Paleoceanography

Supporting Information for

Deltaic and coastal sediments as recorders of Mediterranean regional climate and human impact over the past three millennia

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Text S1.

Tephrostratigraphy:

The oven-dried sieved fraction >63 µm of all the sampled materials was carefully observed under a binocular microscope and four samples representative of the three deposits were selected based on glass fraction exceeding the 50% in volume. For each sample, a fraction was then embedded in epoxy resin and suitably polished for microprobe analysisOperating conditions were 15 kV primary beam voltage, 50-100 mA filament current, 50 sec acquisition time with variable spot size. Correction for matrix

effect was performed using INCA version 4.08 software that used the XPP correction routine, based on a Phi-Ro-Zeta approach. Primary calibration was performed using international mineral and glass standards USMN reference samples according to the following scheme: Anorthoclase 133868 for Si and Na, Microcline 143966 for Al and K, Fayalite 85276 for Mn, Anorthite 137041 for Ca, Hornblende 143965 for Fe, Mg and Ti, Scapolite 6600-1 for Cl, Apatite 104021 for P. Precision and accuracy were assessed using the rhyolitic glass USNM 75854 as secondary standard. Mean precision was <5% for SiO_2, Al_2O_3, K_2O, CaO and FeO, and around 10% for the other elements.

Table S1.

Age models of the sediment cores analyzed in this study. Raw radiocarbon ages have been calibrated using CALIB7.1 software and the marine calibration curve Marine13 (Stuiver and Reimer, 1993; Reimer et al., 2013) and corrected for local reservoir ages acquired from the Global Marine Reservoir Database (http://calib.org/marine/).

Core	Depth (cm)	Dated material	14C ages	Cal year BP ±1σ	Reference
KESC9-14	0-5	Bulk planktonic	985 ± 30	563 ± 56	new data
KESC9-14	110–113	Bulk planktonic	1635 ± 30	1174 ± 82	new data
KESC9-14	143–146	Bulk planktonic	2530 ± 30	2189 ± 98	new data
KESC9-14	184-187	Bulk planktonic	3130 ± 30	2873 ± 92	new data
INV12-15	170	*Abra alba*	1150 ± 40	690 ± 78	Maselli et al., 2014
INV12-15	264	*Tellina distorta*	1995 ± 30	1510 ± 100	Maselli et al., 2014
INV12-15	528	*Tellina distorta*	2885 ± 30	2611 ± 107	Maselli et al., 2014
CSS00-07	130	Bulk sediments	NA	300	Vigliotti et al., 2008
CSS00-07	188	Bulk sediments	NA	700	Vigliotti et al., 2008
CSS00-07	235	Bulk sediments	NA	1150	Vigliotti et al., 2008
SW104-ND-14Q	15	tephra	NA	319	new data
SW104-ND-14Q	60	tephra	NA	1478	new data
SW104-ND-14Q	79	tephra	NA	1871	new data

Table S2.

^{210}Pb based age models for the INV12-15 and SW104-ND-14Q cores.

Core	Depth (cm)	$^{210}Pb_{xs}$ (mBq g^{-1})	Age Cal AD
INV12-15	0.5	32 ± 5	2007.4 ± 0.7
INV12-15	1.5	n.m.[(1)]	1998.1 ± 2.1
INV12-15	2,5	21 ± 6	1988.8 ± 3.4
INV12-15	3.5	18 ± 6	1979.5 ± 4.8
INV12-15	4.5	18 ± 4	1970.2 ± 6.2
INV12-15	5.5	16 ± 7	1960.9 ± 7.5
INV12-15	6.5	4 ± 5	1951.6 ± 8.9
INV12-15	7.5	n.m.	1942.3 ± 10.3
INV12-15	8.5	2 ± 3	1933.0 ± 11.6
INV12-15	9.5	n.m.	1923.7 ± 13.0
INV12-15	10.5	3 ± 3	1914.4 ± 14.4
SW104-ND-14Q	0.5	323 ± 22	2003.5 ± 1.1
SW104-ND-14Q	1.5	239 ± 15	1982.5 ± 3.2
SW104-ND-14Q	2.5	215 ± 8	1961.6 ± 5.3
SW104-ND-14Q	3.5	208 ± 13	1940.6 ± 7.4
SW104-ND-14Q	4.5	94 ± 3	1919.6 ± 9.5
SW104-ND-14Q	5.5	50 ± 4	1898.6 ± 11.5
SW104-ND-14Q	6.5	24 ± 4	1877.7 ± 13.6
SW104-ND-14Q	7.5	n.m.	1856.7 ± 15.7
SW104-ND-14Q	8.5	8 ± 4	1835.7 ± 17.8
SW104-ND-14Q	9.5	n.m.	1814.7 ± 19.9
SW104-ND-14Q	10.5	2 ± 2	1793.7 ± 22.1[(2)]

[(1)] n.m.: not measured

[(2)] Date extrapolated assuming a constant sedimentation rate

Table S3. Average of the individual SEM-EDS measurements for the glass fragments extracted from the single tephras of core ND14-A (Adriatic Sea). In bold averages and standard deviations of the major-element composition of the proximal equivalents discussed in the text. All analyses recalculated water-free to 100%. Total Fe expressed as FeO. Abbreviation: av. is the number of analyses considered for the average; s.d. is standard deviation (italics). Source of data used for comparison: 1631 and 79 CE white pumices - Santacroce et al (2008); 472 CE - Rolandi et al (2004).

tephra	**ND14A-15**				**ND14A-60**		**ND14A-62**				**ND14A-79**			
type	p		**1631 reference**		s		s		**472 AD reference**		p		**79 AD reference**	
	av.=16	*s.d.*	**av.=28**	*s.d.*	av.=10	*s.d.*	av.=7	*s.d.*	**av=25**	*s.d.*	**av=4**	*s.d.*	**av=188**	*s.d.*
SiO_2	54,43	*1,65*	**53,71**	***2,42***	49,61	*0,79*	50,82	*0,24*	**50,62**	***1,08***	54,32	*0,59*	**55,78**	***1,03***
TiO_2	0,45	*0,25*	**0,60**	***0,30***	0,83	*0,20*	0,41	*0,17*	**0,72**	***0,16***	0,18	*0,16*	**0,22**	***0,09***
Al_2O_3	20,97	*0,78*	**21,69**	***1,31***	19,99	*0,63*	21,99	*0,33*	**21,03**	***0,88***	23,52	*0,29*	**22,83**	***0,81***
FeO	4,11	*0,66*	**4,73**	***2,29***	7,18	*0,35*	5,00	*0,34*	**6,77**	***1,29***	1,83	*0,17*	**2,27**	***0,35***
MnO	0,19	*0,17*	**0,14**	***0,09***	0,19	*0,13*	0,29	*0,07*	**0,21**	***0,04***	0,06	*0,11*	**0,08**	***0,07***
MgO	0,67	*0,23*	**0,79**	***1,01***	1,48	*0,66*	0,48	*0,11*	**1,07**	***0,51***	0,13	*0,12*	**0,08**	***0,17***
CaO	3,74	*0,72*	**4,37**	***2,01***	6,85	*1,09*	5,63	*0,29*	**7,11**	***1,29***	2,50	*0,11*	**3,35**	***0,60***
Na_2O	6,24	*1,36*	**7,22**	***1,81***	6,11	*1,88*	7,96	*0,67*	**6,82**	***0,87***	8,26	*0,44*	**8,25**	***1,43***
K_2O	7,98	*1,56*	**6,88**	***1,68***	6,16	*1,33*	6,25	*0,41*	**5,71**	***0,61***	8,20	*0,19*	**7,13**	***1,46***
P_2O_5	0,24	*0,26*	-	-	0,46	*0,30*	0,09	*0,07*	-	-	0,14	*0,13*	-	-
Cl	0,97	*0,16*	-	-	1,13	*0,19*	1,10	*0,16*	-	-	0,86	*0,12*	-	-
Total	100,00		**100,00**		100,00		100,00		**100,00**		100,00	*0,67*	**100,00**	
alk	14,22		**14,00**		12,27		14,21		**12,53**		16,46	*0,56*	**15,38**	
Na_2O/K_2O	0,85		**1,05**		1,08		1,28		**1,19**		1,01	*0,04*	**1,16**	
CaO+FeO	7,85		**9,50**		14,04		10,62		**13,88**		4,33	*0,25*	**5,62**	