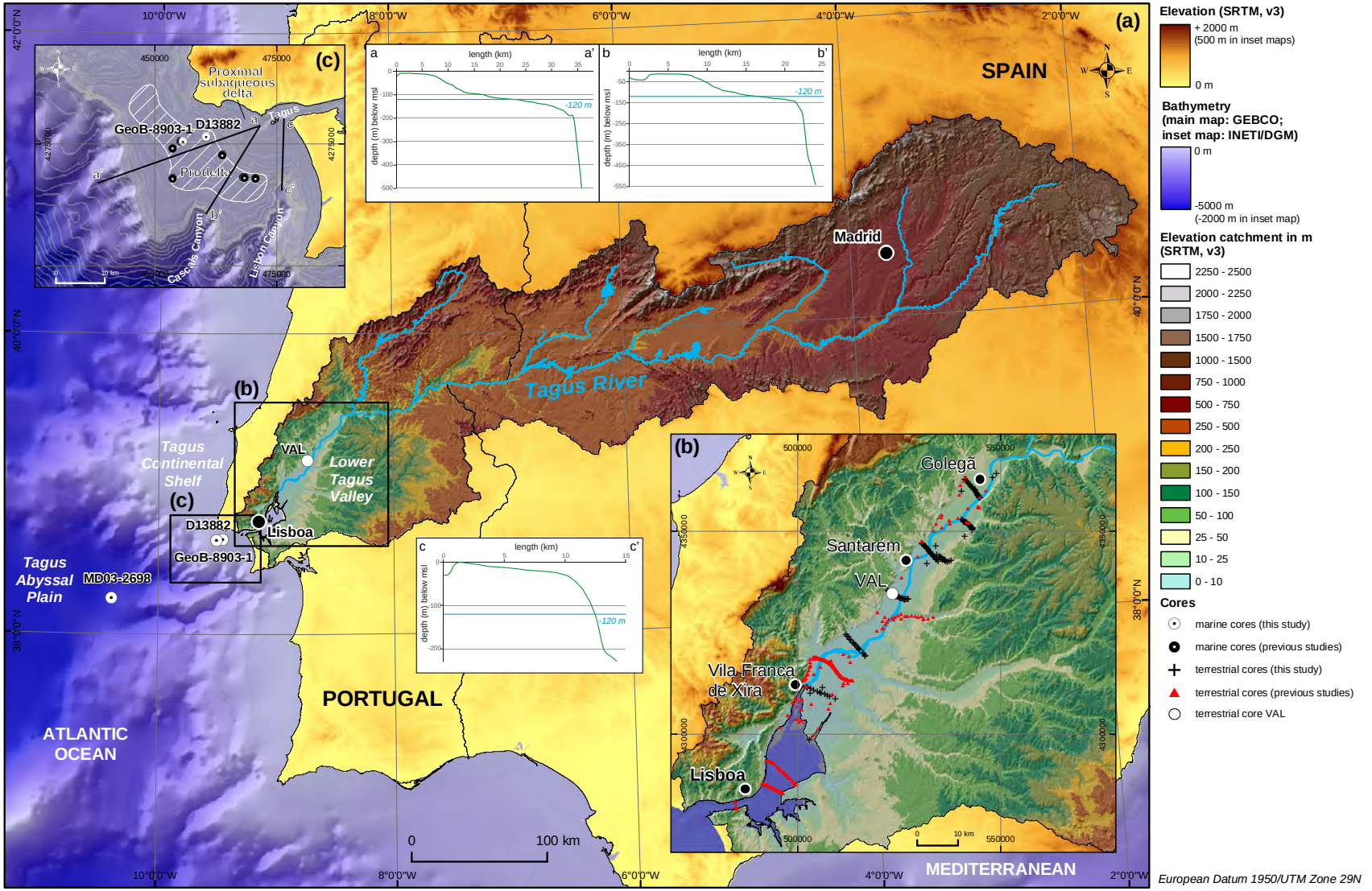
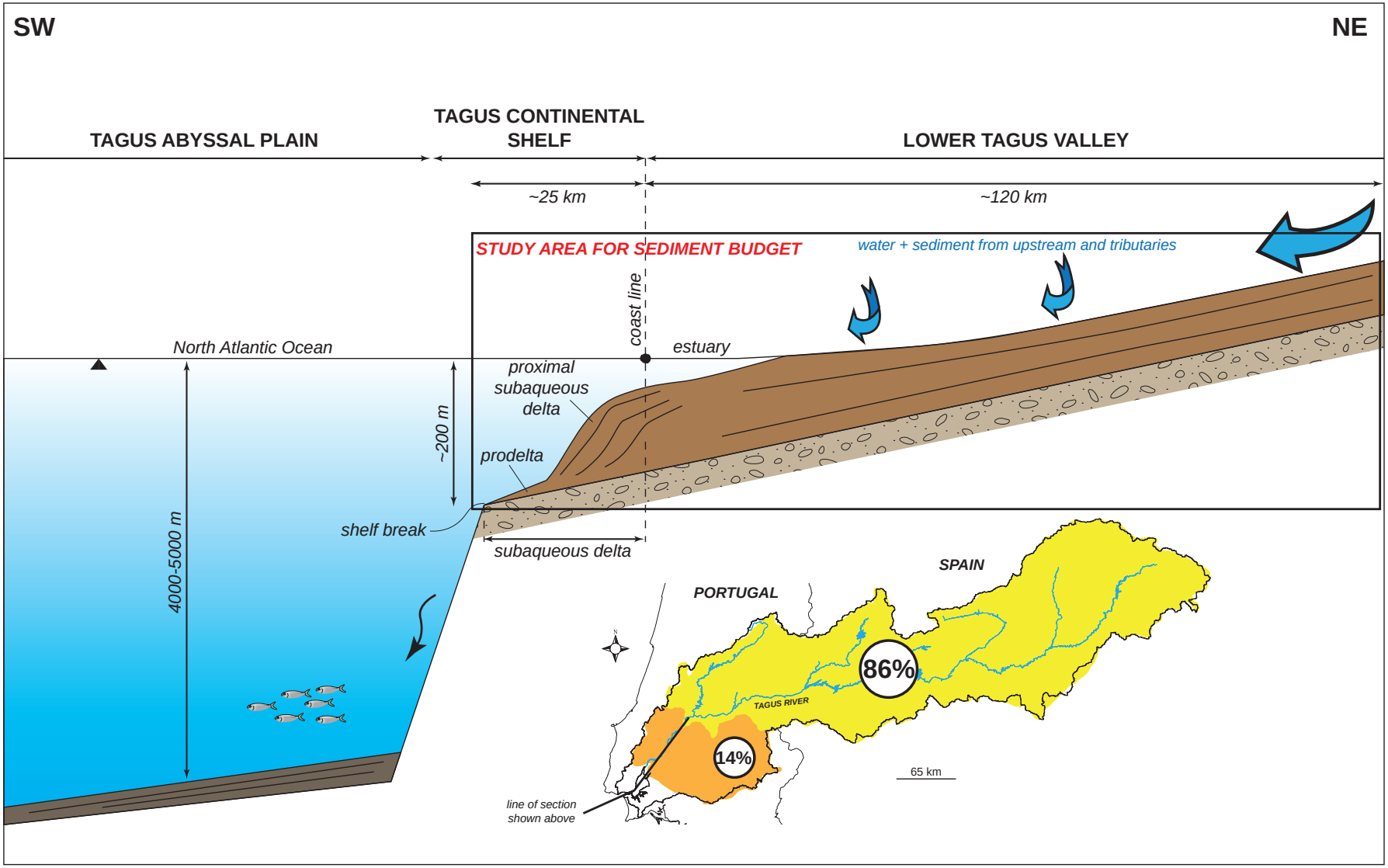
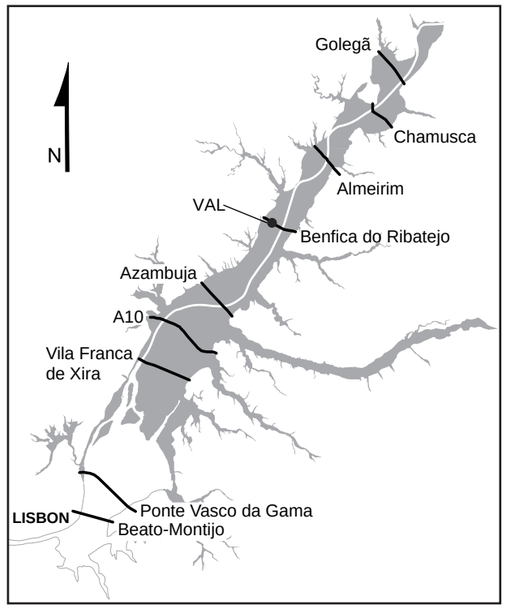
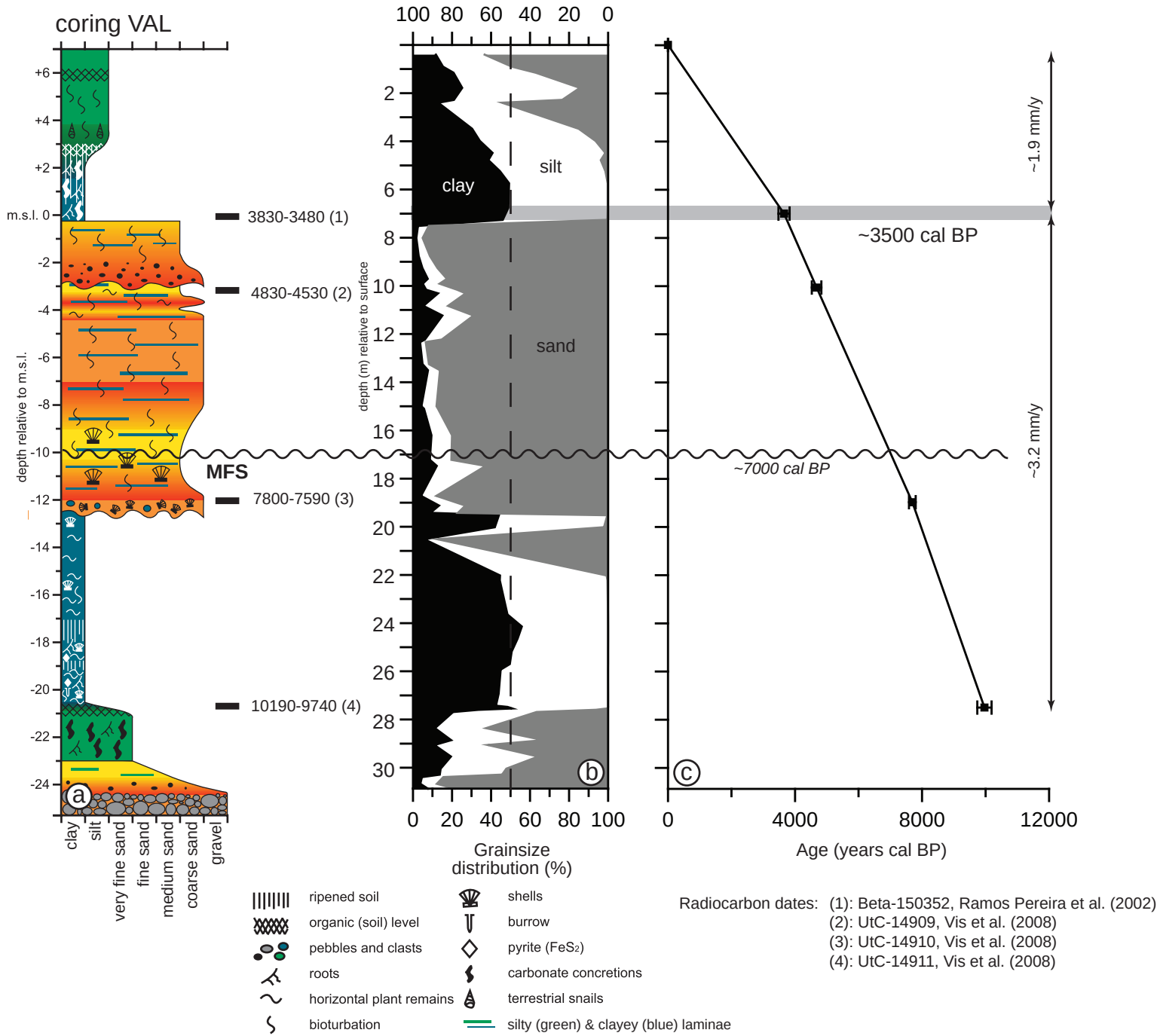
Time-integrated 3D approach of late Quaternary sediment-depocenter migration in the Tagus depositional system: From river valley to abyssal plain


(a)
SPAIN
PORTUGAL
ATLANTIC OCEAN
MEDITERRANEAN
Madrid
Tagus River
Tagus Continental Shelf
Lower Tagus Valley
Tagus Abyssal Plain
MD03-2698
VAL
Lisboa
D13882
GeoB-8903-1
(b)
(c)
Golegã
Santarém
Vila Franca de Xira
Proximal subaqueous delta
Prodelta
Cascais Canyon
Lisbon Canyon
Tagus
a
a'
b
b'
c
c'
length (km)
depth (m) below msl
-120 m
0
100 km
10°0'0"W
8°0'0"W
6°0'0"W
4°0'0"W
2°0'0"W
42°0'0"N
40°0'0"N
38°0'0"N
Elevation (SRTM, v3)
+ 2000 m
(500 m in inset maps)
0 m
Bathymetry
(main map: GEBCO;
inset map: INETI/DGM)
0 m
-5000 m
(-2000 m in inset map)
Elevation catchment in m
(SRTM, v3)
2250 - 2500
2000 - 2250
1750 - 2000
1500 - 1750
1000 - 1500
750 - 1000
500 - 750
250 - 500
200 - 250
150 - 200
100 - 150
50 - 100
25 - 50
10 - 25
0 - 10
Cores
marine cores (this study)
marine cores (previous studies)
terrestrial cores (this study)
terrestrial cores (previous studies)
terrestrial core VAL
European Datum 1950/UTM Zone 29N

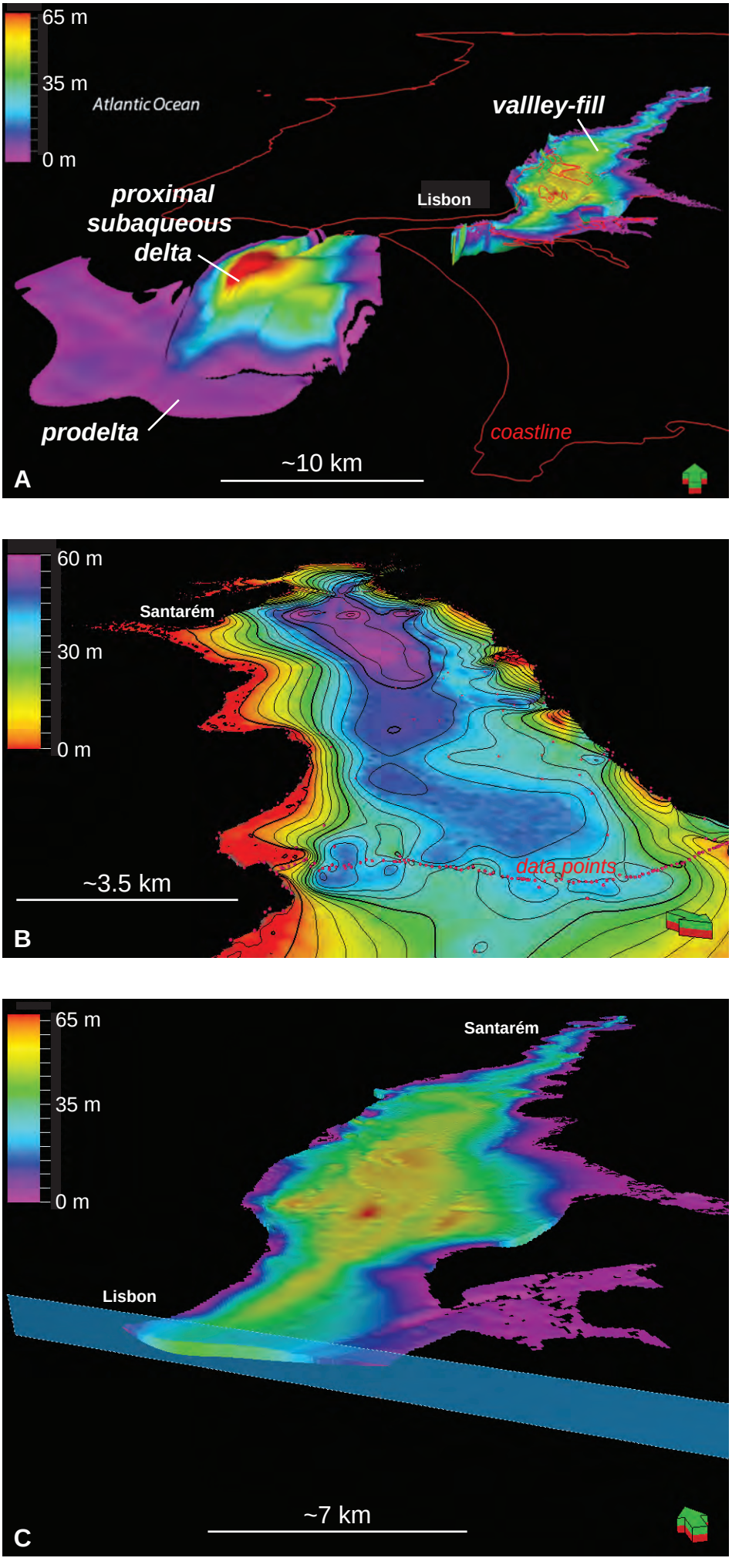

SW
NE
TAGUS ABYSSAL PLAIN
TAGUS CONTINENTAL SHELF
LOWER TAGUS VALLEY
~25 km
~120 km
STUDY AREA FOR SEDIMENT BUDGET
water + sediment from upstream and tributaries
coast line
estuary
North Atlantic Ocean
proximal subaqueous delta
prodelta
~200 m
4000-5000 m
shelf break
subaqueous delta
SPAIN
PORTUGAL
86%
14%
TAGUS RIVER
65 km
line of section shown above

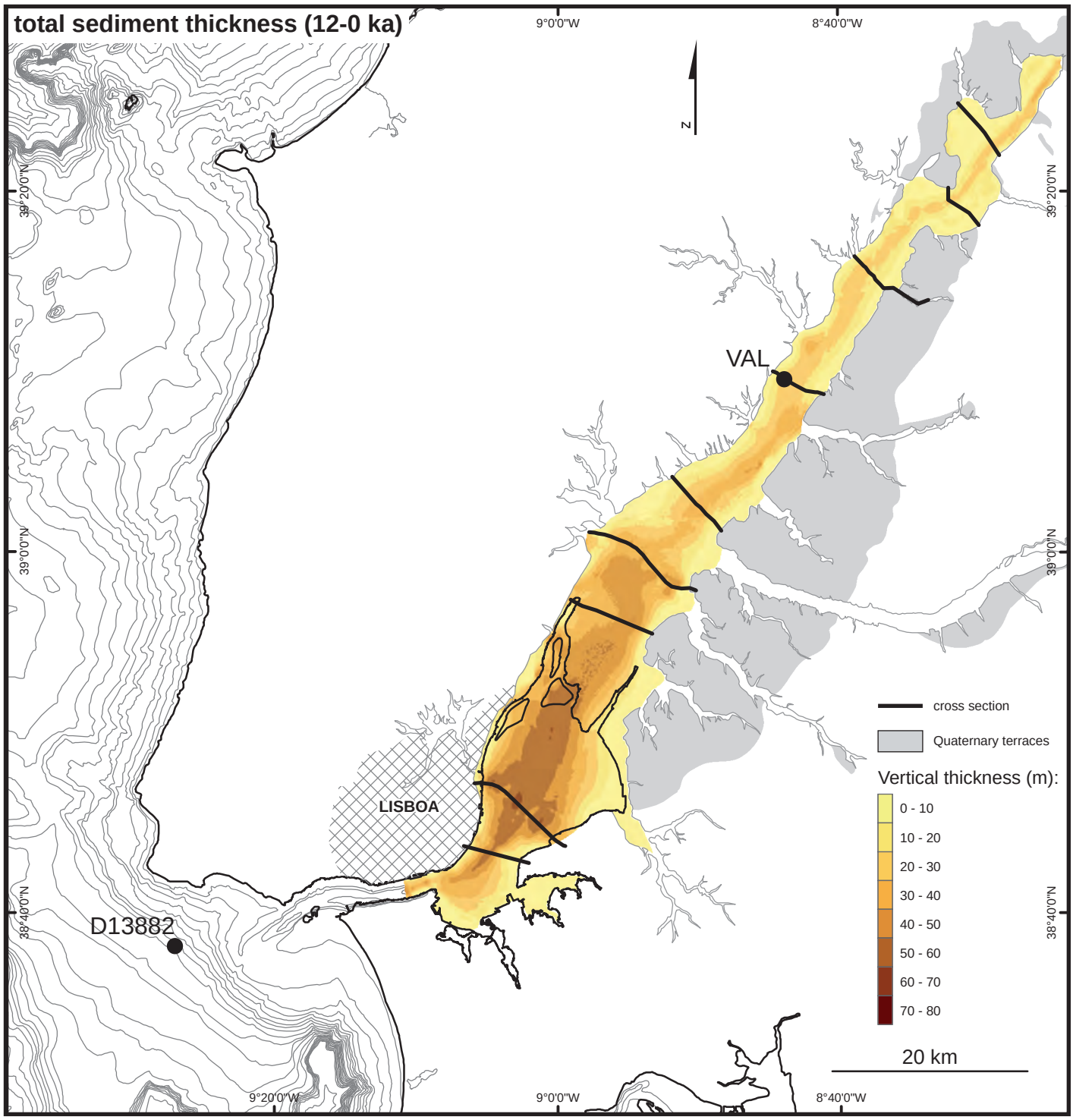

Golegã
Chamusca
N
Almeirim
VAL
Benfica do Ribatejo
Azambuja
A10
Vila Franca
de Xira
LISBON
Ponte Vasco da Gama
Beato-Montijo

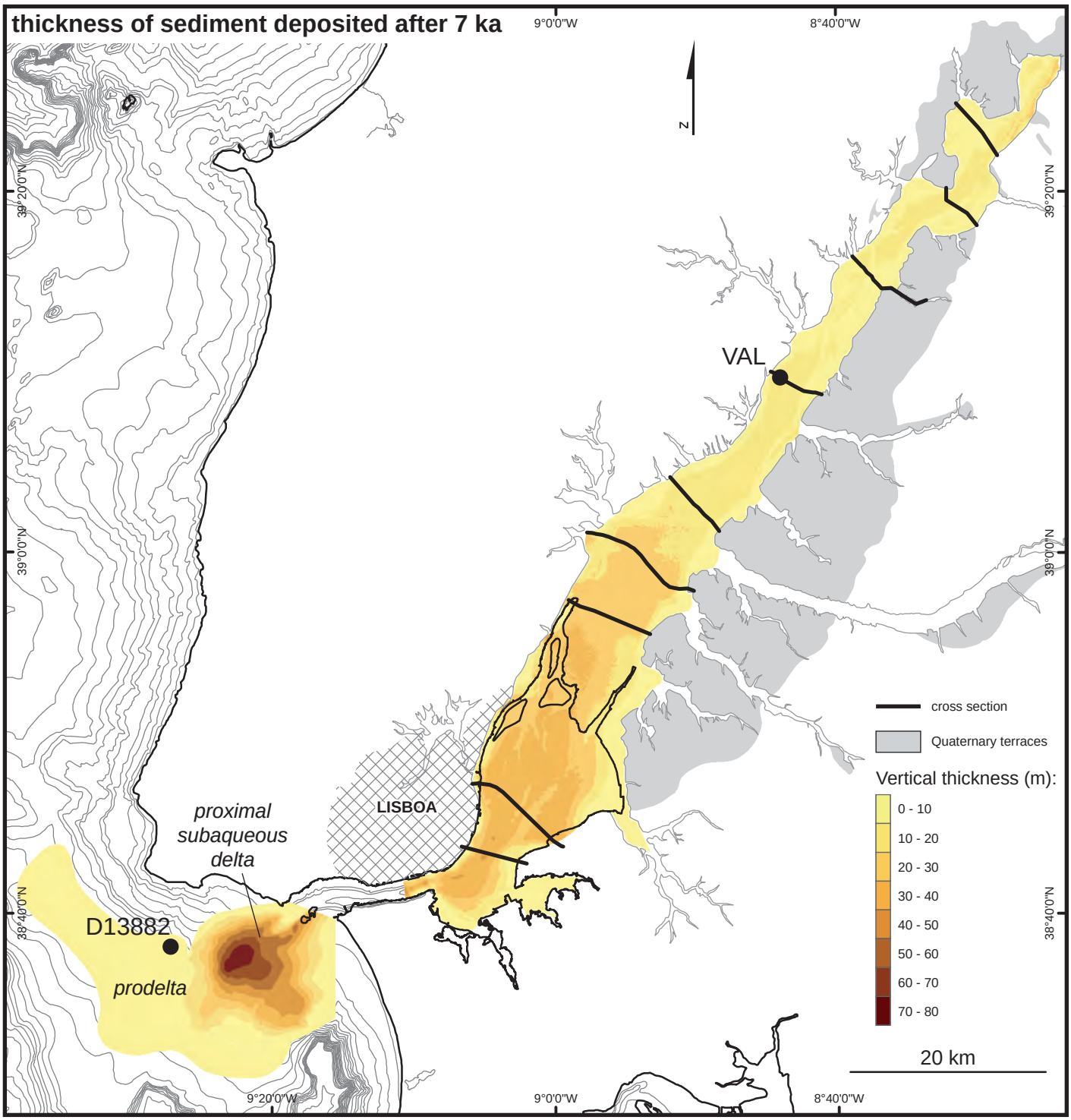
NE
~90 km
~16 m
Golegã
VAL
~25 m
Chamusca
Almeirim
Benfica do Ribatejo
Azambuja
~60 m
A10
Vila Franca de Xira
~80 m
Ponte Vasco da Gama
Beato-Montijo
3 km
SW
depth (m) relative to m.s.l.
40
20
0
-20
-40
-60
-80
-100
fluvial lowstand and terrace deposits
pre-MFS deposits (12000-7000 BP)
post-MFS deposits (7000-0 BP)
Mesozoic deposits
Miocene deposits
landfill deposits
water
dike

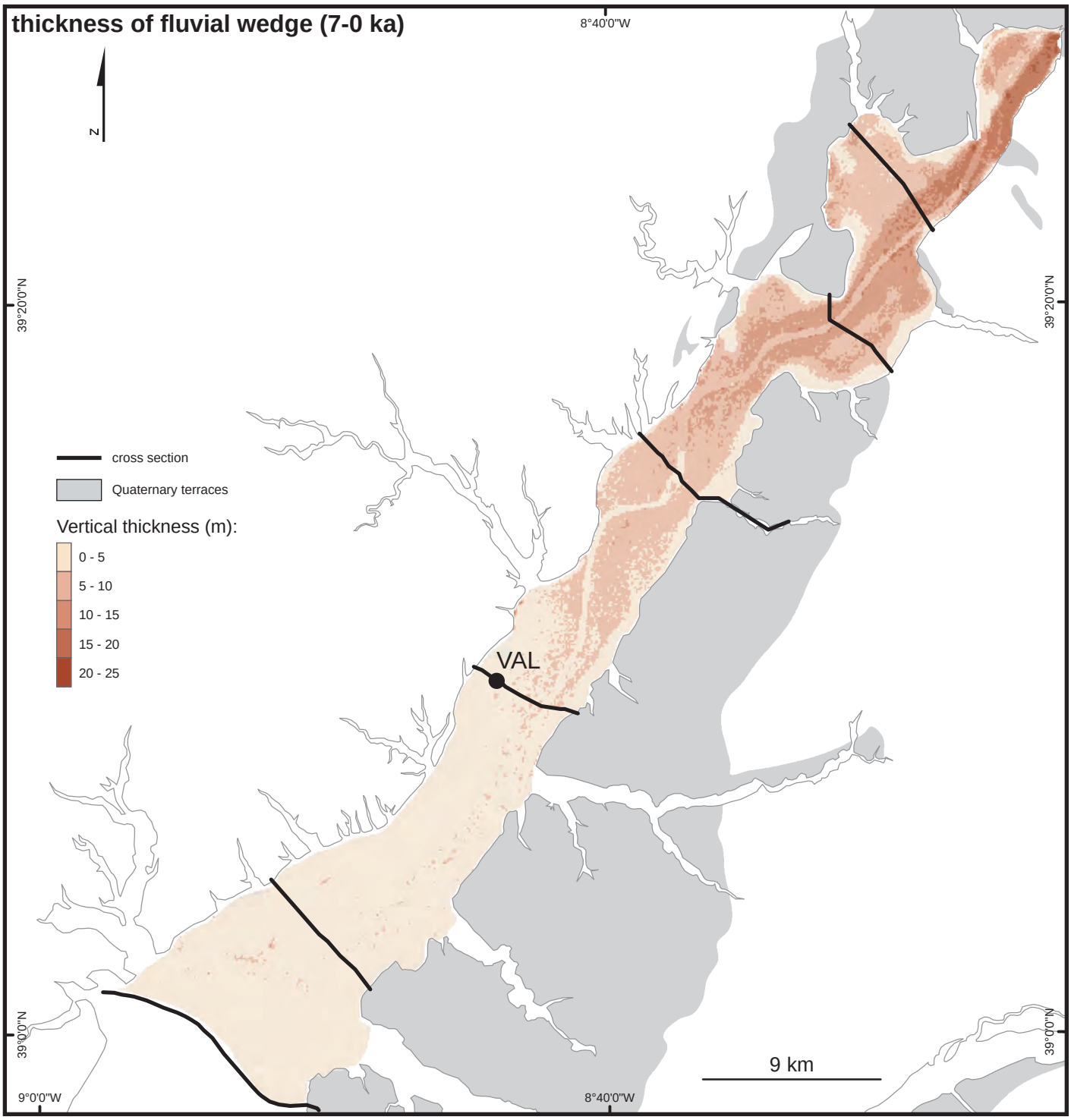


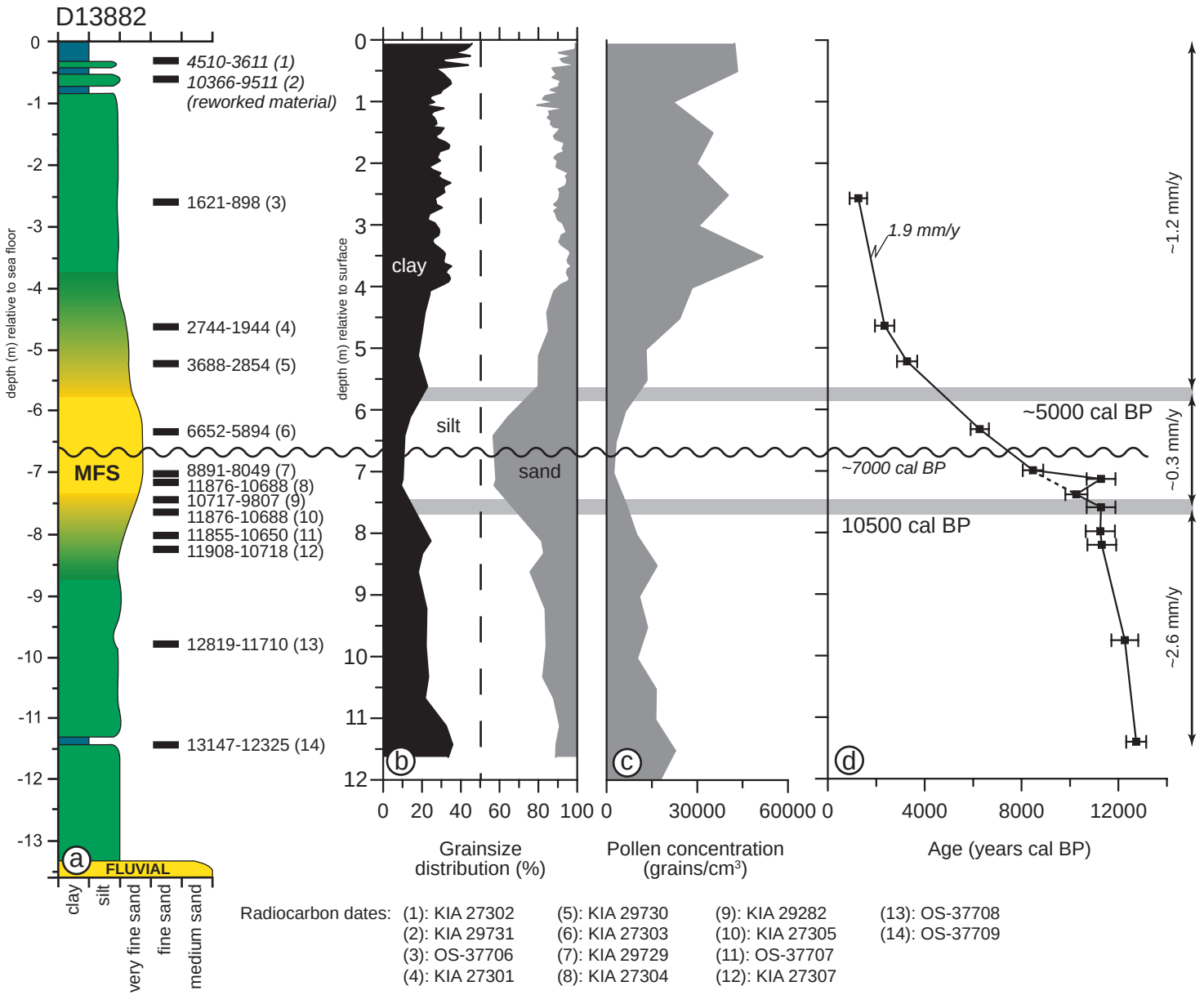
Radiocarbon dates: (1): Beta-150352, Ramos Pereira et al. (2002)
(2): UtC-14909, Vis et al. (2008)
(3): UtC-14910, Vis et al. (2008)
(4): UtC-14911, Vis et al. (2008)


65 m
35 m
0 m
Atlantic Ocean
vallley-fill
Lisbon
proximal
subaqueous
delta
prodelta
coastline
~10 km
A
60 m
30 m
0 m
Santarém
~3.5 km
data points
B
65 m
35 m
0 m
Santarém
Lisbon
~7 km
C

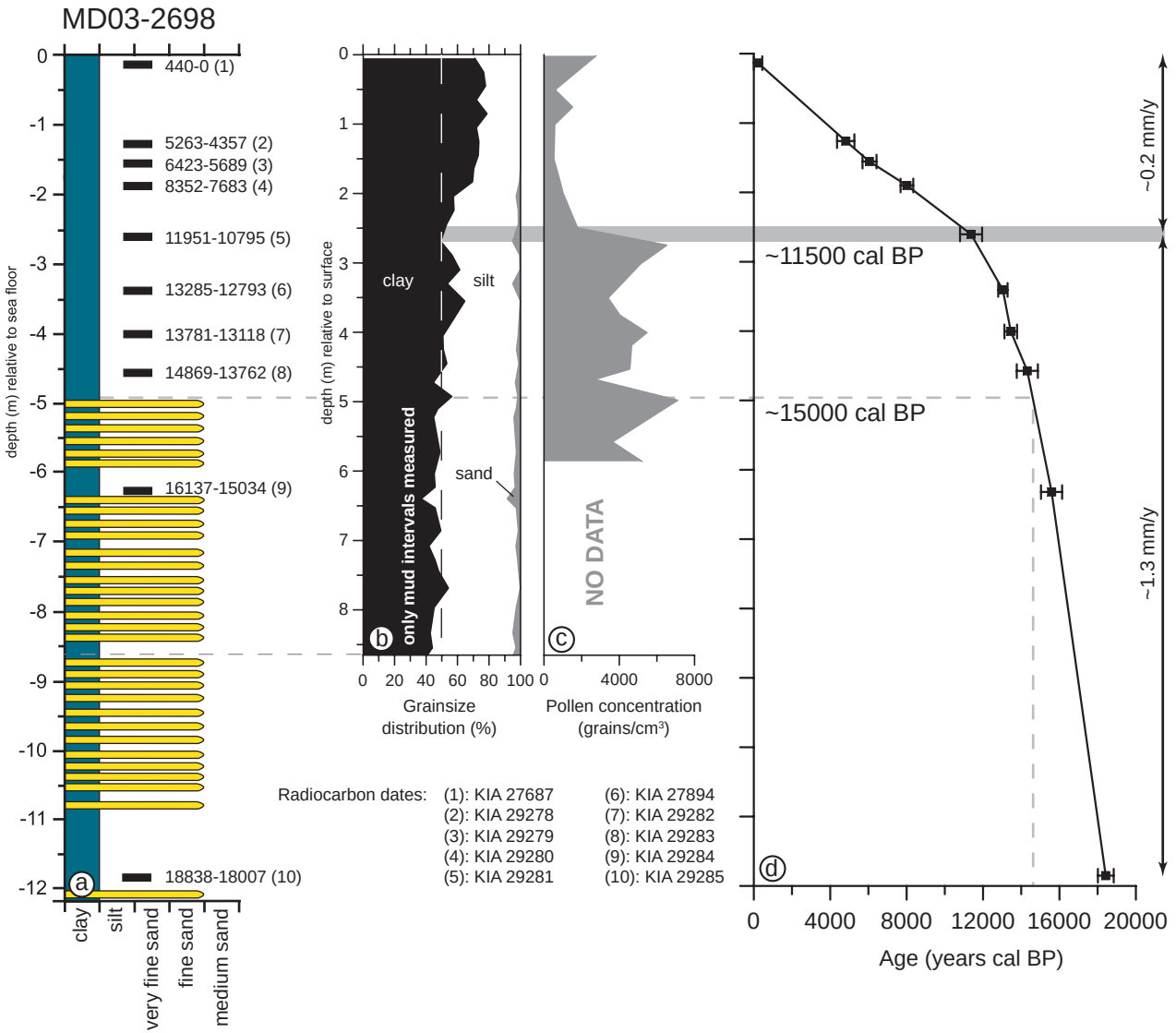

total sediment thickness (12-0 ka)
9°0'0"W
8°40'0"W
N
39°20'0"N
39°0'0"N
38°40'0"N
VAL
LISBOA
D13882
cross section
Quaternary terraces
Vertical thickness (m):
0 - 10
10 - 20
20 - 30
30 - 40
40 - 50
50 - 60
60 - 70
70 - 80
20 km
9°20'0"W

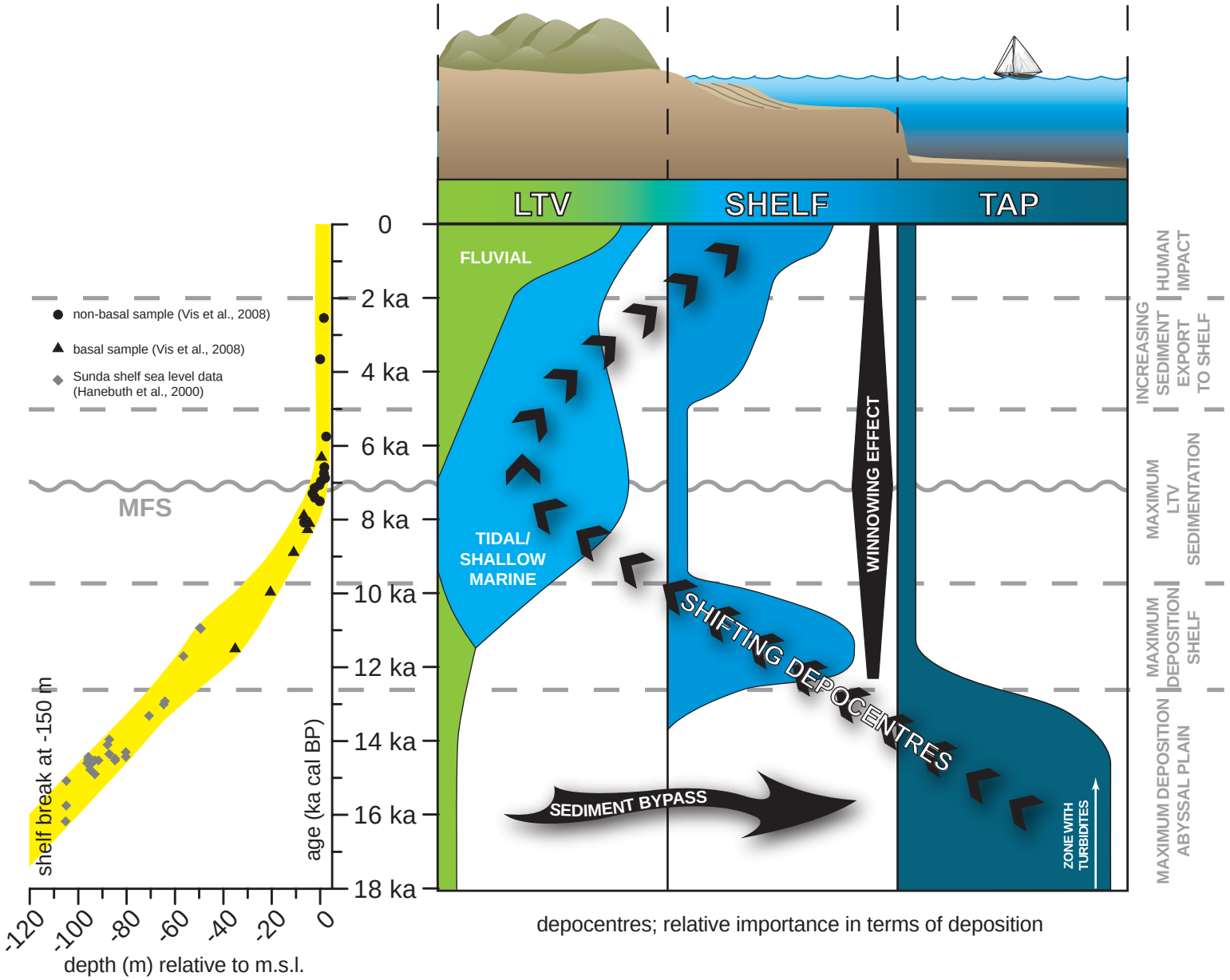

thickness of sediment deposited after 7 ka
9°0'0"W
8°40'0"W
N
39°20'0"N
39°0'0"N
38°40'0"N
9°20'0"W
VAL
LISBOA
proximal
subaqueous
delta
D13882
prodelta
cross section
Quaternary terraces
Vertical thickness (m):
0 - 10
10 - 20
20 - 30
30 - 40
40 - 50
50 - 60
60 - 70
70 - 80
20 km

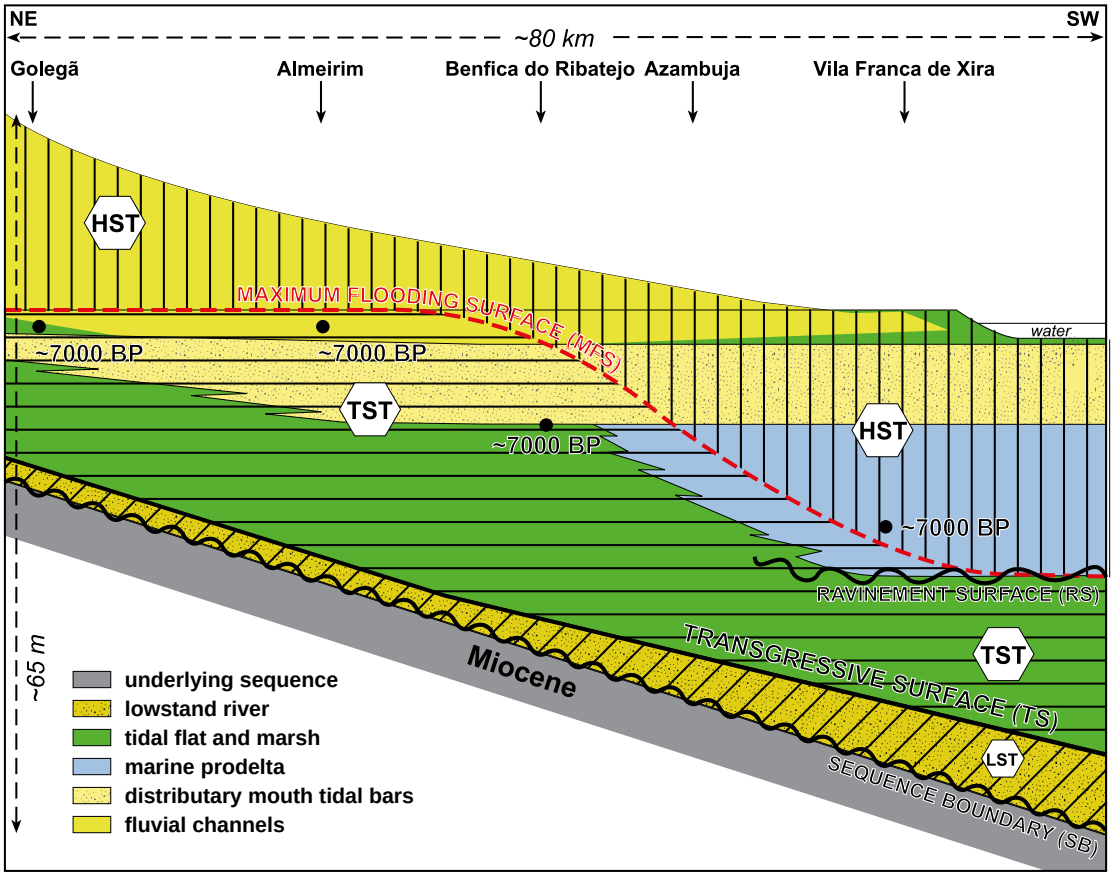

thickness of fluvial wedge (7-0 ka)
N
8°40'0"W
39°20'0"N
cross section
Quaternary terraces
Vertical thickness (m):
0 - 5
5 - 10
10 - 15
15 - 20
20 - 25
VAL
9 km
39°0'0"N
9°0'0"W
8°40'0"W

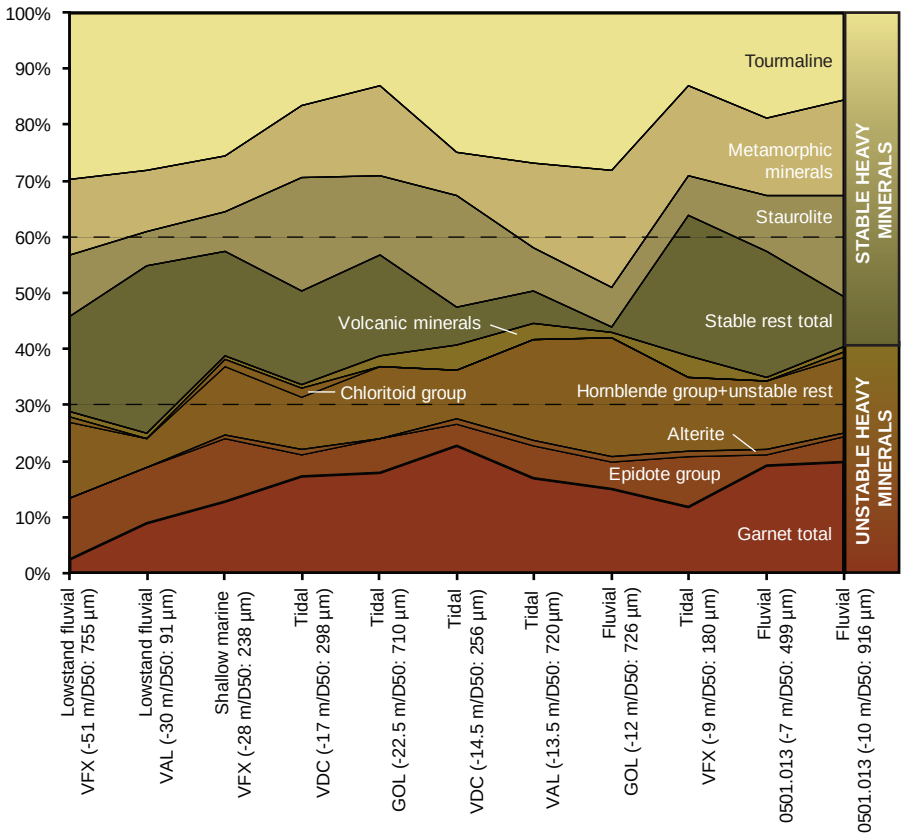


Radiocarbon dates:
(1): KIA 27302
(2): KIA 29731
(3): OS-37706
(4): KIA 27301
(5): KIA 29730
(6): KIA 27303
(7): KIA 29729
(8): KIA 27304
(9): KIA 29282
(10): KIA 27305
(11): OS-37707
(12): KIA 27307
(13): OS-37708
(14): OS-37709


MD03-2698
depth (m) relative to sea floor
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
440-0 (1)
5263-4357 (2)
6423-5689 (3)
8352-7683 (4)
11951-10795 (5)
13285-12793 (6)
13781-13118 (7)
14869-13762 (8)
16137-15034 (9)
18838-18007 (10)
a
clay
silt
very fine sand
fine sand
medium sand
depth (m) relative to surface
0
1
2
3
4
5
6
7
8
clay
silt
sand
only mud intervals measured
b
0 20 40 60 80 100
Grainsize distribution (%)
c
NO DATA
0 4000 8000
Pollen concentration (grains/cm³)
Radiocarbon dates:
(1): KIA 27687
(2): KIA 29278
(3): KIA 29279
(4): KIA 29280
(5): KIA 29281
(6): KIA 27894
(7): KIA 29282
(8): KIA 29283
(9): KIA 29284
(10): KIA 29285
~11500 cal BP
~15000 cal BP
~0.2 mm/y
~1.3 mm/y
d
0 4000 8000 12000 16000 20000
Age (years cal BP)


LTV
SHELF
TAP
FLUVIAL
TIDAL/
SHALLOW
MARINE
WINNOWING EFFECT
SHIFTING DEPOCENTRES
SEDIMENT BYPASS
ZONE WITH
TURBIDITES
non-basal sample (Vis et al., 2008)
basal sample (Vis et al., 2008)
Sunda shelf sea level data
(Hanebuth et al., 2000)
MFS
shelf break at -150 m
age (ka cal BP)
0
2 ka
4 ka
6 ka
8 ka
10 ka
12 ka
14 ka
16 ka
18 ka
-120
-100
-80
-60
-40
-20
0
depth (m) relative to m.s.l.
depocentres; relative importance in terms of deposition
INCREASING
SEDIMENT
EXPORT
TO SHELF
HUMAN
IMPACT
MAXIMUM
LTV
SEDIMENTATION
MAXIMUM
DEPOSITION
SHELF
MAXIMUM DEPOSITION
ABYSSAL PLAIN


NE
SW
~80 km
Golegã
Almeirim
Benfica do Ribatejo
Azambuja
Vila Franca de Xira
HST
MAXIMUM FLOODING SURFACE (MFS)
water
~7000 BP
~7000 BP
TST
~7000 BP
HST
~7000 BP
RAVINEMENT SURFACE (RS)
TRANSGRESSIVE SURFACE (TS)
TST
LST
SEQUENCE BOUNDARY (SB)
Miocene
~65 m
underlying sequence
lowstand river
tidal flat and marsh
marine prodelta
distributary mouth tidal bars
fluvial channels


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Tourmaline
Metamorphic minerals
Staurolite
Volcanic minerals
Stable rest total
Chloritoid group
Hornblende group+unstable rest
Alterite
Epidote group
Garnet total
STABLE HEAVY MINERALS
UNSTABLE HEAVY MINERALS
Lowstand fluvial VFX (-51 m/D50: 755 µm)
Lowstand fluvial VAL (-30 m/D50: 91 µm)
Shallow marine VFX (-28 m/D50: 238 µm)
Tidal VDC (-17 m/D50: 298 µm)
Tidal GOL (-22.5 m/D50: 710 µm)
Tidal VDC (-14.5 m/D50: 256 µm)
Tidal VAL (-13.5 m/D50: 720 µm)
Fluvial GOL (-12 m/D50: 726 µm)
Tidal VFX (-9 m/D50: 180 µm)
Fluvial 0501.013 (-7 m/D50: 499 µm)
Fluvial 0501.013 (-10 m/D50: 916 µm)

Lab. Nr.	^{14}C age yrs BP ± 1σ	Age cal. BP 2σ	Midpoint	Coordinates (x-y/z) (m)	Sample depth (cm)	Borehole name	Remarks	First published	Calibration curve
GrA-27234	5530 +/- 45	6410-6210	6310	531.812-4342.025/+8	740-741	0401.003/203	-	Vis et al. (2008)	intcal04.14c
GrA-27236	2005 +/- 35	2050-1870	1960	543.112-4350.825/+9	300-310	0401.004/204	-	Vis et al. (2008)	intcal04.14c
GrA-29205	1390 +/- 35	1360-1265	1313	541.501-4362.494/+14.3	366-370	0401.021	loogextract	Vis et al. (2008)	intcal04.14c
GrA-29447	1510 +/- 40	1520-1310	1415	541.501-4362.494/+14.3	366-370	0401.021	residue	Vis et al. (2008)	intcal04.14c
GrA-29214	3850 +/- 40	4410-4150	4280	541.501-4362.494/+14.3	506-508	0401.021	loogextract	Vis et al. (2008)	intcal04.14c
GrA-29215	3610 +/- 60	4090-3720	3905	541.501-4362.494/+14.3	506-508	0401.021	residue	Vis et al. (2008)	intcal04.14c
GrA-29216	4215 +/- 40	4860-4610	4735	541.501-4362.494/+14.3	554-556	0401.021	loogextract	Vis et al. (2008)	intcal04.14c
GrA-29218	3945 +/- 40	4520-4240	4380	541.501-4362.494/+14.3	554-556	0401.021	residue	Vis et al. (2008)	intcal04.14c
GrA-29220	545 +/- 35	650-510	580	544.533-4358.745/+16.63	370-380	0401.013	charcoal (AAA)	Vis et al. (2008)	intcal04.14c
GrA-29221	200 +/- 35	310-0	155	540.649-4352.679/+15.68	370-380	0401.104	charcoal (AAA)	Vis et al. (2008)	intcal04.14c
GrA-29530	930 +/- 35	930-760	845	542.899-4360.935/+16.23	260-270	0401.002	Sieved at 250 & 125 µm	Vis et al. (2008)	intcal04.14c
GrA-29843	65 +/- 40	270-0	135	541.504-4352.118/+13.22	540-550	0401.015	Sieved at 250 µm	Vis et al. (2008)	intcal04.14c
GrA-29535	2490 +/- 40	2730-2360	2545	541.504-4352.118/+13.22	840-850	0401.015	Sieved at 250 & 125 µm	Vis et al. (2008)	intcal04.14c
GrA-29538	335 +/- 35	490-300	395	540.649-4352.679/+15.68	610-620	0401.104	Sieved at 250 µm	Vis et al. (2008)	intcal04.14c
GrA-29539	1095 +/- 35	1070-930	1000	541.584-4352.084/+16.65	300-310	0401.106	Sieved at 250 & 125 µm	Vis et al. (2008)	intcal04.14c
GrA-30616	4485 +/- 35	5300-4970	5135	542.943-4350.667/+12.73	923-926	0401.302/S2	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
GrA-31005	6500 +/- 50	7510-7300	7405	542.943-4350.667/+12.73	1491-1495	0401.302/S2	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
GrA-30961	6360 +/- 45	7420-7170	7295	542.943-4350.667/+12.73	1588-1590	0401.302/S2	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
GrA-30615	5790 +/- 40	6680-6480	6580	540.407-4359.849/+12	1024-1029	0501.029	Sieved at 200 µm	Vis et al. (2008)	intcal04.14c
GrA-31004	5900 +/- 45	6860-6630	6745	540.407-4359.849/+12	1046-1050	0501.029	Sieved at 200 µm	Vis et al. (2008)	intcal04.14c
GrA-30860	325 +/- 30	480-300	390	548.938-4364.435/+25	110-120	-	charcoal	Vis et al. (2009)	intcal04.14c
GrA-32584	8030 +/- 40	9030-8750	8890	531.088-4346.563/+11.38	2230-2240	0501.016	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
GrA-32586	2440 +/- 30	2710-2350	2530	531.726-4345.914/+11.07	820-830	0501.013	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
GrA-32647	2480 +/- 30	2720-2360	2540	522.094-4335.448/+3.94	240-250	0501.042	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
GrA-33637	5640 +/- 45	6510-6300	6405	522.373-4335.353/+4.30	1160-1170	0501.041	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
GrA-32650	600 +/- 25	660-540	600	524.799-4333.804/+7.60	690-700	0501.030	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
GrA-32651	6165 +/- 35	7170-6950	7060	526.038-4333.421/+7.42	770-780	0501.025	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
GrA-32654	7440 +/- 40	8360-8180	8270	526.038-4333.421/+7.42	1260-1270	0501.025	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
GrA-32587	2625 +/- 30	2785-2720	2753	514.130-4322.014/+4	860-880	0501.050	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
GrA-32644	450 +/- 30	540-470	505	512.824-4323.436/+3	360-370	0501.051	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
GrA-33636	101,91 +/- 0,4%	0	0	512.474-4323.832/+3	1590-1610	0501.052	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
GrA-32645	2555 +/- 30	2760-2500	2630	514.940-4321.160/+4	1440-1450	0501.044	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
GrA-32646	5010 +/- 35	5900-5650	5775	512.474-4323.832/+3	860-870	0501.052	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
GrA-32656	1765 +/- 30	1820-1570	1695	504.812-4310.535/+2	440-480	0501.071	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
GrA-32655	6265 +/- 35	7270-7020	7145	544.750-4358.375/+17.40	1967-1974	0401.304/S4	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
UtC-14746	2530 +/- 60	2760-2360	2560	540.407-4359.849/+12	516-520	0501.029	Sieved at 125 µm	Vis et al. (2010b)	intcal04.14c
UtC-14747	3089 +/- 38	3390-3210	3300	540.407-4359.849/+12	604-607	0501.029	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
UtC-14748	4129 +/- 42	4830-4520	4675	540.407-4359.849/+12	711-712	0501.029	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
UtC-14749	1022 +/- 37	1060-790	925	540.407-4359.849/+12	331-334	0501.029	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
UtC-14750	1136 +/- 38	1180-960	1070	540.407-4359.849/+12	331-334	0501.029	Sieved at 125 µm	Vis et al. (2008)	intcal04.14c
UtC-14744	1630 +/- 35	1610-1410	1510	526.420-4333.197/+5	140-150	0601.002	-	Vis et al. (2008)	intcal04.14c
UtC-14745	3849 +/- 47	4420-4100	4260	526.420-4333.197/+5	280-290	0601.002	-	Vis et al. (2008)	intcal04.14c
UtC-14909	4145 +/- 42	4830-4530	4680	523.321-4334.600/+7	1004-1010	0601.301	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
UtC-14910	6860 +/- 50	7800-7590	7695	523.321-4334.600/+7	1898	0601.301	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
UtC-14911	8880 +/- 60	10190-9740	9965	523.321-4334.600/+7	2748-2753	0601.301	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
UtC-14904	3647 +/- 41	4090-3850	3970	505.439-4310.324/+2	1281	0601.302	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
UtC-14905	6247 +/- 46	7270-7010	7140	505.439-4310.324/+2	2192-2196	0601.302	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
UtC-14906	8900 +/- 50	10200-9780	9990	505.439-4310.324/+2	2842-2848	0601.302	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
UtC-14907	9990 +/- 70	11800-11200	11500	505.439-4310.324/+2	3710-3716	0601.302	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
UtC-14908	12160 +/- 90	14260-13780	14020	505.439-4310.324/+2	4919-4925	0601.302	Sieved at 63 µm	Vis et al. (2008)	intcal04.14c
UtC-1983	6040 ± 50	7010-6740	6875	536.620-4342.720/+7.5	761-760	Alpiarça III	-	Vis et al. (2010a)	intcal04.14c
UtC-1984	5670 ± 40	6560-6320	6440	536.620-4342.720/+7.5	752-751	Alpiarça III	-	Vis et al. (2010a)	intcal04.14c
UtC-1985	3660 ± 40	4410-3870	4005	536.620-4342.720/+7.5	502-501	Alpiarça III	-	Vis et al. (2010a)	intcal04.14c
UtC-1986	2200 ± 40	2340-2120	2230	536.620-4342.720/+7.5	301-299	Alpiarça III	-	Vis et al. (2010a)	intcal04.14c
-	900 ± 40	?	816	530.589-4347.131/+11.15	103-104	SEV	-	Azevêdo et al. (2006)	intcal04.14c

-	1987 cal BP	?	?	530.589-4347.131/+11.15	300	SEV	-	Azevêdo et al. (unpublished)	intcal04.14c
-	2930 ± 40	?	3086	530.589-4347.131/+11.15	454-455	SEV	-	Azevêdo et al. (2006)	intcal04.14c
Beta-184659	3320 ± 40	?	3550	530.589-4347.131/+11.15	649-650	SEV	-	Azevêdo et al. (2006)	intcal04.14c
Beta-184660	6090 ± 40	?	6960	530.589-4347.131/+11.15	1074-1075	SEV	-	Azevêdo et al. (2006)	intcal04.14c
-	7290 ± 50	?	8097	530.589-4347.131/+11.15	1230	SEV	-	Azevêdo et al. (2006)	intcal04.14c
-	9800 ± 60	?	11219	530.589-4347.131/+11.15	1470	SEV	-	Azevêdo et al. (2006)	intcal04.14c
-	14800 ± 80	?	18109	530.589-4347.131/+11.15	1680	SEV	-	Azevêdo et al. (2006)	intcal04.14c
-	3530 ± 40	?	?	532.600-4342.200/+8	310-311	Goucharia	-	Azevêdo et al. (unpublished)	intcal04.14c
GrN-11838	2590 ± 60	2850-2470	2660	535.566-4344.560/+9	320	Alpiarça II	-	Van Leeuwaarden & Janssen (1985)	intcal04.14c
GrN-11839	3240 ± 110	3850-3200	3525	535.566-4344.560/+8	440	Alpiarça II	-	Van Leeuwaarden & Janssen (1985)	intcal04.14c
GrN-11840	4580 ± 60	5470-5040	5255	535.566-4344.560/+8	580	Alpiarça II	-	Van Leeuwaarden & Janssen (1985)	intcal04.14c
GrN-11841	5060 ± 110	6200-5550	5875	535.566-4344.560/+8	650	Alpiarça II	-	Van Leeuwaarden & Janssen (1985)	intcal04.14c
Beta-150352	3400 ± 40	3830-3480	3655	522.980-4334.110/+7.40	740	Fonte Bela	-	Ramos Pereira et al. (2002)	intcal04.14c
Beta-150351	3230 ± 40	3560-3370	3465	522.980-4334.110/+7.40	270	Fonte Bela	-	Ramos Pereira et al. (2002)	intcal04.14c
Beta-138920	1090 ± 70	1180-800	990	522.980-4334.110/+7.40	70	Fonte Bela	-	Ramos Pereira et al. (2002)	intcal04.14c
-	70 ± 40	270-10	140	522.980-4334.110/+7.40	30	Fonte Bela	-	Ramos Pereira et al. (2002)	intcal04.14c
-	4020 ± 40	4790-4410	4600	532.550-4348.950/+6.5	163	Quinta da Boavista	-	Ramos et al. (2002)	intcal04.14c
-	3920 ± 40	4520-4230	4375	532.550-4348.950/+6.6	133	Quinta da Boavista	-	Ramos et al. (2002)	intcal04.14c
-	3480 ± 40	3850-3640	3745	532.550-4348.950/+6.7	129	Quinta da Boavista	-	Ramos et al. (2002)	intcal04.14c
Beta-111010	2220 ± 80	2360-2000	2180	527.995-4329.276/+4.5	94-96	Pit 20	-	Van der Schriek et al. (2007)	intcal04.14c
Beta-111011	7490 ± 180	8650-7900	8275	527.995-4329.276/+4.5	357-360	Pit 20	-	Van der Schriek et al. (2007)	intcal04.14c
AA-49816	7668 ± 49	8221-7548	7885	526.428-4329.073/+4.0	1073-1076	Core 11	-	Van der Schriek et al. (2007)	marine, Calib Rev. 5.0.2
AA-48977	7263 ± 46	8180-7980	8080	526.428-4329.073/+4.0	1064-1066	Core 12	-	Van der Schriek et al. (2007)	intcal04.14c
AA-48978	7318 ± 44	8200-8010	8105	527.995-4329.276/+4.5	888-890.5	Core 20	-	Van der Schriek et al. (2007)	intcal04.14c
AA-48979	6626 ± 44	7580-7430	7505	527.995-4329.276/+4.5	468-470	Core 21	-	Van der Schriek et al. (2007)	intcal04.14c
AA-48980	4985 ± 73	5900-5600	5750	527.995-4329.276/+4.5	200-202.5	Core 22	-	Van der Schriek et al. (2007)	intcal04.14c
AA-48981	5929 ± 52	6900-6640	6770	527.995-4329.276/+4.5	136.5-138	Core 23	-	Van der Schriek et al. (2007)	intcal04.14c
AA-48982	3006 ± 46	3360-3060	3210	528.993-4328.882/+4.7	598-600	Core 40	-	Van der Schriek et al. (2007)	intcal04.14c
AA-48983	5638 ± 71	6620-6290	6455	530.950-4328.409/+4	556-561	Core 51	-	Van der Schriek et al. (2007)	intcal04.14c
AA-48984	6096 ± 54	7160-6800	6980	532.159-4328.524/+4.5	477-479	Core 64	-	Van der Schriek et al. (2007)	intcal04.14c
SRR-6789	5578 ± 51	6470-6280	6375	532.159-4328.524/+4.5	255-257	Core 64	-	Van der Schriek et al. (2007)	intcal04.14c
SRR-6790	4526 ± 49	5320-4980	5150	532.159-4328.524/+4.5	149-151	Core 64	-	Van der Schriek et al. (2007)	intcal04.14c
AA-48985	176 ± 34	300-0	150	532.159-4328.524/+4.5	97-100	Core 64	-	Van der Schriek et al. (2007)	intcal04.14c
KIA 30888	< 0	0	0	455.895-4275.498/-102	8-12	GeoB-8903-1	prepared in Kiel	Abrantes et al. (2008)	marine04.14c
KIA 28966	610 ± 35	0	0	455.895-4275.498/-102	51-53	GeoB-8903-1	-	Abrantes et al. (2008)	marine04.14c
KIA 30890	735 ± 55	418-0	209	455.895-4275.498/-102	65-70	GeoB-8903-1	prepared in Kiel	Abrantes et al. (2008)	marine04.14c
KIA 28967	760 ± 25	423-0	212	455.895-4275.498/-102	139-141	GeoB-8903-1	-	Abrantes et al. (2008)	marine04.14c
KIA 28968	685 ± 30	0	0	455.895-4275.498/-102	171-173	GeoB-8903-1	-	Abrantes et al. (2008)	marine04.14c
KIA27064	760 ± 45	428-0	214	455.895-4275.498/-102	198	GeoB-8903-1	prepared in Kiel	Abrantes et al. (2008)	marine04.14c
KIA 27065	1035 ± 30	650-0	325	455.895-4275.498/-102	248	GeoB-8903-1	prepared in Kiel	Abrantes et al. (2008)	marine04.14c
KIA 27066	1660 ± 35	1272-649	961	455.895-4275.498/-102	333	GeoB-8903-1	prepared in Kiel	Abrantes et al. (2008)	marine04.14c
KIA 27067	2000 ± 40	1661-935	1298	455.895-4275.498/-102	413	GeoB-8903-1	prepared in Kiel	Abrantes et al. (2008)	marine04.14c
KIA 27320	2885 ± 40	2724-1913	2319	455.895-4275.498/-102	493	GeoB-8903-1	prepared in Kiel	Abrantes et al. (2008)	marine04.14c
OS- 37706	1960 ±45	1621-898	1260	460.591-4276.521/-87	257	D13882	-	Rodrigues et al. (2009)	marine04.14c
KIA 27301	2920 ± 35	2744-1944	2344	460.591-4276.521/-87	464	D13882	-	Rodrigues et al. (2009)	marine04.14c
KIA 29730	3690 ± 30	3688-2854	3271	460.591-4276.521/-87	522	D13882	-	Rodrigues et al. (2009)	marine04.14c
KIA 27303	6120 ± 55	6652-5894	6273	460.591-4276.521/-87	632	D13882	-	Rodrigues et al. (2009)	marine04.14c
KIA 29729	8215 ± 45	8891-8049	8470	460.591-4276.521/-87	699	D13882	-	Rodrigues et al. (2009)	marine04.14c
KIA 27304	10470 ± 70	11876-10688	11282	460.591-4276.521/-87	713	D13882	age reversal/ reworked	This study	marine04.14c
KIA 29728	9735 ± 55	10717-9807	10262	460.591-4276.521/-87	738	D13882	-	Rodrigues et al. (2009)	marine04.14c
KIA 27305	10470 ± 70	11876-10688	11282	460.591-4276.521/-87	759	D13882	instant sed.?/ reworked?/ 14C plateau	This study	marine04.14c
OS- 37707	10450 ± 75	11855-10650	11253	460.591-4276.521/-87	798	D13882	instant sed.?/ reworked?/ 14C plateau	Rodrigues et al. (2010)	marine04.14c
KIA 27307	10490 ± 70	11908-10718	11313	460.591-4276.521/-87	820	D13882	-	Rodrigues et al. (2010)	marine04.14c
OS- 37708	11100 ± 50	12819-11710	12265	460.591-4276.521/-87	975	D13882	-	Rodrigues et al. (2010)	marine04.14c
OS- 37709	11500 ± 70	13147-12325	12736	460.591-4276.521/-87	1140	D13882	-	Rodrigues et al. (2010)	marine04.14c
KIA 27687	790 ± 25	440-0	220	378.451-4233.507/-4602	13-14	MD03-2698	prepared in Kiel	Lebreiro et al. (2009)	marine04.14c

KIA 29278	4830 ± 35	5263-4357	4810	378.451-4233.507/-4602	125-127	MD03-2698	prepared in Kiel	Lebreiro et al. (2009)	marine04.14c
KIA 29279	5935 ± 40	6423-5689	6056	378.451-4233.507/-4602	155-156	MD03-2698	prepared in Kiel	Lebreiro et al. (2009)	marine04.14c
KIA 29280	7820 ± 40	8352-7683	8018	378.451-4233.507/-4602	189-191	MD03-2698	prepared in Kiel	Lebreiro et al. (2009)	marine04.14c
KIA 29281	10540 ± 50	11951-10795	11373	378.451-4233.507/-4602	260-261	MD03-2698	prepared in Kiel	Lebreiro et al. (2009)	marine04.14c
KIA 27894	11735 ± 55	13285-12793	13039	378.451-4233.507/-4602	340-341	MD03-2698	prepared in Kiel	Lebreiro et al. (2009)	marine04.14c
KIA 29282	12240 ± 70	13781-13118	13450	378.451-4233.507/-4602	400-401	MD03-2698	prepared in Kiel	Lebreiro et al. (2009)	marine04.14c
KIA 29283	12895 ± 55	14869-13762	14316	378.451-4233.507/-4602	456.5-458.5	MD03-2698	prepared in Kiel	Lebreiro et al. (2009)	marine04.14c
KIA 29284	13800 ± 70	16137-15034	15586	378.451-4233.507/-4602	631-633	MD03-2698	prepared in Kiel	Lebreiro et al. (2009)	marine04.14c
KIA 29285	15840 ± 70	18838-18007	18423	378.451-4233.507/-4602	1184.2-1186.2	MD03-2698	prepared in Kiel	Lebreiro et al. (2009)	marine04.14c
OS-42381	545 ± 25	232-169	201	468.464-4268.040/-96	86-87	PO287-26G	-	Abrantes et al. (2008)	marine04.14c
KIA 23661	1310 ± 25	915-764	840	468.464-4268.040/-96	86-88	PO287-26G	-	Abrantes et al. (2008)	marine04.14c
AAR-8368.2-K	440 ± 25	73-33	53	468.464-4268.040/-96	51-52	PO287-26B	-	Abrantes et al. (2008)	marine04.14c
AAR-7825	492 ± 39	148-12	80	470.762-4267.846/-102	75.4-76.4	D13902	-	Abrantes et al. (2008)	marine04.14c
AAR-7207	1160 ± 45	772-653	713	470.762-4267.846/-102	110.4-111.4	D13902	-	Abrantes et al. (2008)	marine04.14c
AAR-7828	2007 ± 37	1568-1403	1486	470.762-4267.846/-102	151-152	D13902	-	Abrantes et al. (2008)	marine04.14c
AAR-7210	2340 ± 55	1999-1733	1866	470.762-4267.846/-102	199-200	D13902	-	Abrantes et al. (2008)	marine04.14c

	Volume (km^3)		DBD (t/m^3)		Mass (t)	Period (y)		Mean storage rate (t/y)	
12-7 ka cal BP									
LTV	6.4	x	1.35*	=	$8.6x10^9$	/ 5000	=	**$1.7x10^6$**	
								~1.7x	
7-0 ka cal BP									
LTV	*13.9*	x	*1.48■*	=	$2.1x10^{10}$	/ 7000	=	*$2.9x10^6$*	*~2.5x*
Pr. sub. delta	*5.5*	x	*1.50◊*	=	$8.2x10^9$	/ 7000	=	*$1.2x10^6$*	
Prodelta	*0.7*	x	*1.15*	=	$7.8x10^8$	/ 7000	=	*$0.1x10^6$*	
Total	20.2							**$4.2x10^6$**	
			Summed:		**$3.8x10^{10}$ t**				

↕

$3.2x10^6$ t/y (based on 12,000 y)

↕

0.4 t/ha/y (based on a catchment area of 8,000,000 ha, which is 80,000 km^2)

Catchment	SDR (%)	Area (km^2)	Remark	Source
Upper Mississippi tributary (USA)	7	-		Trimble, 1983
Middle Yellow River (China)	1-100	-	high drainage density and frequent hyper-concentrated flows	Gong and Xiong, 1980; Mou and Meng, 1980; in Walling, 1999
Upper Yangtze River (China)	0.34-34	-		Dai and Tan, 1996; Liu and Zhang, 1996; in Walling, 1999
Russian Plain	0-89	-	small- and medium-sized	Golosov et al. 1992
agricultural (UK)	14-27	1.5-3.6	low relief, extensive land-use and strong soil erosion	Walling et al. 2002
Various in overview	3-90	-	SDR decreases with greater catchment size and lower average slope	Morgan, 2005
Geul (Netherlands) suspended only, last ky	7	380		De Moor and Verstraeten, 2008
Dijle (Belgium)	17	758		Notebaert et al., 2009
Rhine (Netherlands)	low	185,000	nearly all sediment is stored in Rhine-Meuse delta and does not reach coast	Erkens, 2009

Period	Sediment mass (t)	SDR (%)	Mechanical denudation rate (mm/y)	Sediment production (t/ha/y)
12-0 ka	$3{,}81 \times 10^{10}$	15	0.10	2.6
		35	0.04	1.1
12-7 ka	$8{,}56 \times 10^{9}$	15	0.05	1.4
		35	0.02	0.6
7-0 ka	$2{,}95 \times 10^{10}$	15	0.13	3.5
		35	0.06	1.5