Project of Strategic Interest NEXTDATA

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Report for the Mediterranean area, on the recognised (based on literature data) climatic oscillations in the last two millennia from marine cores; transmission of data to the archives and General Portal

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A review of the literature on marine core sediments available for the Mediterranean basin, allowed us to collect information on many biotic and abiotic data related to the last 2000 years. In particular, information on 26 marine cores (recovered in the continental shelf and in deep marine environments) from different sectors of the Mediterranean area has been collected: 3 cores from the Adriatic Sea, 1 core from Gulf Lion, 10 cores from Gulf of Taranto, 1 core from Gulf of Salerno, 3 cores from Sicily Channel, 1 core close to Israel, 1 core from the north Aegean Sea and 6 cores from the Alboran Sea (Figure 1).

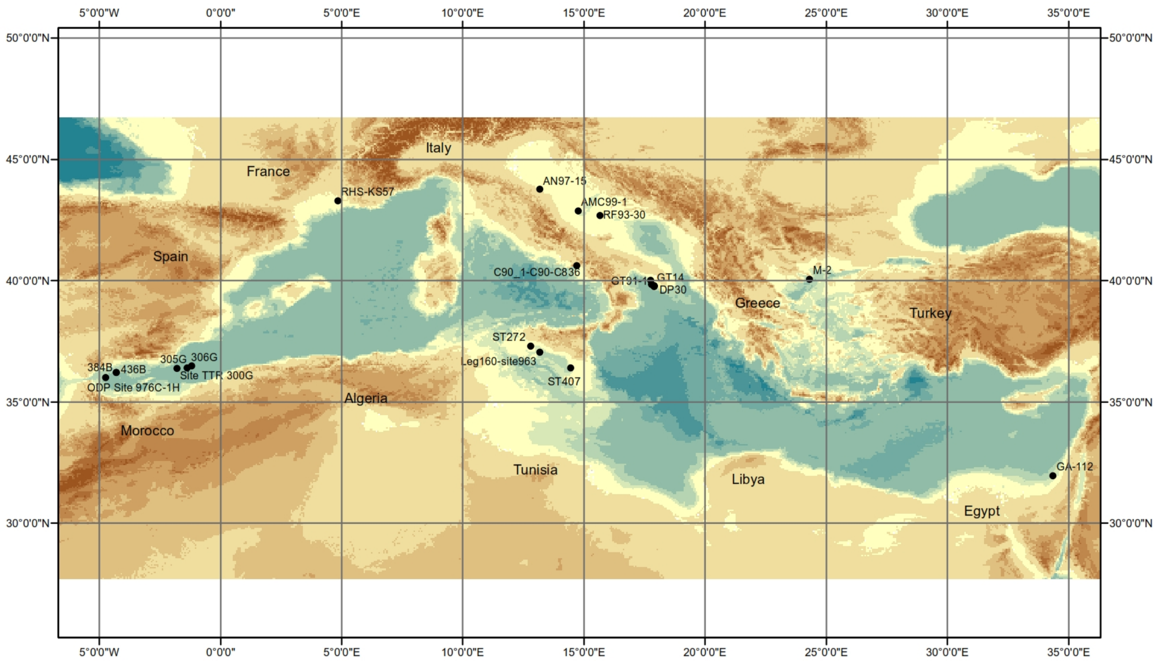

Fig. 1. Location map of marine cores (literature data) from the Mediterranean area with useful information for paleoclimatic studies of the last 2000 years.

This review of the marine core literature indicated that the useful datasets for paleoclimatic studies, related to the last two millennia, are very few (in terms of the number of marine sites with high-resolution studies) and scattered around the Mediterranean area (Figure 1). Several biotic (i.e., planktonic and benthic foraminifera, calcareous nannofossils, pollens, dinoflagellates, ostracods) and abiotic (i.e., oxygen stable isotope data, geochemistry, alkenones, thermo luminescence, XRF) proxies are documented in the investigated scientific literature, but unfortunately, these proxies are not measured in all cores (Table 1).
The two main tools commonly used as proxies for the paleoceanographic and paleoclimatic reconstructions are identifications of planktonic foraminifera (because they record the changes of the environmental parameters of the water masses in which they live) and oxygen and carbon stable isotope analyses performed on selected planktonic and benthic foraminifera. Planktonic foraminifera data are available only in five marine cores (studies performed with different time resolutions) while oxygen isotope analysis is reported in seven marine cores (Table 1). Conversely, inorganic geochemical analyses (major and trace element contents) on bulk sediment have only been reported from the western Mediterranean and Gulf of Taranto (these analyses are based on XRF core scanning and can be considered semi-quantitative data) (Table 1).
Reconstructions of the Sea Surface Temperature (SST) are available only from two box cores from the western Alboran Sea at 1022 and 1108 meters water depth, from 4 gravity cores from Gulf of Taranto at 173/174 meters water depth and from a gravity core from the northern Aegean Sea at 1018 meter water depth.

These differences in the types of available data in the literature often make correlations between the different marine cores difficult to estimate.

Core	Latitude	Longitude	Mediterranean area	meters water depth	References	Type of recovery	Measured parameters
AN97-15	43°45.21'N	13°38.46'E	North Adriatic Sea	-55,1	Piva et al. (2008)	Gravity core	Planktonic and benthic foraminifera, δ¹⁸O *G. bulloides*,
RF93-30	42°40'01''N	15°40'03''E	South Adriatic Sea	-77	Olfield et al. (2003)	Gravity core	Planktonic and benthic foraminifera, pollens, alkenone, paleomagnetic variation
RHS-KS57	43°17.10'N	4°50.97'E	Gulf of Lion	-79	Fanget et al. (2012)	Piston core	Ostracods, benthic foraminifera, Coccolits, XRF
C90_1-C90-C836	40°35.76'N	14°42.48'E	Gulf of Salerno	-103,4	Lirer et al. (2013); Lirer et al. (2014); Vallefuoco et al. (2012); Incarbona et al (2010); Sagnotti et al.(2005); Iorio et al.(2004)	Gravity core-SW104	Planktonic and benthic foraminifera, δ¹⁸O *G. ruber*, Coccoliths, paleomagnetic variation
GeoB10709-5	39.757N	17.893E	Gulf of Taranto	-160	Zonneveld et al. (2012)	Gravity core	Dinoflagellates
GT14	39°45'55''N	17°53'30''E	Gulf of Taranto	-166	CiniCastagnoli et al. (1989)	Gravity core	Thermoluminescence
GeoB10709-4	39.757°N	17.893°E	Gulf of Taranto	-173	Gruel et al. (2013)	Gravity core	SST alkenone, δ¹⁸O *G. ruber*and*U.mediterranea*
NU04-MC	39.764N	17.892E	Gulf of Taranto	-173	Gruel et al. (2013)	Gravity core	SST alkenone, δ¹⁸O *G. ruber*and*U. mediterranea*
GT90/3	39"45'53"N	17"53'33"E	Gulf of Taranto	-174	Cini Castagnoli et al. (2000, 2002, 2002a); Tarrico et al. (2009); Alessio et al. (2012)	Gravity core	δ¹⁸O andδ¹³C *G. ruber*, $CaCO_3$, alkenone
GT89-3	39°45'43'' N	17° 53'55'' E	Gulf of Taranto	-180	Cini Castagnoli et al. (1998)	Gravity core	Thermoluminescence
ST 272	37°17'N	12°48'E	Sicily Channel	-226	Incarbona et al. (2010)	boxcore	Coccoliths
GT91-1	39°59'23''N	17°45'250''E	Gulf of Taranto	-250	Versteegh et al. (2007)	Gravity core	alkenone
AMC99-1	42°51.80'N	14°45.67'E	Central Adriatic Sea	-260	Piva et al. (2008)	Gravity core	Planktonic and benthic foraminifera, δ¹⁸O *G. bulloides*
DP30PC	39°50.070 N	17 48.050 E	Gulf of Taranto	-270	Chen et al. (2011)	Piston core	Dinoflagellates
DP30	39.835°N	17.801°E	Gulf of Taranto	-270	Gruel et al. (2013a)	Gravity core	SST alkenone,
ST 407	36°23'N	14°27'E	Sicily Chanel	-345,4	Incarbona et al. (2010)	boxcore	Coccoliths
GA-112	31°56.41'N	34°22.13'E	EasternMediterranean (Israel)	-470	Schilman et al. (2001)	Piston core	δ¹⁸O *G. ruber*
Leg 160-site 963	37°02.148'N	13°10.686'E	Sicily Channel	-480	Sprovieri et al. (2003); Incarbona et al. (2008)	ODP core system	Planktonic foraminifera, Coccoliths
ST 342	36°42'N	13°55'E	Sicily Channel	-858,2	Incarbona et al. (2010)	boxcore	Coccoliths
M-2	40.05N	24.32E	North Aegean Sea	-1018	Gogou et al. (2013)	Gravity core	alkenone

384B	35°59.161'N	4°44.976'W	West Alboran Sea	-1022	Nieto-Moreno 2012 (PhD Thesis)	boxcore	SST alkenone, Geochemistry(Rb/Al-K/Zr-Zr/Al-Zr/Rb-V/Al-V/Cr-Ni/Co-Mg/Al-Br/Al-Mn/Al-Mo/Al-Co/Al-Fe/Al), TOC
ODP Site 976C-1H	36°12' N	4°18'W	West Alboran Sea	-1108	Martin-Puertas et al. 2010	ODP core system	Geochemistry(Mg/Al-Rb/Al- Zr/Al-Pb/Al)
436B	36°12.318'N	4°18.800'W	West Alboran Sea	-1108	Nieto-Moreno 2012 (PhD Thesis)	boxcore	SST alkenone, Geochemistry(Rb/Al-K/Zr-Zr/Al-Zr/Rb-V/Al-V/Cr-Ni/Co-Mg/Al-Br/Al-Mn/Al-Mo/Al-Co/Al-Fe/Al), TOC
Site TTR 300G	36°21'532'' N	1°47.501'W	West Alboran Sea	-1860	Martin-Puertas et al. 2010	Gravity core	Geochemistry(Mg/Al-Rb/Al- Zr/Al-Pb/Al)
305G	36°23.603'N	1°22.710'W	West Alboran Sea	-2512	Nieto-Moreno 2012 (PhD Thesis)	Gravity core	Geochemistry (Rb/Al-Ba/Al-K/Al-Mg/Al-Si/Al-Ti/Al-Zr/Al-V/Al-Cr/Al-Ni/AlZn/Al-U/Th-Cu/Al-Mn/Al-Co/Al-Mo/Al-Fe/Al), TOC
306G	36°27.846'N	1°11.166'W	West Alboran Sea	-2574	Nieto-Moreno 2012 (PhD Thesis)	Gravity core	Geochemistry(Rb/Al-Ba/Al-K/Al-Mg/Al-Si/Al-Ti/Al-Zr/Al-V/Al-Cr/Al-Ni/AlZn/Al-U/Th-Cu/Al-Mn/Al-Co/Al-Mo/Al-Fe/Al), TOC

Tab. 1. List of the marine sediment cores from the Mediterranean area which provide information on the last two millennia. This table also indicates all the measured proxies and the published references for each core.

The data available from the selected scientific literature allowed to identify a succession of intervals corresponding to important climatic phases during the last two millennia and recognisable at Mediterranean and extra-Mediterranean scale.

The synthetic reconstruction of the climatic oscillations for the last two millennia recorded in Mediterranean marine sediment cores is based on only 5 sites: i) west Alboran Sea (Nieto-Moreno et al., 2011); ii) Gulf of Salerno, south Tyrrhenian Sea (Lirer et al., 2014); iii) Gulf of Taranto (Grauel et al., 2013); iv) Adriatic Sea (Piva et al., 2008) and north Aegean Sea (Gogou et al., 2012). The choice of these sites is related to the existing documented high-resolution analyses, which are useful to identify the short-term paleoclimatic phases occurring during the last two millennia (Table 2).

Nieto Moreno PhD thesis (2012) western Alborean Sea		Lirer et al. (2014) south Tyrrhenian Sea (Salerno Gulf)		Grauelet al. (2013) centralMediterranean (Taranto Gulf)		Piva et al. (2008) Adriatic Sea		Gogou et al. (2012) (Aegean Sea)	
Climatic phase	Age (yr. AD)	Climatic phase	Age (yr. AD)	Climatic phase	Age (yr. AD)	Climatic phase	Age (yr. AD)	Climatic phase	Age (yr. AD)
		Modern warm Period	1940 AD upwards						
Industrial Period	1800AD upwards	Industrial Period	1850AD - 1940AD						
Little Ice Age	1300AD - 1800AD	Little Ice Age	1240AD - 1850AD	Little Ice Age	1400AD - 1850AD	Little Ice Age	1400/1450AD -1840AD	Little Ice Age	1300AD - 1850 AD
Medieval Classic Anomaly	800AD - 1300AD	Medieval Classic Anomaly	840AD - 1240AD	Medieval Warm Period	800AD - 1200AD	Medieval Warm Period	600AD – 1200 AD	Medieval Warm Period	900AD - 1300AD
Dark Age	650AD - 800AD	Dark Age	530AD - 840AD	Dark Age Cold Period	500AD - 750AD	Dark Age Cold Period	350 AD – 600 AD	Dark Age	500AD - 900AD
Roman Humid Period	300AD - 650BC	Roman Period	top 530AD	Roman Classic Warm Period	1AD- 200AD	Roman Warm Period	150 AD – 350 AD	Roman Warm Period	0AD- 500 AD

Tab. 2. Succession of paleoclimatic phases recognisable in the Mediterranean area during the last two millennia.

The chronologies proposed by different authors (Piva et al., 2008; Nieto Moreno 2012; Gogou et al. 2012; Grauel et al., 2013; Lirer et al., 2014) for identifying the paleoclimatic phases are comparable. Even so, these ages have to be carefully evaluated to understand the synchrony of the climatic phases as well as how these phases are registered in the marine sediments of the different sectors of the Mediterranean area. In addition, it is possible that local effects (natural and anthropogenic) amplify the global climate signature recorded in the marine cores, as recently reported by Lirer et al. (2014) for the cold Maunder event. This overprint can consequently modify the value of the SST reconstructed by oxygen isotope data.
Recently, *Lirer et al*. (2014) reported the identification of additional events for the *Roman Period* (three cold intervals: Roman I, II and III) and for the *Medieval Classic Anomaly* (*Medieval Cold Period* and *Medieval Warm Period*).
It is important to stress that, excluding the north Aegean Sea (Gogou et al. 2012), no high resolution data are documented in the eastern Mediterranean.
A standard codification of these climatic phases is necessary to make easy/possible the correlation between different Mediterranean and extra-Mediterranean areas.
In this framework, the key sites (mainly sites located in the continental shelf, useful for high-resolution studies) identified during the first year of the NextData Project and recovered during the oceanographic cruise NEXTDATA-2013 (Table 3), offer the possibility to propose a more complete reconstruction of the climatic oscillations documented during the last 2000 years in the Mediterranean area.

Core	**Latitude**	**Longitude**	**Mediterranean area**	**meters water depth**	**Oceanographic cruise**	**Type of recovery**	**Measured parameters**
ND2	36°33'52''	14°52'59''	Sicily continental shelf	-89	NEXTDATA 2013	Gravity core and SW104	Magnetic susceptibility, paleomagnetic variation
C5	40°58'24,953''	13°47'02,514''	Gulf of Gaeta	-93	AMICA 2013	Gravity core	Planktonic foraminifera, Coccoliths, $\delta^{18}O$ and $\delta^{13}C$ *G. ruber*, paleomagnetic variation

C5_SW104	40°58'24,993"	13°47'03,040"	Gulf of Gaeta	-93	AMICA 2013	Gravity core and SW104	Planktonicforaminifera, Coccoliths, $\delta^{18}O$ and$\delta^{13}C$ *G. ruber*, paleomagnetic variation, pollens
ND13	36°35'10''	14°26'55''	Sicily continental shelf	-165	NEXTDATA 2013	Gravity core and SW104	Magnetic susceptibility, paleomagnetic variation
ND9	39°49'24''	17°52'47''	Gulf of Taranto	-172	NEXTDATA 2013	Gravity core and SW104	Magnetic susceptibility, paleomagnetic variation
ND10	40°05'50''	17°44'50''	Gulf of Taranto	-174	NEXTDATA 2013	Gravity core and SW104	Magnetic susceptibility, paleomagnetic variation
ND5	35°20'06''	15°24'45''	Sud-Est di Malta	-335	NEXTDATA 2013	Gravity core and SW104	Magnetic susceptibility, paleomagnetic variation
ND11	37°01'57''	13°10'54''	Sicily Channel	-475	NEXTDATA 2013	Gravity core and SW104	Magnetic susceptibility, paleomagnetic variation

Tab.3. List of the marine sediment cores collected for NextData Project.

Concerning extra-Mediterranean marine areas, close to the Iberian peninsula, there are very few marine sediment cores with useful data (biotic or abiotic) for paleoclimatic studies for the last two millennia (Table 4 and Figure 2).

Core	Latitude	Longitude	Atlantic ocean	meters water depth	References	Type of recovery	Measured parameters
PO287-6G	41.4° N	8.9°W	North-western Portugal-Galician shelf	-80	Abrantes et al. 2011	Gravity core	Magnetic susceptibility, $\delta^{18}O$ and$\delta^{13}C$ *G. bulloides, G. inflata, N-. pachyderma* and *U. peregrina*, alkenones, marine diatomes
PO287-6B	41.4° N	8.9°W	North-western Portugal-Galician shelf	-80	Abrantes et al. 2011	boxcore	Magnetic susceptibility, $\delta^{18}O$ and$\delta^{13}C$ *G. bulloides, G. inflata, N-. pachyderma* and *U. peregrine*, alkenones, marine diatom
VIR-18	42°14.07N	8°47.37W	Ria de Vigo	-45	Alvarez et al. 2005	Vibro-corer	Coccoliths
EUGC-3B	42°45.105N	9°02.231W	Rio de Muros (Portugal)	-38	Pena et al. 2007	Gravity core	$\delta^{18}O$ and$\delta^{13}C$ Nonion (benthic)
D13902	38°33.24'N	9°20.13'W	South Estroril (Portugal)	-90	Abrantes et al. 2005	Piston core	Magnetic susceptibility, Paleomagnetic analysis, total carbon, $CaCO_3$, diatom, alkenone, grain sizes, Radionuclides,
PO287-26B	38°33.49N	9°21.84'W	South Estroril (Portugal)	-96	Abrantes et al. 2005	boxcore	Radionuclides,Magnetic susceptibility, grain sizes,
PO287-26G	38°33.49N	9°21.84'W	South Estroril (Portugal)	-96	Abrantes et al. 2005	Gravity core	Magnetic susceptibility, alkenone,

Table 4. List of marine sediment cores from extra-Mediterranean area, close to the Iberian Peninsula (Portugal margin), providing information on the last two millennia. This table includes all the measured proxies and the published references for each core.

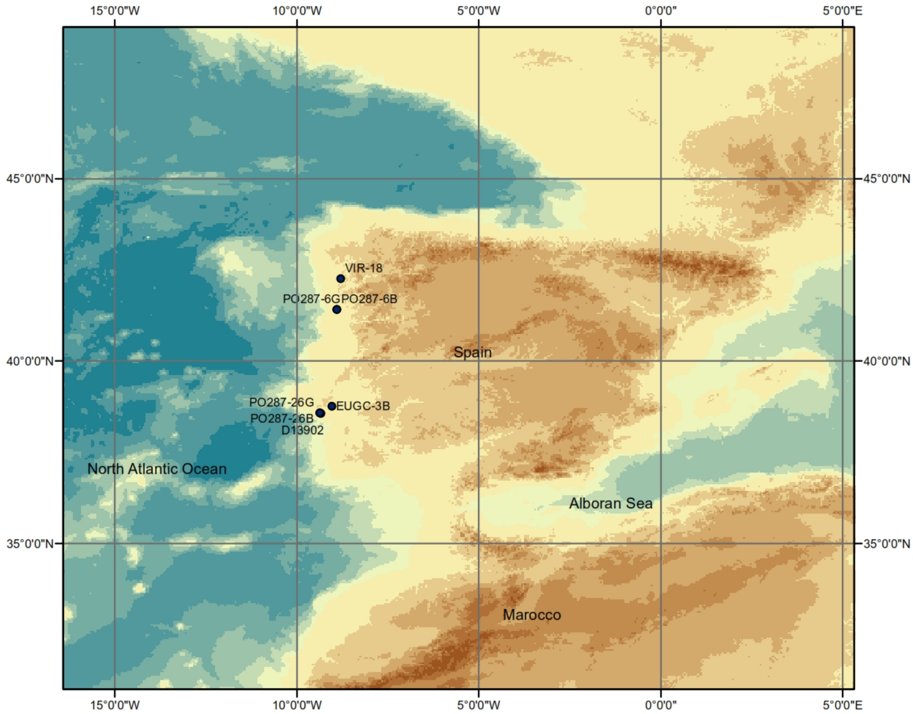

Fig. 2. Location map of marine cores (from literature data) from extra-Mediterranean areas (Portugal margin), providing useful information for paleoclimatic studies of the last 2000 years.

In recent years, several Italian pollen sites have been studied in order to reconstruct the history of vegetation and climate of the last few thousand years, although some Italian regions are still largely unexplored (e.g., Sardinia, Campania, Marche). Despite the network of published Italian pollen sites, which provides fundamental information on the history of vegetation in Italy, as yet there has been no synthesis work capable of providing a detailed understanding of the mechanisms and dynamics involved in the vegetation changes at regional and supra-regional scales during the past 3000 years. At present, 39 Italian pollen sites have been selected, providing data for the last 2000/3000 years (Table 5 and Figure 3).

Latitude	Longitude	Age of sediment (years cal BP)	meters a.s.l.	Sea (S) Lake (L) Coastal (C) site	References
44,540	9,470	0.5-10.5	1279	L	Branch 2013
44,483	9,467	0÷6	1331	L	Cruise 1990
44,450	8,580	0÷6	987	L	Braggio Morucchio et al. 1978; Guido et al. 2004
44,420	9,960	0÷15	1254	L	Bertoldi 1981; Bertoldi et al. 2007
44,400	10,010	0÷3.8	1377	L	Mori Secci 1996
44,383	10,050	0÷13	1350	L	Lowe 1992
44,350	10,100	0÷10,6	1550	L	Lowe 1992
44,320	10,840	0÷14.5	675	L	Vescovi 2007
44,300	9,570	0÷11	830	L	Cruise, Maggi 2000; Cruise et al. 2009
44,280	10,210	0÷10	1261	L	Lowe, Watson 1993; Watson 1996
44,170	10,570	0÷5,5	1307	L	Watson 1996
44,150	10,770	0÷10	1225	L	Watson 1996
44,130	10,620	0÷13	1442	L	Vescovi et al. 2010
43,830	10,330	0÷6	0	C	Colombaroli et al. 2007; Marchetto et al. 2008
42,980	10,920	0÷15	157	L	Magny et al. 2006; Drescher-

					Schenider et al. 2007; Vanniere et al. 2008
42,720	11,030	0÷6	2	C	Biserni, van Geel 2005
42,670	14,620	0÷15	-150	S	Lowe et al. 1996
42,450	15,100	0÷15	-140	S	Lowe et al. 1996
42,317	12,233	0÷90	510	L	Magri, Sadori 1999
42,100	12,310	0÷12	207	L	Kelly, Huntley 1991
42,040	15,670	0÷6	-77	S	Oldfield et al. 2003; Mercuri et al. 2012
41,900	16,130	0÷6	1	C	Caroli, Caldara 2007; Caldara et al. 2008
41,825	12,282	0÷8	3	C	Di Rita et al. 2010
41,814	13,987	0÷9	2000	L	Brown et al. 2013
41,783	12,750	0÷20	293	L	Lowe et al. 1996; Mercuri et al. 2002
41,760	12,310	1.4÷4	0	C	Bellotti et al. 2011
41,728	13,953	0÷6	1590	L	Brown et al. 2013
40,944	15,600	0÷120	656	L	Allen et al. 2002
40,840	14,080	1÷2	2	C	Grüger, Thulin 1999
40,470	14,700	0÷20	-292	S	Russo Ermolli, di Pasquale 2002; Di Donato et al. 2008
40,176	18,450	0÷5.5	2	C	Di Rita, Magri 2009
39,900	8,470	1.5÷5.2 cal	1	C	Di Rita, Melis 2013
39,550	16,170	0÷10	1048	L	Joannin et al. 2012; Brugiapaglia et al. 2013
37,900	14,39	0÷10	1044	L	Bisculm et al. 2012
37,620	12,650	0÷10	6	C	Tinner et al. 2009
37,620	12,630	0.5÷10	4	C	Magny et al. 2011; Calò et al. 2012
37,510	14,300	0÷11	674	L	Sadori Narcisi 2001; Sadori et al. 2008
37,020	14,330	0÷7.5	7	C	Noti et al. 2009
36,817	11,986	0-0.12 cal	2	C	Calò et al. 2013

Tab. 5. List of pollen sites from Mediterranean area with sediments spanning the last two millennia.

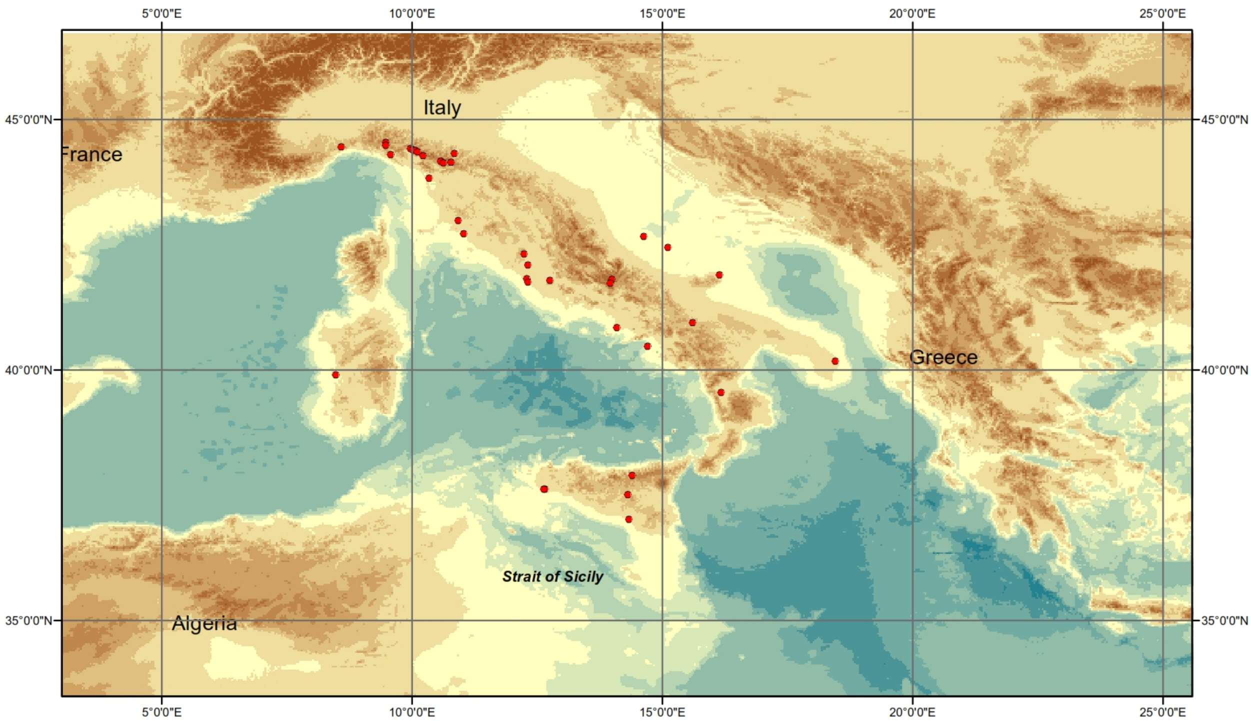

Fig. 3. Location map of the pollen sites from literature data.

As part of the NextData Project, a pollen database from the Italian peninsula is under construction, with the intent to estimate the variability of vegetation (composition, structure, and density) during the last 3000 years, with particular attention to:

- estimate of the extent, duration and rate of vegetation changes;
- assessment of synchrony or diachrony of climatic fluctuations over the Italian territory;
- estimate of the importance of natural and anthropogenic factors in the modification of the vegetational landscape during the past thousands of years;
- correlation of vegetation and environmental changes with centennial-scale climatic fluctuations recognized in Italy and other Mediterranean countries (e.g., *Little Ice Age*).

Here we report some preliminary results about nineteen pollen sites from peninsular Italy, Sicily and Sardinia, whose chronology is supported by radiometric dates. Although we present only changes in the degree of forestation, represented by the percentage (average calculated over 500 years) of the pollen of arboreal plants (AP), significant environmental fluctuations can be observed (Figure 4):

- 3000 years BP: most of the Italian peninsula was forested (AP > 70%), while the diagrams from Sicily and Sardinia show rather open vegetation.
- 2750-2250 years BP: a deforestation pattern is outlined in large areas of southern Italy and Sicily, while in north-central Italy there were no significant variations in forest cover.
- 2250-1750 years BP: the Italian peninsula generally shows a modest but wide spread recovery of arboreal vegetation.
- 1750-1250 years BP: a strong deforestation trend is recorded, especially in central and northern Italy, with the exception of a few sites in the Adriatic side of the peninsula.
- 1250-750 years BP: there is a new forest recovery in the Tyrrhenian side of the Italian peninsula contrasting with a decline observed on the Adriatic side and Sicily.
- 750-250 years BP: a further general deforestation is highlighted, however not involving some southern sites.

These preliminary results reveal some significant trends, which at least partly reflect bioclimatic trends. In general, despite human influence on local afforestation or more frequently clearance, regional-scale trends towards more widespread forest conditions may indicate greater water availability, due to increased precipitation and/or lower evapotranspiration. Conversely, a reduction of forest extent could be caused by more or less prolonged periods of dryness, as well as by increased land exploitation.

The detail of the presented maps (Fig. 4) will be improved during the NextData Project through increases both in the resolution of the time-windows and in the number of sites included in the database and the analysis. In addition, this type of representation will be applied to individual taxa or vegetation types. This will better define the relationship between the observed vegetation changes and climatic fluctuations (eg. *Roman Warm Period, Dark Age, Medieval Anomaly, Little Ice Age*) recognized by independent proxy data, studied at a regional or continental scale.

For those purposes, it will be important to obtain a high-resolution pollen record with detailed chronological control, studied with a multidisciplinary approach, which may serve as a reference for the recognition of the abovementioned centennial-scale fluctuations. For this purpose, detailed multidisciplinary analyses of a marine sediment core off Gaeta are being carried out, which will allow direct stratigraphic correlations between climate changes recorded by marine proxies and vegetational changes in the landscape inland.

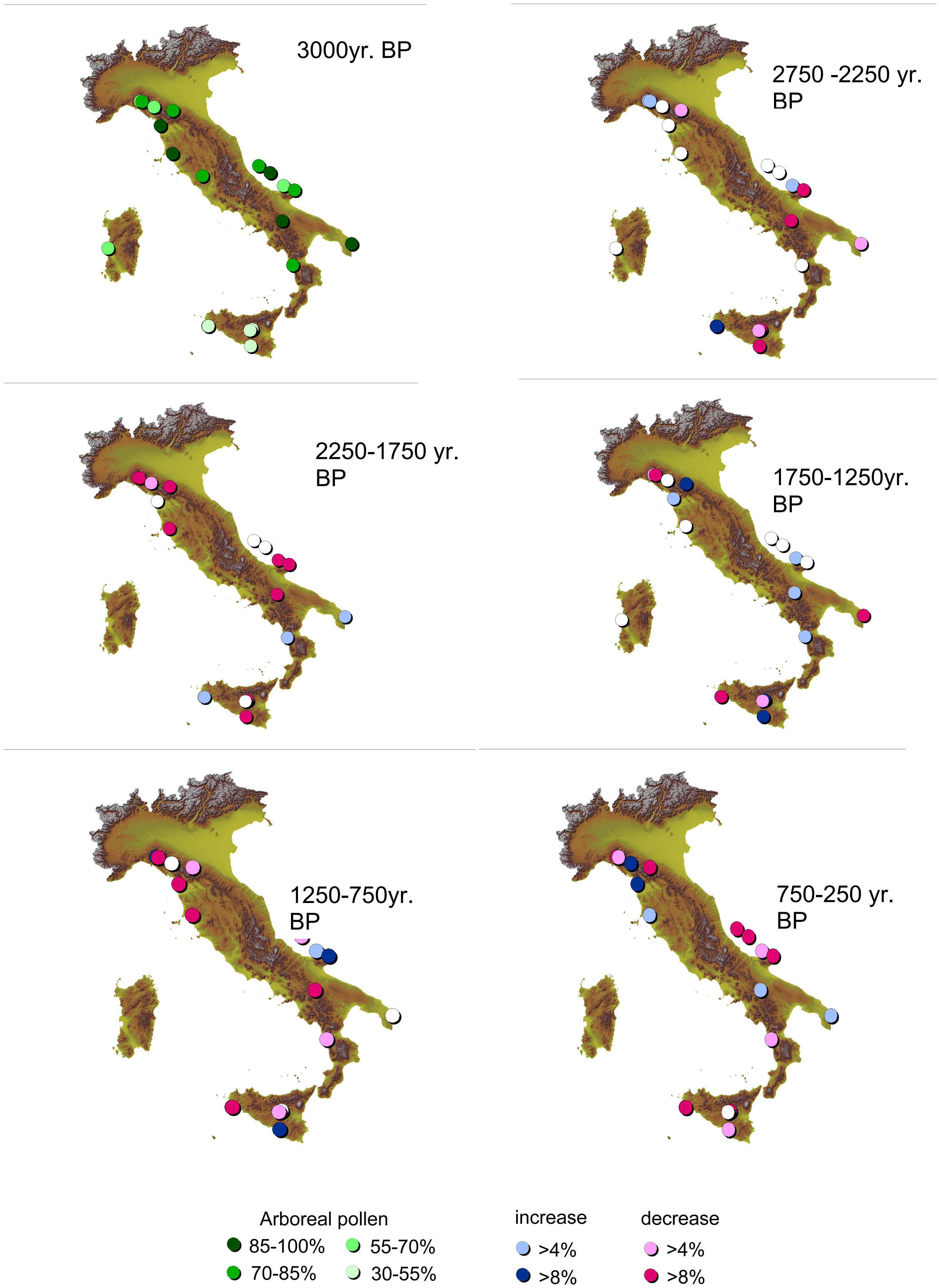

Fig. 4. Changes in the degree of forestation, represented by the percentage (average calculated over 500 years) of the pollen of arboreal plants (AP) based on the survey of 19 selected sites. Changes are referred to the first map (3000 y BP).

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Transmission of data to the archives and General Portal:

The numerical data transferred to the General Portal are:

- Planktonic foraminiferal quantitative data of cores: C90_1m-C90-C836 (Gulf of Salerno, southern Tyrrhenian Sea), C5, C5_SW104 and C6 (Gulf of Gaeta, central Tyrrhenian Sea).
- Calcareous nannofossil quantitative data of cores: C90_1m-C90-C836 (Gulf of Salerno, southern Tyrrhenian Sea), C5 e C5_SW104 (Gulf of Gaeta, central Tyrrhenian Sea).
- $\delta^{18}O$ e $\delta^{13}C$ data from planktonic foraminifer *Globigerinoidesruber* of cores: C90_1m-C90-C836 (Gulf of Salerno, southern Tyrrhenian Sea), C5 e C5_SW104 (Gulf of Gaeta, central Tyrrhenian Sea).
- Pollens quantitative data of core C5_SW104 (Gulf of Gaeta, central Tyrrhenian Sea).
- Radionuclide data of cores: C90_1m (Gulf of Salerno, southern Tyrrhenian Sea) and C5_SW104 (Gulf of Gaeta, central Tyrrhenian Sea).
- Magnetic susceptibility data of cores: C5, C5_SW104, C6 e C13_SW104 (Gulf of Salerno, southern Tyrrhenian Sea); ND9 e ND10 (Gulf of Taranto), ND11, ND2 e ND13 (Sicily channel), ND5 e ND6 (south continental shelf of Malta Island).