Supporting Information

Pusceddu et al. 10.1073/pnas.1405454111

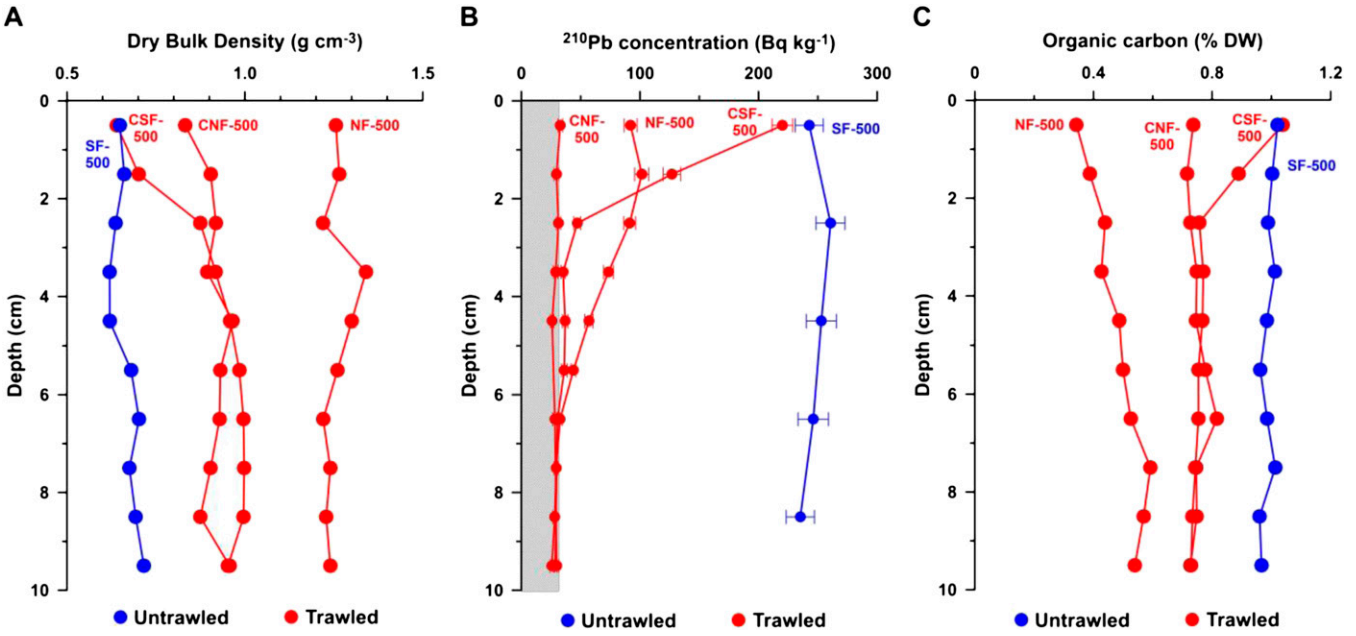

Fig. S1. Depth profiles of dry bulk density (*A*), total ^{210}Pb concentrations (*B*), and organic C content [percentage of sediment dry weight (DW)] (*C*) in the surface sediments (0–10 cm) at the trawled and untrawled coring sites along the flanks of La Fonera Canyon. The gray area in *B* represents the estimated supported ^{210}Pb concentration (in equilibrium with ^{226}Ra). Concentrations of ^{210}Pb above that threshold are "in excess," indicating net accumulation of recently deposited sediments (within the order of a century). Absence of excess ^{210}Pb indicates that sediments are older than 100–150 y. See Fig. 1 for sampling locations and Table S1 for sampling codes.

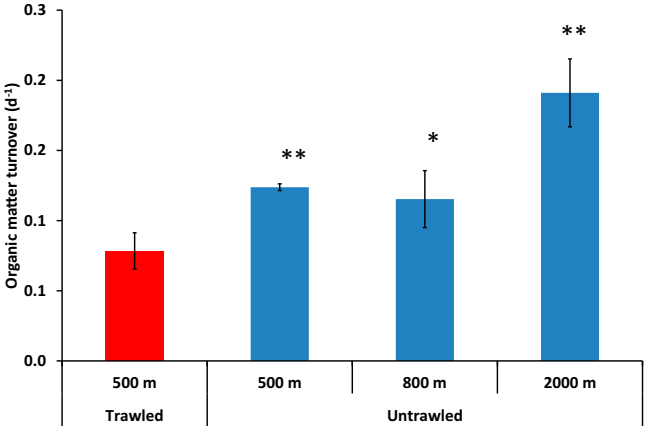

Fig. S2. Turnover of organic C (±SE) in the trawled and untrawled sediments. The turnover (d^{-1}) of the biopolymeric C pools were calculated as the ratios of the biopolymeric C daily degradation rates (estimated from extracellular enzymatic activities; *Methods*) and the biopolymeric C contents in the sediment.

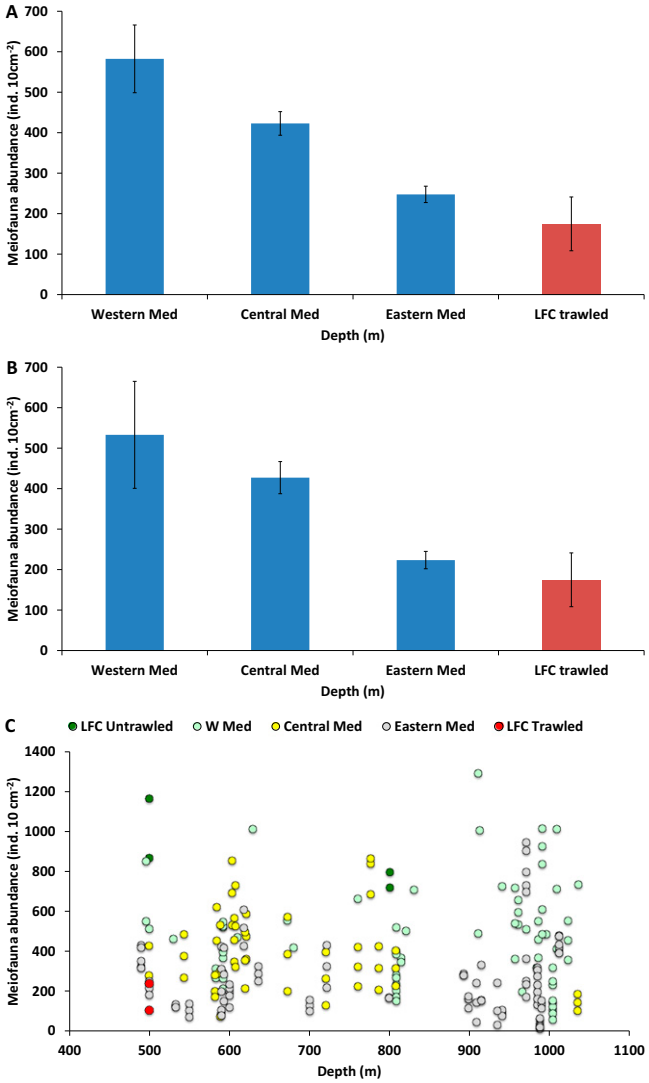

Fig. S3. Meiofaunal abundance in the Western, Central, and Eastern sectors of the Mediterranean Sea and in the trawled sediments of La Fonera Canyon (LFC). Illustrated are mean values (±SE) of meiofaunal abundance from the 500- to 800-m-depth (*A*) and 500- to 600-m-depth (*B*) ranges and the comparison of data from the 500- to 1,000-m-depth range in the whole Mediterranean Sea (*C*). Data are derived from refs. 1 and 2.

1. Bianchelli S, Gambi C, Zeppilli D, Danovaro R (2010) Metazoan meiofauna in deep-sea canyons and adjacent open slopes: A large-scale comparison with focus on the rare taxa. *Deep Sea Res Part 1 Oceanogr Res Pap* 57(3):420–433.
2. Gambi C, Lampadariou N, Danovaro R (2010) Latitudinal, longitudinal and bathymetric patterns of abundance, biomass of metazoan meiofauna: Importance of the rare taxa and anomalies in the deep Mediterranean Sea. *Adv Oceanogr Limnol* 1(1):167–197.

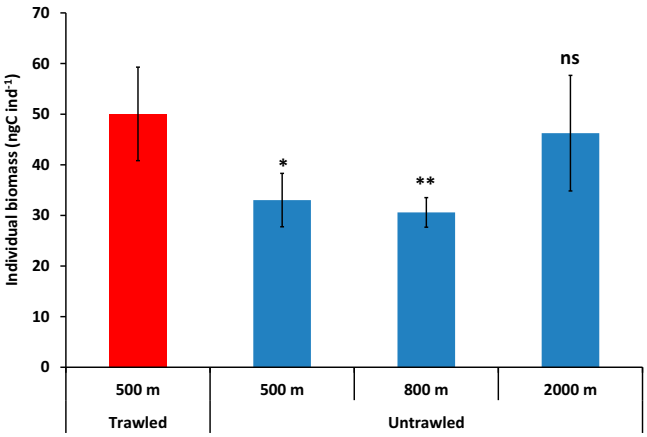

Fig. S4. Meiofaunal individual biomass in trawled (red) and untrawled (blue) sediments.

Table S1. Location, geographical coordinates, depth, and level of impact of sampling stations, with the variables measured for each station

Area and station code	Date of sampling	Latitude, N	Longitude, E	Depth, m	Impact	Variables
Northern canyon flank						
NF 500 1	10/05/2011	41°53.450′	3°24.100′	484	Trawled	OM, M, D, Nem, OMD
NF 500 2	10/05/2011	41°53.340′	3°24.560′	556	Trawled	Nem
NF 500 3	10/05/2011	41°53.390′	3°24.260′	513	Trawled	Nem
CNF 500	12/05/2011	41°53.161′	3°19.929′	500	Trawled	OM, M, D, Nem
NF 800	12/05/2011	41°52.701′	3°29.940′	780	Untrawled	OM,M, Nem
Southern canyon flank						
CSF 500	12/05/2011	41°50.041′	3°19.069′	500	Trawled	D, Nem
SF 500 1	12/05/2011	41°48.450′	3°23.230′	472	Untrawled	OM, M, D, Nem
SF 500 2	12/05/2011	41°48.240′	3°23.590′	454	Untrawled	Nem
SF 500 3	12/05/2011	41°48.520′	3°22.960′	500	Untrawled	Nem
SF 800	12/05/2011	41°49.080′	3°23.450′	797	Untrawled	OM, M, Nem, OMD
Canyon axis						
CA 500	11/05/2011	41° 54643′	3°16.210′	543	Untrawled	OM,M, Nem, OMD
CA 800	11/05/2011	41°53.130′	3°15.510′	697	Untrawled	OM,M, Nem
CA 2000	12/05/2011	41°47.355′	3°33.840′	1,984	Untrawled	OM, M, Nem, OMD

NF, northern flank; CNF, coastal northern flank; CSF, coastal southern flank; SF, southern flank; CA, canyon axis; D, depth profiles of ^{210}Pb concentration, dry bulk density, and organic C of sediments; M, meiofauna; Nem, nematodes; OM, organic matter; OMD, OM degradation rates.

Table S2. Permutational analyses of variance and the a posteriori pairwise tests for the quantity, composition, and turnover of the organic matter in the trawled and untrawled sediments at the different depths in La Fonera Canyon

Variable and source	df	MS	Pseudo-F	P(MC)	Pairwise comparisons	*t*	P(MC)
Biopolymeric C							
Impact	3	2.775	3.781	$P < 0.01$	Trawled 500; untrawled 500	2.959	$P < 0.05$
Residual	20	0.734			Trawled 500; untrawled 800	1.845	NS
Total	23				Trawled 500; untrawled 2,000	0.050	NS
Phytopigment							
Impact	3	6.550	39.123	$P < 0.001$	Trawled 500; untrawled 500	8.917	$P < 0.001$
Residual	20	0.167			Trawled 500; untrawled 800	7.540	$P < 0.001$
Total	23				Trawled 500; untrawled 2,000	3.129	$P < 0.01$
OM composition							
Impact	3	22.124	9.099	$P < 0.001$	Trawled 500; untrawled 500	4.618	$P < 0.001$
Residual	20	2.432			Trawled 500; untrawled 800	2.878	$P < 0.01$
Total	23				Trawled 500; untrawled 2,000	1.362	NS
OM turnover							
Impact	3	9.839	3.280	$P < 0.001$	Trawled 500; untrawled 500	7.990	$P < 0.01$
Residual	11	1.161	0.145		Trawled 500; untrawled 800	2.659	$P < 0.05$
Total	12				Trawled 500; untrawled 2,000	7.109	$P < 0.01$

Fixed levels of contrast include trawled sediments at 500 m in depth ($n = 2$ replicate stations, 1 for organic matter turnover), untrawled sediments at 500 m in depth ($n = 2$, 1 for organic matter turnover), untrawled sediments at 800 m in depth ($n = 3$, 1 for organic matter turnover), and untrawled sediments at 2,000 m in depth ($n = 1$). The multivariate test [permutational analyses of variance (PERMANOVA)] on the organic matter composition included the protein, carbohydrate, lipid, chlorophyll-*a*, and phytopigment concentrations. All analyses were carried out on normalized data, using unrestricted permutations of the raw data and 999 permutations. df, degrees of freedom; MS, mean square; NS, not significant; P(MC), probability level after Monte Carlo tests; pseudo-F, statistic *F*; *t*, statistic *t* for pairwise comparisons.

Table S3. Total phytopigment contents along European continental margins

Area	Date	Latitude, °N	Longitude, °E/°W	Depth, m	CPE, $\mu g \cdot g^{-1}$	±SE
La Fonera Canyon	May 2011	See Table S1	See Table S1	500	5.2	0.7
Catalan margin	May 2006	35.147	23.714	2,420	45.4	35.8
Catalan margin	April 2005	42.248	4.344	2,147	28.3	19.9
Catalan margin	May 2006	35.052	23.492	3,600	24.2	5.1
Catalan margin	May 2006	35.085	23.554	3,553	23.5	4.6
Catalan margin	May 2006	34.883	24.548	2,669	20.5	7.7
Catalan margin	May 2006	34.849	24.809	2,180	15.1	3.8
Catalan margin	May 2006	34.603	24.143	3,617	12.1	3.7
Catalan margin	October 2005	42.080	4.682	2,342	9.5	2.1
Malta Escarpment	August 2005	36.818	15.362	2,325	16.8	2.6
Malta Escarpment	August 2005	36.849	15.341	2,062	9.0	5.6
Nordic margin	August 2005	78.780	5.333	2,468	44.2	24.5
Nordic margin	August 2005	79.134	2.842	5,571	22.3	7.3
Nordic margin	August 2005	79.067	4.170	2,545	16.0	2.5
Nordic margin	August 2005	79.108	4.600	1,914	13.8	2.0
Nordic margin	August 2005	78.610	5.070	2,339	11.9	3.4
Nordic margin	August 2005	79.065	4.180	3,997	10.1	5.6
Nordic margin	August 2005	79.283	4.328	2,397	8.0	2.1
Nordic margin	August 2005	79.065	4.180	2,462	7.9	2.6
Nordic margin	August 2005	79.065	4.180	2,462	7.9	2.6
Nordic margin	August 2005	78.918	5.002	2,634	6.4	1.8
Portuguese margin	July 2005	39.500	**9.940**	3,530	48.0	1.6
Portuguese margin	September 2006	38.363	**9.510**	2,100	31.8	3.6
Portuguese margin	July 2005	39.594	**10.321**	4,340	23.7	2.7
Portuguese margin	September 2006	39.504	**9.843**	3,231	21.7	2.3
Portuguese margin	September 2006	39.593	**10.333**	4,363	20.0	7.4
Portuguese margin	July 2005	38.356	**9.979**	4,513	16.2	3.5
Portuguese margin	September 2006	37.833	**9.515**	1,002	15.5	3.2
Portuguese margin	September 2006	38.312	**9.703**	2,975	13.4	3.1
Portuguese margin	September 2006	40.166	**10.167**	3,981	9.5	1.1
Portuguese margin	September 2006	37.833	**10.083**	2,908	9.0	0.9
Portuguese margin	September 2006	38.333	**9.858**	3,914	8.7	0.8
Portuguese margin	September 2006	39.177	**10.666**	2,084	7.8	3.5
Portuguese margin	July 2005	40.078	**10.376**	4,277	7.5	0.5
Portuguese margin	September 2006	37.833	**9.750**	2,130	7.1	1.8
Portuguese margin	September 2006	37.833	**11.000**	4,987	6.9	2.2
Portuguese margin	September 2006	40.167	**10.000**	3,475	6.5	2.6

Data from La Fonera Canyon are derived from mean (±SE) concentrations in trawled stations at 500 m in depth in La Fonera Canyon. Data from the Catalan, Nordic, and Portuguese margin are from ref. 1. The data from the Malta Escarpment are deposited in http://doi.pangaea.de/10.1594/PANGAEA.681264. Bolded values indicate western longitude. CPE, total phytopigment concentration.

1. Pusceddu A, et al. (2010) Organic matter in sediments of canyons and open slopes of the Portuguese, Catalan, southern Adriatic and Cretan Sea margins. *Deep Sea Res Part 1 Oceanogr Res Pap* 57(3):441–457.

Table S4. PERMANOVA and pairwise tests for the total meiofauna abundance, biomass, and richness of the higher taxa in trawled and untrawled sediments at different depths in La Fonera Canyon

Variable and source	df	MS	Pseudo-F	*P*(MC)	Pairwise comparisons	*t*	*P*(MC)
Abundance							
Impact	3	2,456.3	31.298	$P < 0.001$	Trawled 500; untrawled 500	7.591	$P < 0.001$
Residual	20	78.5			Trawled 500; untrawled 800	6.995	$P < 0.001$
Total	23				Trawled 500; untrawled 2,000	3.017	$P < 0.05$
Biomass							
Impact	3	1,331.6	24.866	$P < 0.001$	Trawled 500; untrawled 500	7.080	$P < 0.001$
Residual	20	53.6			Trawled 500; untrawled 800	7.856	$P < 0.001$
Total	23				Trawled 500; untrawled 2,000	2.991	$P < 0.05$
Taxa richness							
Impact	3	109.9	15.534	$P < 0.001$	Trawled 500; untrawled 500	5.862	$P < 0.001$
Residual	20	7.1			Trawled 500; untrawled 800	3.369	$P < 0.01$
Total	23				Trawled 500; untrawled 2,000	2.434	$P < 0.05$

Fixed levels of contrast include trawled sediments at 500 m in depth ($n = 2$ replicate stations), untrawled sediments at 500 m in depth ($n = 2$), untrawled sediments at 800 m in depth ($n = 3$), and untrawled sediments at 2,000 m in depth ($n = 1$). Analyses were carried out on the fourth-root transformed data, using unrestricted permutations of the raw data and 999 permutations. df, degrees of freedom; MS, mean square; P(MC), probability level after Monte Carlo tests; Pseudo-F, statistic *F*; *t*, statistic t for pairwise comparisons.

Table S5. Multivariate PERMANOVA and pairwise tests on the composition of the meiofauna communities and nematode assemblages in trawled and untrawled sediments at different depths in La Fonera Canyon

Variable and source	df	MS	Pseudo-F	P(MC)	Contrast	*t*	P(MC)	β
Meiofauna								
Impact	3	1670	5.178	$P < 0.001$	Trawled 500; untrawled 500	3.097	$P < 0.01$	nc
Residual	23	323			Trawled 500; untrawled 800	2.069	$P < 0.05$	nc
Total	26				Trawled 500; untrawled 2,000	1.610	NS	nc
					Untrawled 500; untrawled 800	2.266	$P < 0.05$	nc
					Untrawled 500; untrawled 2,000	3.276	$P < 0.01$	nc
					Untrawled 800; untrawled 2,000	1.302	NS	nc
Nematode								
Impact	3	4774	2.109	$P < 0.001$	Trawled 500; untrawled 500	1.761	$P < 0.01$	37
Residual	22	2264			Trawled 500; untrawled 800	1.190	NS	31
Total	25				Trawled 500; untrawled 2,000	1.483	$P < 0.05$	27
					Untrawled 500; untrawled 800	1.310	NS	27
					Untrawled 500; untrawled 2,000	1.730	$P < 0.05$	31
					Untrawled 800; untrawled 2,000	1.129	NS	22

Fixed levels of contrast include trawled sediments at 500 m in depth ($n = 2$; 5 replicate stations for meiofauna and nematodes, respectively), untrawled sediments at 500 m in depth ($n = 2$–4), untrawled sediments at 800 m in depth ($n = 3$), and untrawled sediments at 2,000 m in depth ($n = 1$). Nematode data are presence-/absence- transformed. Analyses were carried out using unrestricted permutations of the raw data and 999 permutations. β, turnover diversity of nematodes as Bray–Curtis dissimilarity percentage; df, degrees of freedom; MS, mean square; NS, not significant; P(MC), probability level after Monte Carlo tests; Pseudo-F, statistic *F*; *t*, statistic t for pairwise comparisons; nc, not calculated.

Table S6. Analysis of seasonal and interannual variability in Cap de Creus Canyon

Contrast, variable, and source	df	MS	Pseudo-F	P(MC)
Interannual (2005, 2008, 2009)				
Phytopigment content				
Year	2	2.82	3.5357	NS
Residual	18	0.80		
Meiofauna abundance				
Year	2	174.88	2.766	NS
Residual	18	63.23		
Meiofauna community structure				
Year	2	1,010.70	2.2805	NS
Residual	18	443.20		
Seasonal (April vs. October 2008 and 2009)				
Phytopigment content				
Month	1	3.20	3.7047	NS
Residual	16	0.86		
Meiofauna abundance				
Month	1	192.72	2.4693	NS
Residual	16	78.05		
Meiofauna community structure				
Month	1	957.04	3.1359	NS
Residual	16	305.19		

Reported are the results of PERMANOVA carried out to test the hypothesis of no significant interannual (2005, 2008, 2009) and seasonal (April 2008, October 2008, April 2009, October 2009) changes in the phytopigment contents, meiofaunal abundance, and meiofaunal community composition at 1,000 m in depth. Raw data are derived from ref. 1. PERMANOVAs on phytopigment contents and meiofaunal abundance have been carried out, after normalization and fourth-root transformation of the raw data, respectively, on resemblance matrixes based on Euclidean distances with unrestricted permutation of the data. Tests on meiofaunal composition have been carried out on fourth-root transformed data, using resemblance matrixes based on Bray–Curtis similarity values, with permutations of the residuals under a reduced model. df, degrees of freedom; MS, mean square; P(MC), probability level after Monte Carlo tests; Pseudo-F, statistic *F*.

1. Pusceddu, et al. (2013) Major consequences of an intense dense shelf water cascading event on deep-sea benthic trophic conditions and meiofaunal biodiversity. *Biogeosciences* 10: 2659–2670.