Data in brief 24 (2019) 103897

Contents lists available at ScienceDirect

Data in brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Data on coastal dunes vulnerability of eleven microtidal wave-dominated beaches of Sardinia (Italy, western Mediterranean)

Carla Buosi, Marco Porta, Daniele Trogu, Mauro Casti, Fabrizio Ferraro, Sandro De Muro*, Angelo Ibba

Coastal and Marine Geomorphology Group (CMGG), Department of Chemical and Geological Sciences, University of Cagliari, Cittadella Universitaria, 09042 Monserrato CA, Italy

ARTICLE INFO

Article history:
Received 14 March 2019
Received in revised form 22 March 2019
Accepted 27 March 2019
Available online 4 April 2019

Keywords:
Coastal dunes
Coastal dune vulnerability index
Geomorphology
Beach management
Sardinia
Mediterranean sea

ABSTRACT

This article contains data about the values of the Dune Vulnerability Index (DVI) and the Partial Index Vulnerability (IVp) of eleven coastal dune systems located in Sardinia (Italy, western Mediterranean). Specifically, we present the values of 59 variables that summarize the condition of the studied dune systems, clustered in five groups: Geomorphological Condition (GCD), Marine Influence (MI), Aeolian Influence (AI), Vegetation Condition (VC), and Human Effects (HE). Data were collected during numerous field surveys and using aerial-photos. This dataset can be useful to evaluate the coastal dune vulnerability of several Sardinian beaches in order to drive local coastal managers towards an efficient management.

© 2019 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

* Corresponding author.
E-mail address: marinegeology@unica.it (S. De Muro).

https://doi.org/10.1016/j.dib.2019.103897
2352-3409/© 2019 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Specifications Table

Subject area	*Environmental science*
More specific subject area	*Coastal Dune Management, Geomorphology, Vulnerability*
Type of data	*Tables, figure*
How data was acquired	*Field survey, sample collection, laboratory analysis, aerial-photos interpretation*
Data format	*Raw data collection and analysis*
Experimental factors	*Data were analyzed by various environmental parameters: Geomorphological Condition (GCD), Marine Influence (MI), Aeolian Influence (AI), Vegetation Condition (VC), and Human Effects (HE).*
Experimental features	*Coastal Dune Vulnerability (DVI) of several dune systems was determined.*
Data source location	*Eleven beach systems located in Sardinia (Italy, western Mediterranean)*
Data accessibility	*Data are with this article.*
Related research article	*De Muro, S., Kalb, C., Ibba, A., Batzella, T., Pusceddu, N., Ferrara, C., Ferraro, F. (2011). Coastal dunes vulnerability. GAVAM checklist method used at three mediterranean microtidal wave dominated beaches (Gulf of Cagliari). Rendiconti Online della Società Geologica Italiana, 17, 77–82.* https://doi.org/10.3301/ROL.2011.26

Value of the Data

- This dataset will act as guide for researchers, scientists and local coastal managers for the comprehension of coastal processes and facilitates the understanding of dune vulnerability estimates.
- These data can facilitate the conservation of dune habitats by informing coastal managers of current anthropogenic impact.
- Provided data can be useful to develop a global database to quantify the coastal dune vulnerability according to the main geomorphological and ecological resilience level, together with aeolian, marine and anthropogenic factors.
- The dataset may represent a starting point for monitoring of future changes of coastal dune systems, using the DVIs parameters as indicators of changes.
- The investigation of DVIs parameters can help to design efficient remediation actions of coastal dune systems.

1. Data

This study summarizes the condition of eleven coastal dunes systems of Sardinia, Italy (Fig. 1) according to the Coastal Dune Vulnerability Index (DVI [1,2]). These coastal dune systems belong to the coastal environments of Porto Pino, Piscinnì, Chia (Sa Colonia, Porto Campana, Su Giudeu), Solanas, Villasimius (Porto Giunco, Simius, Is Traias, Punta Molentis) and Budoni (Fig. 1), important tourist destinations of semi-pristine nature that are facing environmental pressures common to many coastal Mediterranean settings. The main environmental features of these beaches are summarized in Table 1. These beaches were studied with an integrated, morphodynamic sea-land approach [3,4]. For a detailed description and discussion of the studied sites see Refs. [5–9]. The sedimentary regime of these beaches is mainly controlled by the wind-induced currents and the widespread presence of the *Posidonia oceanica* meadows. This seagrass plays a crucial role in the Mediterranean ecosystems contributing to the carbonate sediment production of the beaches [10].

Dune vulnerability is defined as the loss of capacity of a dune system to return to its original dynamic equilibrium after system displacement. The DVI is based on a range of parameters derived from coastal and dune geomorphology, but also includes the identification of sediment sources, transport and sedimentation pathways, the assessment of vegetation cover and the associated human impact. Table 1 shows partial and total vulnerability indices for each sampling site, whereas Tables 2–6 report the variables considered in the DVI classification procedure and the relative scores.

2. Experimental design, materials, and methods

Researchers collected several data by numerous field surveys and using aerial-photos that were analyzed in order to evaluate the DVI of eleven Sardinian dune systems. The aerial-photos analysis

Fig. 1. Study Area. Map with the location of the studied beaches in Sardinia. Image from Google Maps, modified (Coordinates: WGS84/UTM32 N). A: Porto Pino, B: Piscinnì, C: Chia, C1: Su Giudeu, C2: Porto Campana, C3: Sa Colonia, D: Solanas, E: Villasimius, E1: Porto Giunco, E2: Simius, E3: Is Traias, E4: Punta Molentis, F: Budoni.

Table 1
Beach characteristics, DVI and IVp values of the study areas.

Station	Location	Coordinates WGS84/UTM32 N	Average beach width (m)	Average beach length (m)	DVI	IVp				
						GCD	MI	AI	VC	HE
Porto Pino	SW coast	466836 E, 4311606 N	50–70	500	0.44	0.81	0.33	0.38	0.25	0.41
Piscinnì	SW coast	481027 E, 4307157 N	30	250	0.54	0.75	0.44	0.59	0.53	0.41
Su Giudeu	S coast	488393 E, 4304132 N	50–60	1300	0.50	0.75	0.34	0.44	0.45	0.50
Porto Campana	S coast	488840 E, 4304483 N	30	500	0.53	0.67	0.33	0.61	0.57	0.47
Sa Colonia	S coast	489453 E, 4305096 N	30–40	700	0.57	0.75	0.42	0.52	0.62	0.54
Solanas	S coast	537179 E, 4331740 N	45	1000	0.49	0.94	0.38	0.28	0.33	0.50
Porto Giunco	SE coast	544898 E, 4329748 N	25–100	1100	0.52	0.75	0.56	0.45	0.38	0.47
Simius	SE coast	545567 E, 4330808 N	30–70	1200	0.58	0.91	0.44	0.36	0.58	0.62
Is Trias	SE coast	546237 E, 4331382 N	12–35	170	0.48	0.69	0.72	0.38	0.33	0.29
Punta Molentis	SE coast	548094 E, 4331748 N	12–40	175	0.44	0.67	0.39	0.48	0.23	0.43
Budoni	NE coast	560535 E, 4506350 N	70	2000	0.51	0.94	0.43	0.36	0.33	0.50

was carried out using the orthophoto mosaics (from 2008 to 2016) of the SITR (Sistema Informativo Territoriale Regionale) of the "Regione Autonoma della Sardegna – RAS". The data directory is made available through a dedicated WMS service, which can be consulted using a desktop GIS client. Additional information about field surveys and aerial-photos interpretation can be found in Supplementary Material (Appendix 1). The DVI [1,2] is based on 59 variables that summarize the condition of the system according to Geomorphological Condition (GCD), Marine Influence (MI), Aeolian Influence (AI), Vegetation Condition (VC), and Human Effects (HE). These variables allow to quantify the dune system vulnerability through the calculation of the Partial Index Vulnerability (IVp) for each group of variables. Each IVp is calculated by summing all values within each variable group. In detail, each variable was transformed into quantitative value (v) by rating it independently within a rating scale, ranging from 0 (lowest) to 4 (highest). Each IVp was calculated by summing all values assigned to every variable and then the sum of the ranked variables for each group was divided by the sum of the maximum ranking attainable within each group, according to the following Formula (1):

$$IVp = \frac{\sum_{k=1}^{n} v_k}{4*n} \quad (1)$$

where: v_k is the value assigned to each variable ranging from 0 (lowest) to 4 (highest), n is the number of considered variables within each group and 4 is the highest value attainable within each variable.

The DVI is calculated as the average of the five partial vulnerability indices (IVp), according the following Formula (2):

$$DVI = (GCD + MI + AI + VC + HE) / 5 \quad (2)$$

The DVI and each IVp index range between 0 (low vulnerability) and 1 (high vulnerability). Higher values of DVI correspond to a lower ability of the dune system to withstand further interferences. Four main groups of coastal dune conditions were identified [1,2], based on different vulnerability scale: low (DVI < 0.25), from low to medium (between 0.25 and 0.5), from medium to high (between 0.5 and 0.6) and high vulnerability (DVI > 0.6).

Table 2
Geomorphological Condition (GCD) variables and the relative score/percent considered in the dune vulnerability classification procedure of the study areas.

	Geomorphological Condition of the Dune System - GCD	A: Porto Pino	B: Piscinnì	C1: Su Giudeu	C2: Porto Campana	C3: Sa Colonia	D: Solanas	E1: Porto Giunco	E2: Simius	E3: Is Traias	E4: Punta Molentis	F: Budoni	Values of variables
1	Lenght of homogeneous active dune system (km)	4	4	4	4	4	4	4	4	4	4	3	0 >20 1 >10 2 >5 3 >1 4 >0.1
2	Width of dynamic dune system (km)	4	4	3	3	4	4	4	4	4	4	4	0 >2 1 >1 2 >0.5 3 >0.1 4 <0.1
3	Width of frontdune as % of active dune system	2		2	3	0	4	1	3	1	1	4	0 <5% 1 <25% 2 <50% 3 <75% 4 >75%
4	Average height of secondary dunes (m)	3	3	3	3	4		3	4	3	3	3	0 >25 1 >10 2 >5 3 >1 4 <1
5	Average height of frontal dunes (m)	4		4	4	4	4	4	4	4	4	4	0 >25 1 >15 2 >10 3 >5 4 <5
5a	If any ridges, n° of major ridges	3		3	3	4	4					4	0 >10 1 >4 2 >2 3 2 4 1
5b	If plastered to slope, slope steepness			2						4			0 moderate 2 gentle 4 steep
5c	If perched on cliff-cliff height (m)										2		0 <2 2 2–5 4 >5

(*continued on next page*)

Table 2 (*continued*)

Geomorphological Condition of the Dune System - GCD		A: Porto Pino	B: Piscinnì	C1: Su Giudeu	C2: Porto Campana	C3: Sa Colonia	D: Solanas	E1: Porto Giunco	E2: Simius	E3: Is Traias	E4: Punta Molentis	F: Budoni	Values of variables
6	Relative area of wet slacks measured from map (%)	4		2	0		4	2	4	3	2	4	0 moderate 2 small 4 none
7	Degree of dune system fragmentation	2		4	4	4	4	4	4	0	1	4	0 low 2 medium 4 high
8	Particle size of the frontal dune - Phi sizes	3	1	3	0	0	2	2	2	2	3		0 <-1 1 0 2 1 3 2 4 3
Total score/percent		29/0.81	12/0.75	30/0.75	24/0.67	24/0.75	30/0.94	24/0.75	29/0.91	25/0.69	24/0.67	30/0.94	

Table 3
Marine Influence (MI) variables and the relative score/percent considered in the dune vulnerability classification procedure of the study areas.

	Marine Influence - MI	A: Porto Pino	B: Piscinnì	C1: Su Giudeu	C2: Porto Campana	C3: Sa Colonia	D: Solanas	E1: Porto Giunco	E2: Simius	E3: Is Traias	E4: Punta Molentis	F: Budoni	Values of variables	
1	Orthogonal fetch (km)	0	3	3	3	3		3	3	3	0	3	0	<25
													1	<100
													2	<250
													3	>500
													4	>1000
2	Berm slope (degrees)	0	0	2	2	4	2	2	2	4	3	2	0	moderate
													2	gentle
													4	steep
3	Width of intertidal zone (km)	4	4	4	4	4	4	4	4	4	4	4	0	>0.5
													1	>0.2
													2	>0.1
													3	>0.05
													4	<0.05
4	Tidal range (m)	0	1	0	0	0	0	0	0	0	0	0	0	>2
													2	2–4
													4	>4
5	Coastal orientation to wave direction (degrees)	2	2	0	0	0	2	4	4	4	2	2	0	10–45°
													2	0–10°
													4	0°
6	Width of the zone between HWSM and dune face (m)	1	1	0	1	0	2	1	1	2	2	1	0	>75
													1	<75
													2	<25
													3	<10
													4	0
7	Breaches in the frontal dune to wash over, relative total area	1	2	0	0	1	0	2	0	3	1	0	0	0%
													1	<5%
													2	<25%
													3	<50%
													4	>50%
8	% frontal dune cliff by the sea or with only ephemeral dunes as % of dune height	0	1		0	1	0		0	4	0		0	0
													1	<25%
													2	>25%
													3	>50%
													4	>75%
9	Particle size of the beach: Phi sizes	4	2	2	2	2	2	2	2	2	2		0	<0
													2	0–2
													4	>2
Total score/percent		8/0.33	16/0.44	11/0.34	12/0.33	15/0.42	12/0.38	18/0.56	16/0.44	26/0.72	14/0.39	12/0.43		

Table 4
Aeolian Influence (AI) variables and the relative score/percent considered in the dune vulnerability classification procedure of the study areas.

	Aeolian Effect - AI	A: Porto Pino	B: Piscinnì	C1: Su Giudeu	C2: Porto Campana	C3: Sa Colonia	D: Solanas	E1: Porto Giunco	E2: Simius	E3: Is Traias	E4: Punta Molentis	F: Budoni	Values of variables	
1	Sandy supply input	2		2	4	2		2		4	1		0	high
													2	moderate
													4	low
2	% Cover of embryodunes along the seaward edge	3	3	3	4	4	3	3	2	3	3	2	0	>50
													1	>25
													2	>5
													3	<5
													4	none
3	Blowouts: % of the system	2				3	0	0	0	0	0	1	0	<5%
													1	<10%
													2	<25%
													3	<50%
													4	>50%
4	Aeolian breaches in seaward face not induced by trampling: % of the system	1	4	3	4	2	1	1	1	0	1	2	0	<5%
													1	<10%
													2	<25%
													3	<50%
													4	>50%
4a	If breaches-depth as % of dune height	0	3		4	3	0	0	1	0	1	1	0	<5%
													1	<10%
													2	<25%
													3	<50%
													4	>50%
5	Natural litter drift cover as % surface	4	3	1	1	2		4	2	4	4	1	0	0%
													1	<5%
													2	>5%
													3	>25%
													4	>50%
6	Pebble cover as % surface	0	1	0	0	0	2	1	1	1	3		0	0%
													1	<5%
													2	>5%
													3	>25%
													4	>50%
7	Shell cover as % surface on upper beach	1	1	1	1	1	0	2	1	2	3		0	0%
													1	<5%
													2	>5%
													3	>25%
													4	>50%

8	% seaward dune vegetated	1	2	1	2	2	1	2	2	0	1	1	0 1 2 3 4	>90 >60 >30 >10 <10
9	% of the system unvegetated	1	2	3	2	2	2	3	3	1	2	2	0 1 2 3 4	<10 >10 >20 >40 >75
Total score/percent		15/0.38	19/0.59	14/0.44	22/0.61	21/0.52	9/0.28	18/0.45	13/0.36	15/0.38	19/0.48	10/0.36		

Table 5
Vegetation Condition (VC) variables and the relative score/percent considered in the dune vulnerability classification procedure of the study areas.

	Vegetation Condition - VC	A: Porto Pino	B: Piscinnì	C1: Su Giudeu	C2: Porto Campana	C3: Sa Colonia	D: Solanas	E1: Porto Giunco	E2: Simius	E3: Is Traias	E4: Punta Molentis	F: Budoni	Values of variables	
1	% cover of Type III plants in the beach	1	2	4	2	4	2	4	4	3	4	2	0	>50
													1	>25
													2	>15
													3	>5
													4	<5
2	% cover Type III plants in the seaside of the frontal dune	1	2	4	2	3	2	1	2	1	0	1	0	>90
													1	>60
													2	>30
													3	>15
													4	<15
3	Relative proportion of Type II plants in the seaside of the frontal dune (% cover)	0	2	2	2	3	0	0	0	2	2	2	0	<5
													1	<15
													2	<30
													3	<60
													4	>60
4	Relative proportion of Type I plants in the seaside of the frontal dune (% cover)	3	1	0	2	4	3	1	4	0	0	3	0	<1
													1	>1
													2	>5
													3	>10
													4	>30
5	Relative proportion of exotic species in the seaside of the frontal dune (% cover)	1	1	0	2	2	1	2	3	2	0	0	0	0
													1	<1
													2	<5
													3	<15
													4	>15
6	Relative proportion of Type II & III plants in 100 m inland of the dune front	1	3	0	2	2	1	1	3	0	1	1	0	>75
													1	>50
													2	>25
													3	>10
													4	<10
7	Relative proportion of vigorous plants or plants with normal vitality in the seaside of the frontal dune (%)	1	4	2	4	1	1	1	4	1	1	1	0	>75
													1	>50
													2	>25
													3	>10
													4	<10
8	Relative cover (%) of exposed roots in the seaside of the frontal dune	1	2	2	2	1	1	3	0	4	0	1	0	<5
													1	>5
													2	>15
													3	>25
													4	>50

9	Relative proportion (%) of plants with obvious effect of physical damage	0	2	2	3	3	0	0	0	0	0	0	0 1 2 3 4	<5 >5 >15 >25 >50
10	% Vegetation removal seaward of the frontal dune due to human disturbance	1	2	2	2	2	2	2	3	0	1	2	0 1 2 3 4	<10 >10 >25 >50 >75
Total score/percent		10/0.25	21/0.53	18/0.45	23/0.57	25/0.62	13/0.33	15/0.38	23/0.58	13/0.33	9/0.23	13/0.33		

Table 6
Human Effect (HE) variables and the relative score/percent considered in the dune vulnerability classification procedure of the study areas.

	Human Effect - HE	A: Porto Pino	B: Piscinnì	C1: Su Giudeu	C2: Porto Campana	C3: Sa Colonia	D: Solanas	E1: Porto Giunco	E2: Simius	E3: Is Traias	E4: Punta Molentis	F: Budoni	Values of variables
1	Visitor pressure	4	2	4	4	4	4	4	4	2	4	4	0 low 2 moderate 4 high
2	Visitor frequency	2	2	4	4	4	4	4	4	3	4	4	0 low 2 moderate 4 high
3	Access difficulty	4	4	4	4	4	4	4	4	3	3	4	0 low 2 moderate 4 high
4	On dune driving	2	1	0	0	4		2	4	2	4	2	0 none 2 some 4 much
5	On beach driving	2	1	2	2	4		4	4			2	0 none 2 some 4 much
6	Horse riding	0	0	0	0	0	2	0	0	0	0		0 none 2 some 4 much
7	Path network as percent of the frontal dune	2	4	4	4	4	4	3	4	1	2	3	0 0% 1 <5% 2 >5% 3 >25% 4 >50%
7.1	Path width (m)	3	4	4	4	4	2	2	3	1	2	2	0 <1 1 <2 2 <3 3 <5 4 >5
7.2	Paths incised as percent of the frontal dune height	3	2	4	2	4		1	2	0	1		0 <5 1 <25 2 <50 3 >50 4 <75
8	Anthropogenic litter: cover as % surface cover	1	0	1	1	1		0	1	0	0		0 0% 1 <5% 2 >5% 3 >25% 4 >50%

9	Amount of sand (%) extracted for building etc.	0	1	2	2	2	0	2	2	0	0	0	0 0% 1 <5% 2 >5% 3 >25% 4 >50%
10	Summer beach cleaning frequency. (High is twice a day; medium, daily)	2	1	1	1	1		4	4	2	3		0 low 2 moderate 4 high
11	% upper beach cleaned	3	3	4	2	1		4	4	4	4		0 0 1 <25 2 <50 3 <75 4 >75
12	% permanent infrastructure replacing active dunes (roads, houses, etc.)	1	0	0	0	4		0	3	0	0	1	0 0 1 <25 2 <50 3 <75 4 >75
13	% ephemeral infrastructure replacing active dunes (outdoor facilities, camping, etc.)	0	0	0	2	0	1	0	2	0	0	0	0 0 1 <25 2 <50 3 <75 4 >75
14	Relative surface (%) forested in system (200 m inland from foredune)	1	0	0	0	0	1	0	0	0	0	2	0 0 1 <25 2 <50 3 <75 4 >75
15	Relative cover (%) of agriculture in system (200 m inland from foredune)	0	0	0	0	0	1	0	0	0	0	0	0 0 1 <25 2 <50 3 <75 4 >75
16	Grazing on the active system	0	4	0	0	0	0	0	0	0	0		0 none 1 low 2 moderate 3 high 4 intensive
17	Rabbit numbers	1	2	4	4	0	1	0	2	3	4		0 none 1 low 2 moderate 3 high 4 intensive
Total score/percent		31/0.41	31/0.41	38/0.50	36/0.47	41/0.54	24/0.50	34/0.47	47/0.62	21/0.29	31/0.43	24/0.50	

Acknowledgments

The data provided in this dataset were gathered and analyzed within two European Projects: LIFE 'SOSS DUNES' (Safeguard and management of South-western Sardinian Dunes) (LIFE13NAT/IT/001013) and LIFE 'PROVIDUNE' (LIFE07/NAT/IT/000519). This study is part of two Fellowship grants intended to "Young Researchers" co-financed by PO Sardinia FSE 2007–2013 L.R. 7/2007. The research is also supported by the project "RIsposta e Adattamento dei sistemi costieri della Sardegna alle variazioni climatiche globali - R.I.A.S." and the Olbia-Tempio Province "Studi e ricerche finalizzati alla tutela delle coste - Atlante delle coste della provincia di Olbia-Tempio" project.

Transparency document

Transparency document associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2019.103897.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.103897.

References

[1] M.R. García-Mora, J.B. Gallego Fernández, A.T. Williams, F. García Novo, A coastal dune vulnerability classification. A case of study of the SW Iberian Peninsula, J. Coast. Res. 17 (2001) 802–811.
[2] A.T. Williams, J. Alveirinho-Dias, F. Garcia-Novo, M.R. García-Mora, R. Curr, A. Pereira, Integrated coastal dune management: Checklists, Cont. Shelf Res. 21 (2001) 1937–1960, https://doi.org/10.1016/S0278-4343(01)00036-X.
[3] S. De Muro, A. Ibba, S. Simeone, C. Buosi, W. Brambilla, An integrated sea-land approach for mapping geomorphological and sedimentological features in an urban microtidal wave-dominated beach: a case study from S Sardinia, western Mediterranean, J. Maps 13 (2017) 822–835, https://doi.org/10.1080/17445647.2017.1389309, 2017.
[4] G. Mastronuzzi, D. Aringoli, P.P.C. Aucelli, M.A. Baldassarre, P. Bellotti, M. Bini, S. Biolchi, S. Bontempi, P. Brandolini, A. Chelli, L. Davoli, G. Deiana, S. De Muro, S. Devoto, G. Di Paola, C. Donadio, P. Fago, M. Ferrari, S. Furlani, A. Ibba, E. Lupia Palmieri, A. Marsico, R.T. Melis, M. Milella, L. Mucerino, O. Nesci, P.E. Orrú, V. Panizza, M. Pennetta, D. Piacentini, A. Pisciteli, N. Pusceddu, R. Raffi, C.M. Rosskopf, P. Sansó, C. Stanislao, C. Tarragoni, A. Valente, Geomorphological map of the Italian coast: from a descriptive to a morphodynamic approach, Geogr. Fis. Din. Quaternaria 40 (2017) 161–196, https://doi.org/10.4461/GFDQ2017.40.11.
[5] C. Buosi, S. Tecchiato, N. Pusceddu, P. Frongia, A. Ibba, S. De Muro, Geomorphology and sedimentology of Porto Pino, SW Sardinia, western mediterranean, J. Maps 13 (2017) 470–485, https://doi.org/10.1080/17445647.2017.1328318.
[6] S. De Muro, T. Batzella, C. Kalb, N. Pusceddu, Sedimentary processes, hydrodynamics and modeling of the beaches of Santa margherita, Solanas, Cala di Trana and La Sciumara (Sardinia - Italy), Rendiconti Online della Società Geologica Italiana 3 (2008) 308–309.
[7] S. De Muro, C. Kalb, A. Ibba, F. Ferraro, C. Ferrara, Sedimentary processes, morphodynamics and sedimentological map of "Porto Campana" SCI beaches (Domus De maria - SW Sardinia), Rendiconti Online della Società Geologica Italiana 11 (2010) 754–755.
[8] S. De Muro, C. Kalb, A. Ibba, T. Batzella, N. Pusceddu, C. Ferrara, F. Ferraro, Coastal dunes vulnerability. GAVAM checklist method used at three Mediterranean microtidal wave dominated beaches (Gulf of Cagliari), Rendiconti Online della Società Geologica Italiana 17 (2011) 77–82, https://doi.org/10.3301/ROL.2011.26.
[9] N. Pusceddu, T. Batzella, C. Kalb, F. Ferraro, A. Ibba, S. De Muro, Short-term evolution of the Budoni beach on NE Sardinia (Italy), Rendiconti Online della Società Geologica Italiana 17 (2011) 155–159, https://doi.org/10.3301/ROL.2011.45.
[10] R. Bartole, S. De Muro, Acoustic facies and seabed features of the mixed carbonate-siliciclastic deposits of the last eustatic cycle in the La Maddalena Archipelago (North Sardinia, Italy), Ital. J. Geosci. 131 (2012) 102–122, https://doi.org/10.3301/ijg.2011.28 ISSN: 2038-1719.