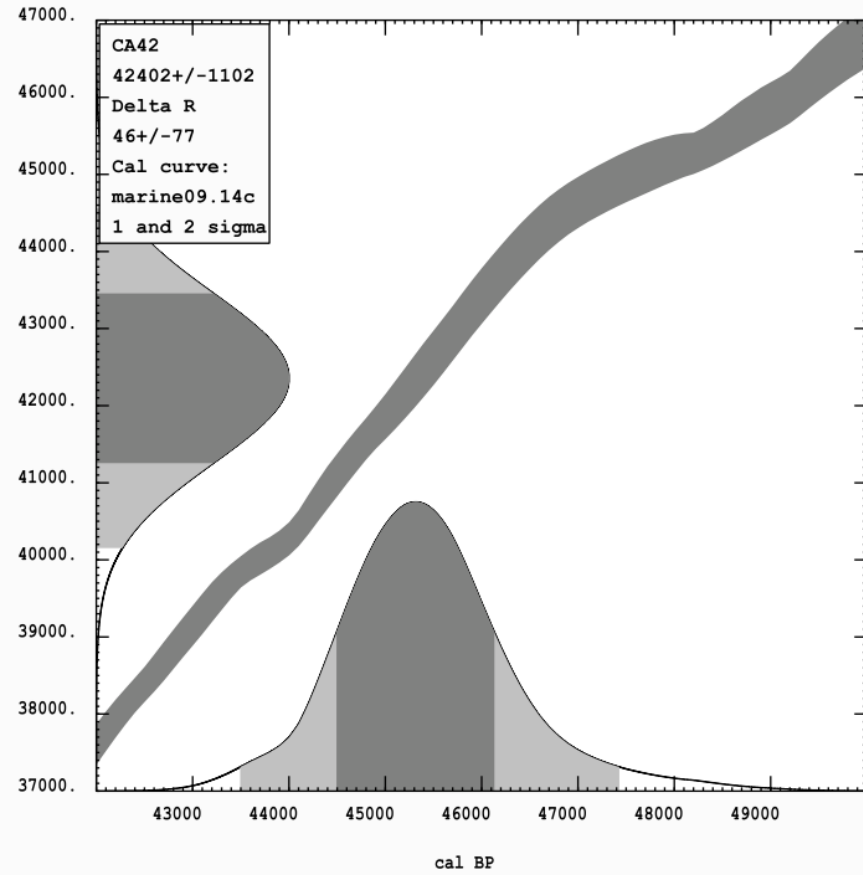
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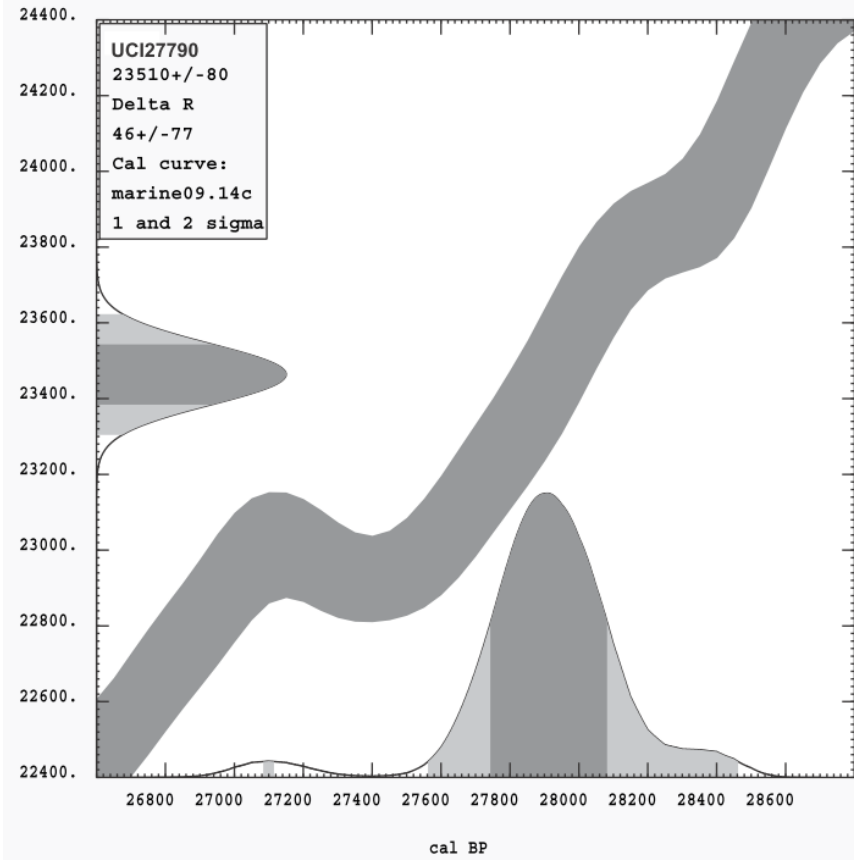
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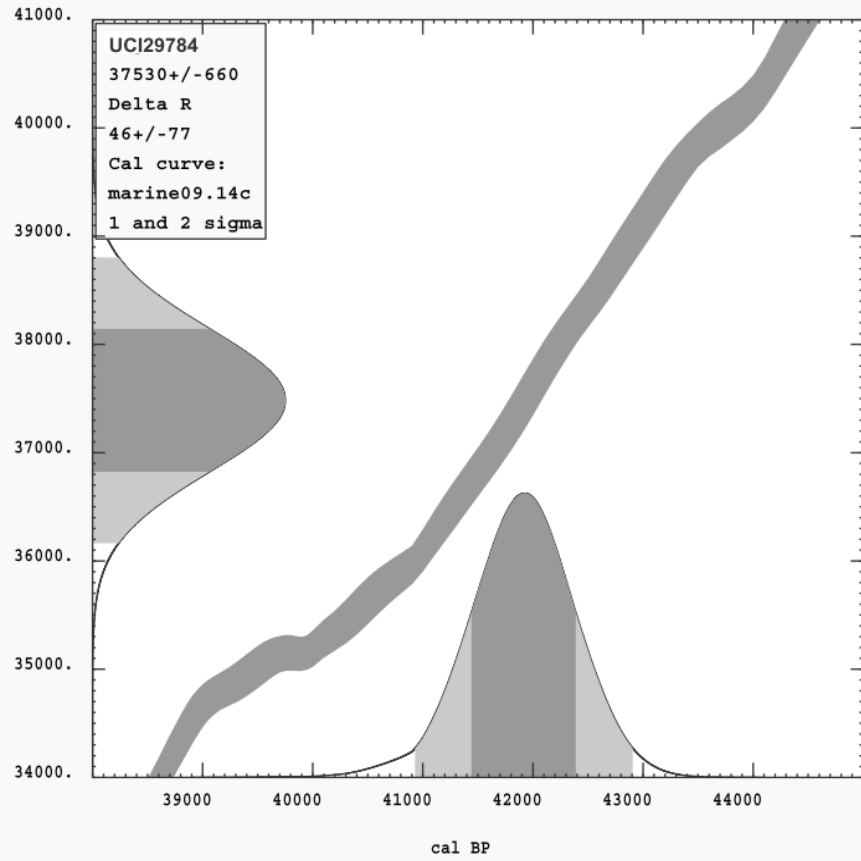
Radiocarbon Age vs. Calibrated Age



Radiocarbon Age vs. Calibrated Age



Radiocarbon Age vs. Calibrated Age



Radiocarbon Age vs. Calibrated Age

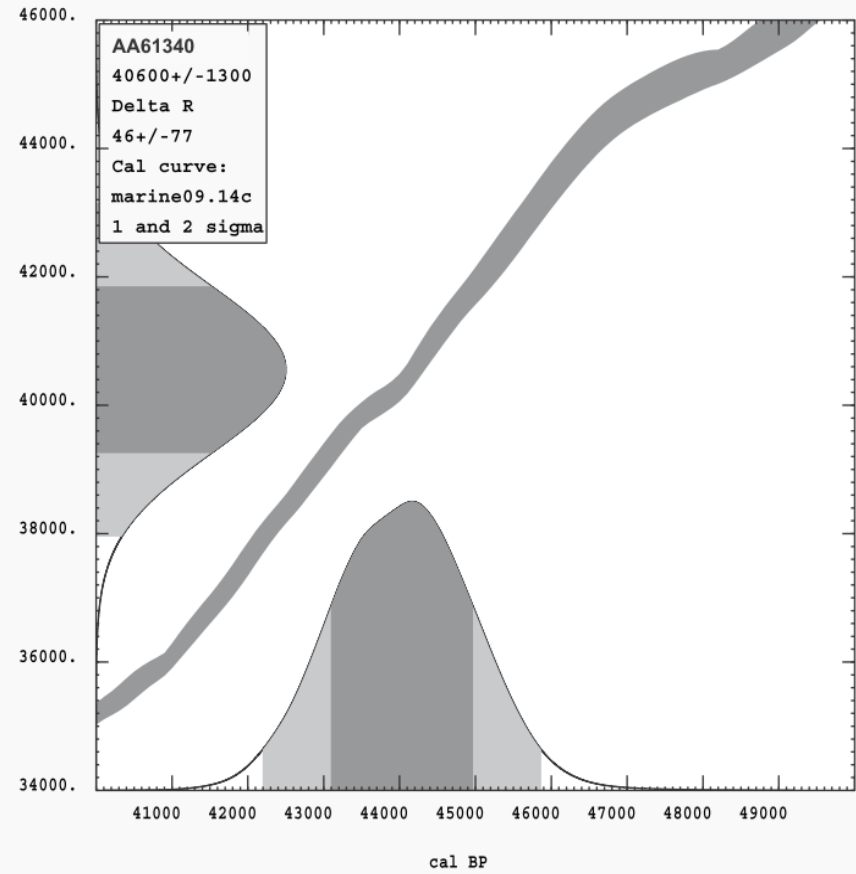
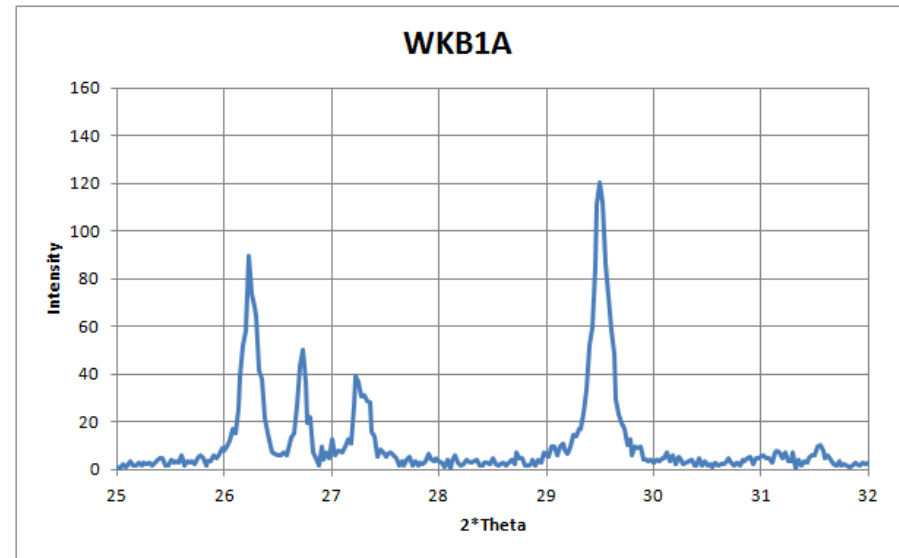
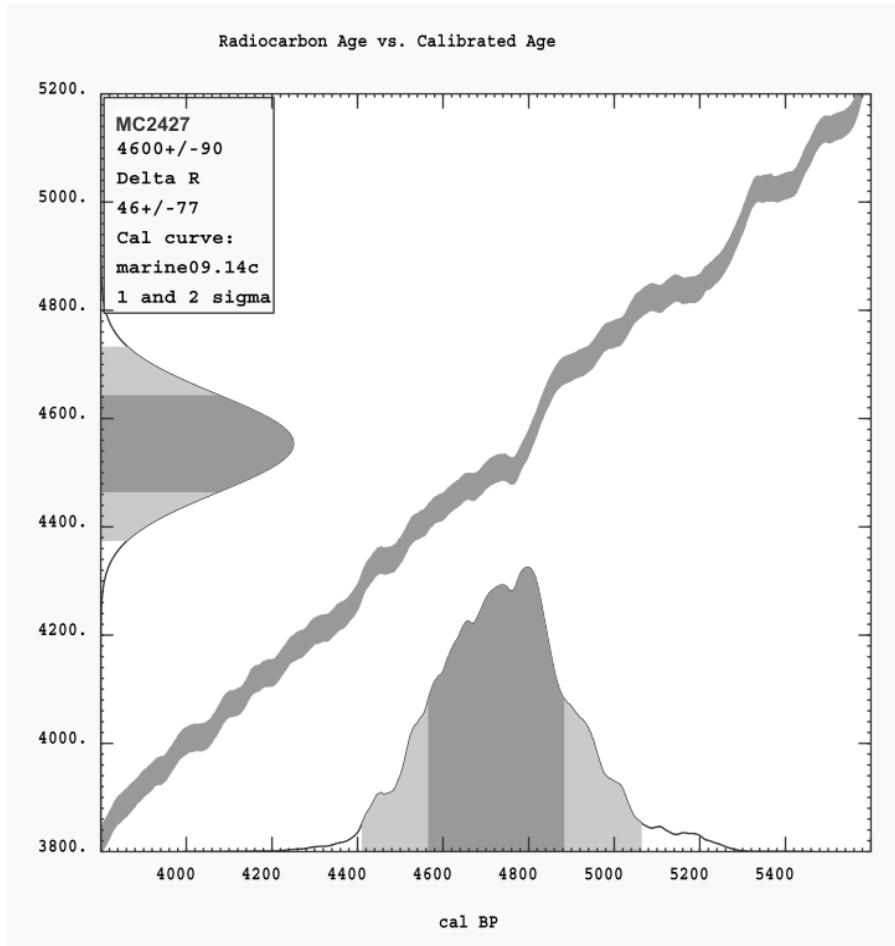
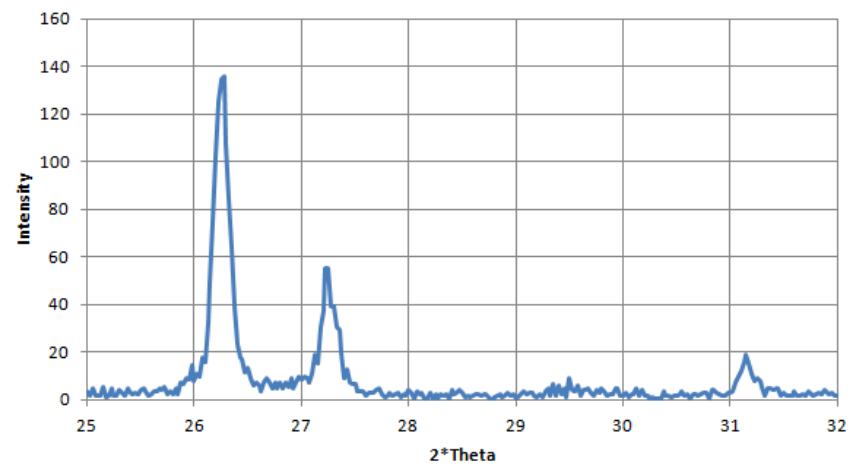
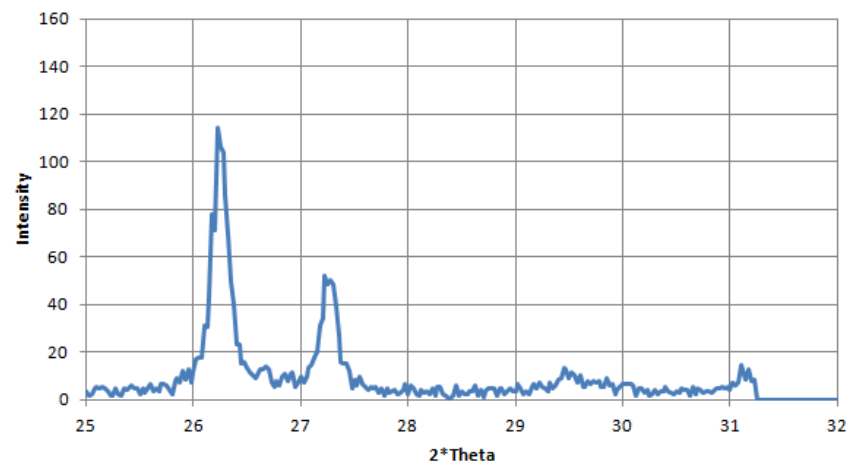
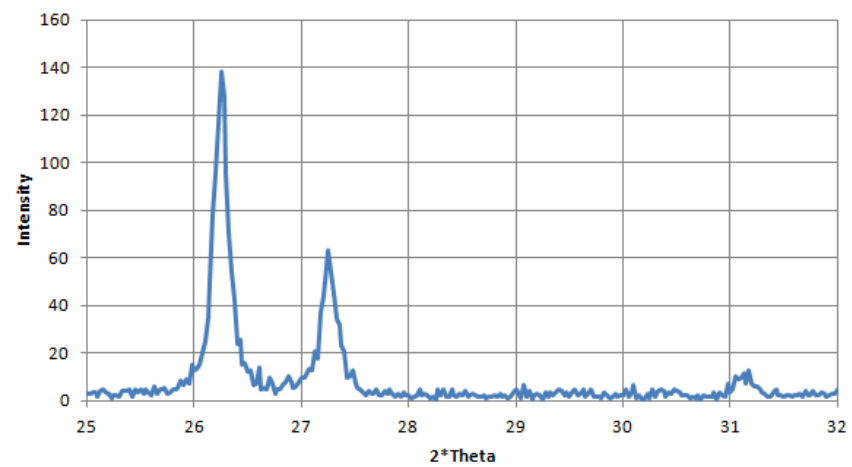
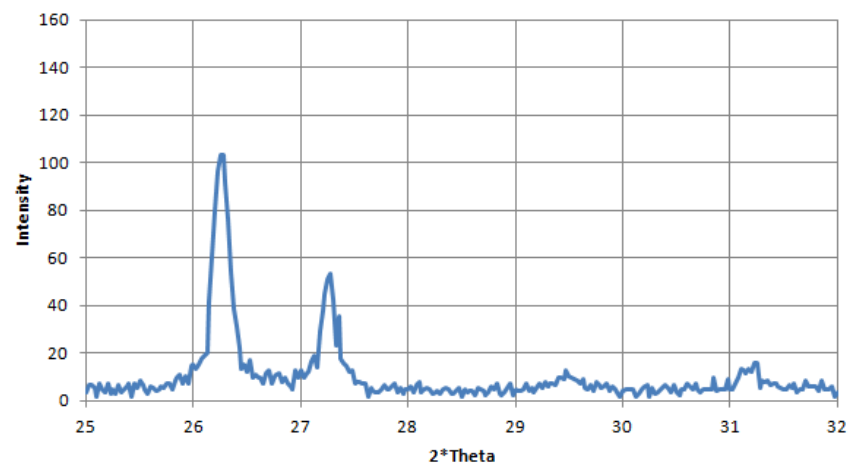


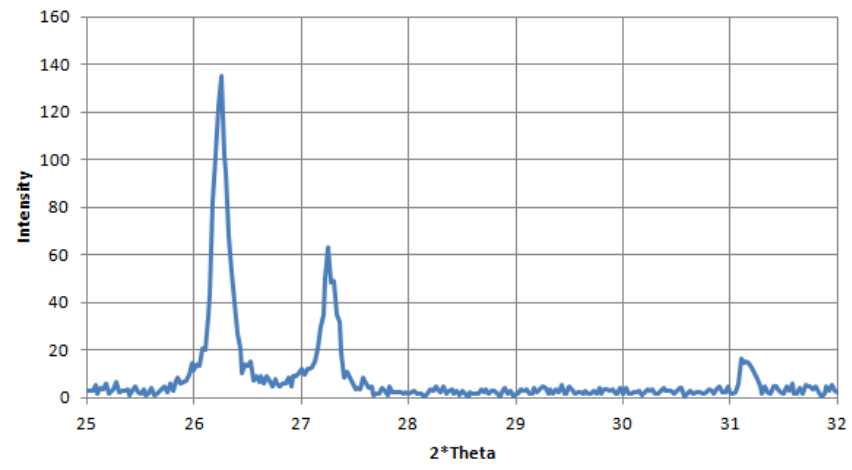
Figure S2 - XRD graphs for each analyzed sample (7 panels).



Note: WKB1A is a *Spondylus* sp., hence the outer part of the shell is expected to be made of calcite.

WKB5**KB26A****WKB6****WKB8**

WKB10



WKB10mix

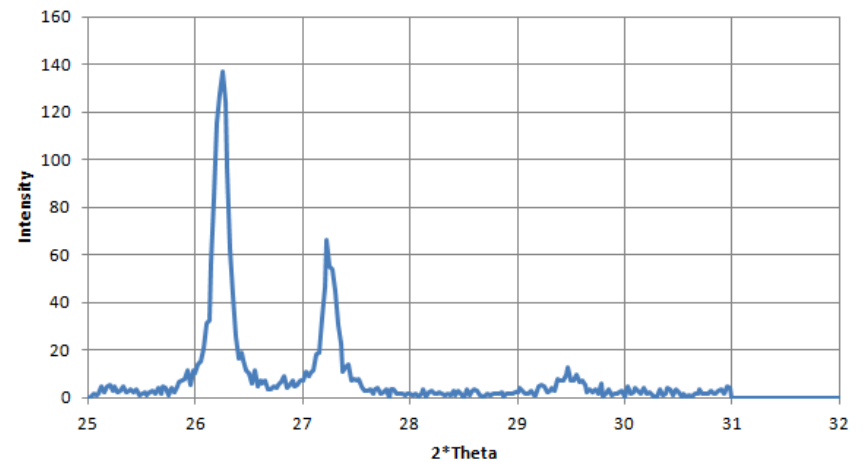


Figure S3 – Shoreline elevation and age of the associated samples, along with uncertainties, compared with the eustatic curve by Waelbroeck et al. (2002). We-36Cl and We-14C: Wegmann (2008); Sh-14C: Shaw et al. (2008); Ke-14C: Kelletat and Zimmerman (1991).

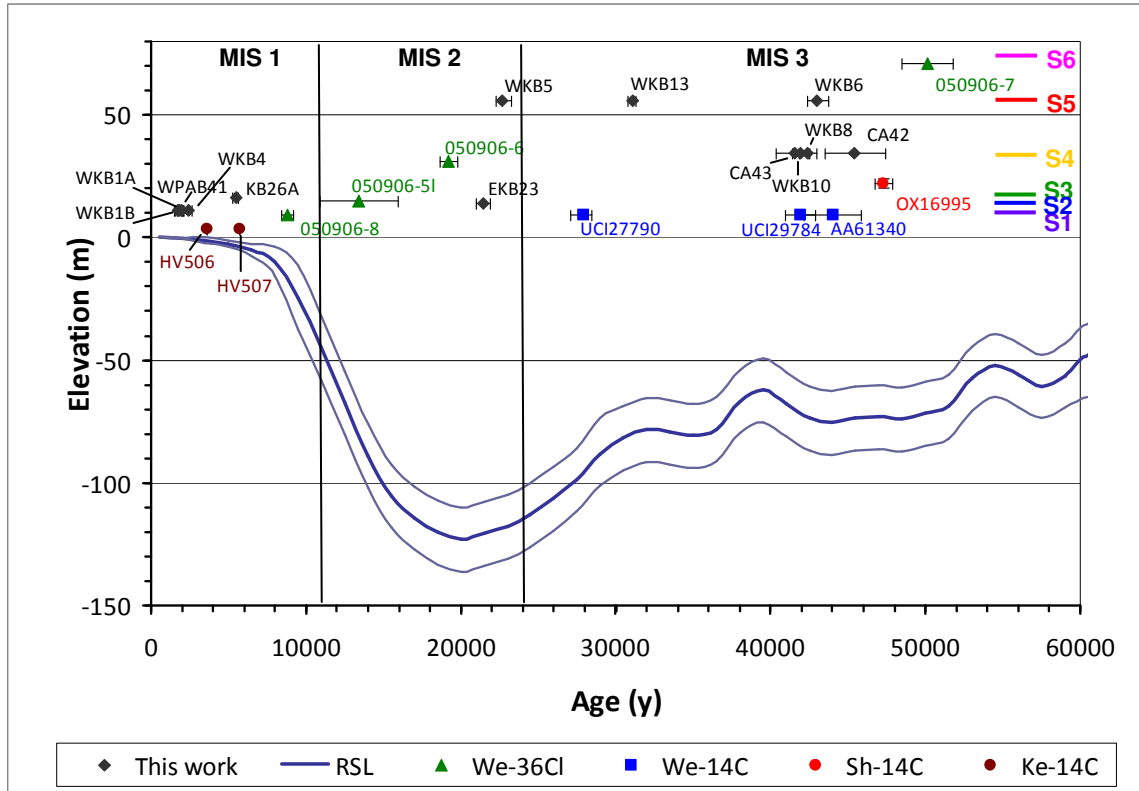


Table S5 – Two-layer model.

Depth (km)	Density (kg/m ³)	Vp (m/s)	Vs (m/s)	Viscosity (Pa s)	Relaxation
0	2880	6.437	3.164	∞	1
33	3310	7.900	3.310	10 ¹⁹	0.001

Table S6- Profile geographic coordinates.

LatSW	Lon SW	LatNE	LonNE	Lat Paleochora	Lon Paleochora
32.47	20.88	36.54	25.03	35.24	23.71

Table S7 – Fault parameters.

Fault	Lat*	Lon*	Depth to top (km)	Depth to bottom (km)	Strike (deg)	Dip (deg)	Rake (deg)	Length (km)	Width (km)	Slip (m)
A1: Front-section Interface	34.61	23.06	14	20	310	4	90	160	80	3.5
A2: Front-section Splay	34.61	23.07	4	20	310	12	90	160	80	3.5
B1: Rear-section Interface	35.16	23.62	20	41	310	15	90	160	80	3.5
B2: Rear-section Splay	35.08	23.53	5	35	310	22	90	160	80	3.5

* Geographic coordinates refer to fault mid-upper edge intersection with profile in Figure 1.

Figure S4 – Coseismic and steady-state displacement profiles for faults in the front section of subduction zone causing subsidence in Paleochora (2 panels).

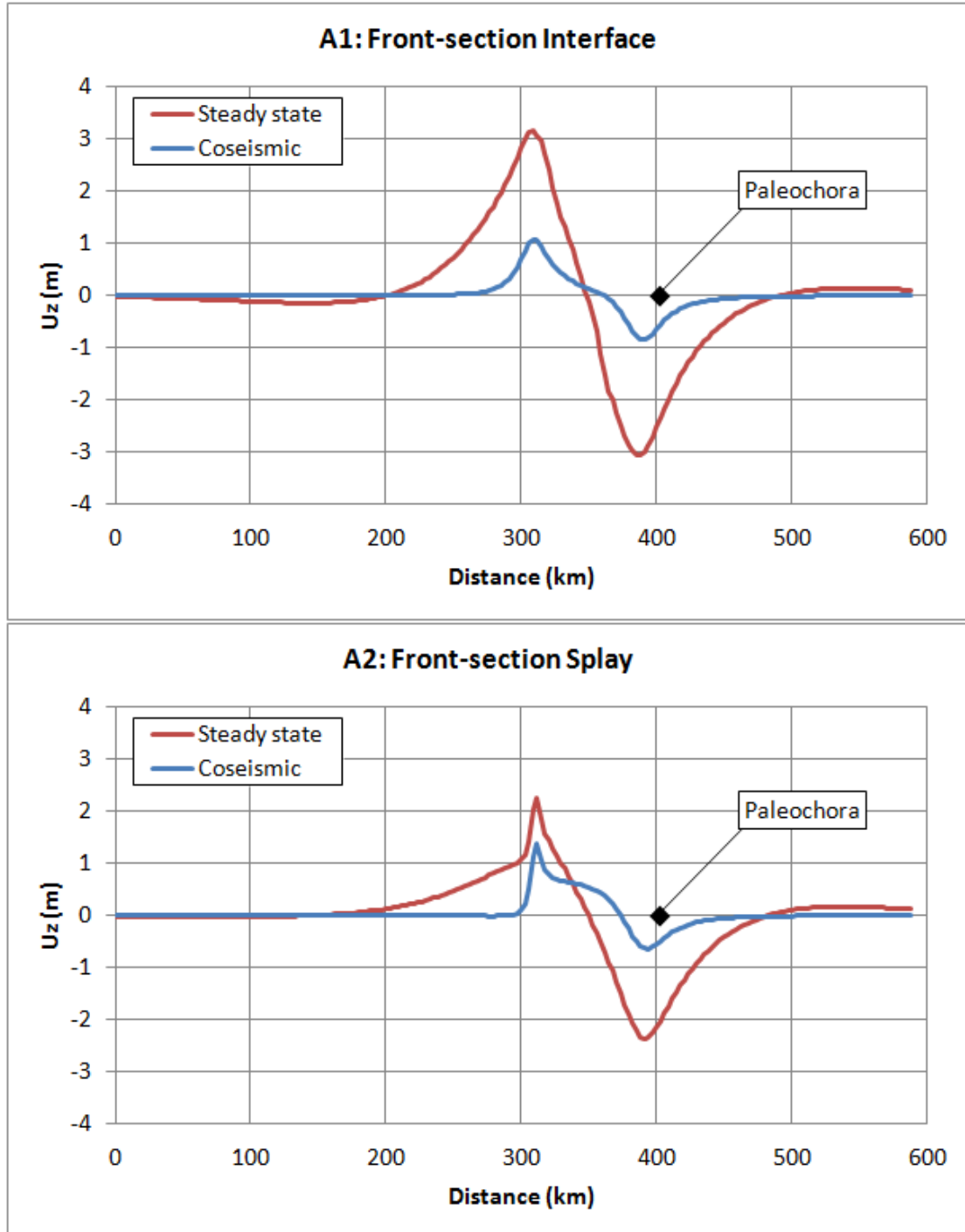


Figure S5 – Coseismic and steady-state displacement profiles for faults in the rear section of subduction zone causing uplift in Paleochora (2 panels).

