

# Seep communities from two mud volcanoes in the deep eastern Mediterranean Sea: faunal composition, spatial patterns and environmental control

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**Supplement 1.** Porewater profile modelling and calculation of advectives rates, chemical characterisation within the sediments, description of the meiofaunal compartment (abundance, density, composition and alpha-diversity), and vertical distribution of the fauna within the sediments.

## MATERIALS AND METHODS

### Modelling and calculation of advection rates from porewater profiles

To better understand the different biological, chemical and physical processes occurring at these sites, a 1D diffusion–advection model was applied to the sulphate and chloride porewater profiles (Boudreau 1997, Boudreau & Jorgensen 2001). To do so, a 1D partial differential equation for solutes was set up in gPROMS software (PSE Entreprise), following the classical approach used in steady-state transport models:

$$\frac{\partial}{\partial x} \left( \varphi D_s \frac{\partial C}{\partial x} \right) + v \varphi \frac{\partial C}{\partial x} + \varphi R = 0 \quad (S1)$$

where  $\varphi$  is the sediment porosity,  $v$  is upward fluid velocity,  $\chi$  is the sediment depth,  $D_s$  is the sediment diffusion coefficient,  $C$  is the solute concentration, and  $R$  is the reaction term.

The sediment porosity was calculated using the following depth-dependant equation:

$$\varphi = \varphi_f + (\varphi_0 - \varphi_f) e^{-px} \quad (S2)$$

where  $\varphi_0$  and  $\varphi_f$  are respectively the porosity at 0 and infinite depth, and  $p$  is the attenuation coefficient.

To solve the transport model equation, we considered the Dirichlet boundary conditions, i.e. we took the known upper and lower boundary concentrations that were measured for each core (Boudreau 1997). Therefore, with this equation, the relative importance of advection and diffusion can be evaluated. As chloride is a conservative solute, the upward fluid velocities were calculated from chloride profiles. In addition, this chemical is known to undergo little diagenetic change (Reitz et al. 2007). Due to the complexity of the studied system, chemical reactions were not taken into consideration in the equation, but a qualitative evaluation was done. In fact, since chemical reactions involving porewater constituents can occur in these habitats, any deviation from the measured profile can be attributed to chemical processes different from advection and diffusion.

## Vertical distributions

Vertical distributions within each reduced sediment microhabitat and the reference site were studied by summing the 3 replicates for each sediment layer (0–1, 1–3, 3–5, 5–10 and >10 cm). This was repeated for relative abundance and biomass. Biomass was assessed by measuring the mean preserved wet weight for each microhabitat. Individuals of all major macrofaunal taxa (bivalves, polychaetes, gastropods and crustaceans) were pooled, patted dry on absorbent paper and weighed on a microbalance with an error of 0.1 mg.

## RESULTS

### Advection rates

The results of the porewater profile modelling and calculation of upward advection rates can be used to establish the dominant transport process in different microhabitats. Due to significant discrepancies within the different measured profiles, the model to estimate advection rates could only be applied to 5 microhabitats/samples on Napoli: Lam1, Lam3, Pcc-A, Pcc-B and Plam-B (see Table S1 for microhabitat descriptions) where complex biogeochemical processes, (i.e. bio-irrigation) were identified. Therefore, only 2 chloride profiles (Lam1 and Lam3) can be described simply by taking into consideration the molecular diffusion and the advection. The advection rate varied from 63 cm yr<sup>-1</sup> in Lam1 to 9.5 cm yr<sup>-1</sup> in Lam3. Moreover, the relationship between chloride and sulphate concentrations gives further information about the biogeochemical processes and the origins of the fluids at each site. Indeed, fluids coming up at Biv2, Biv3, Pcc-B and Plam-A appear to have the same geochemical properties than that of the bottom seawater where no change in chloride and sulphate concentrations has been observed (Fig. S1g,h). Fluids in Lam2 appear to be the result of a mixing between bottom seawater and fresh water (Fig. S1g), resulting from the mineral dehydration of deep clay layers (Haese et al. 2006). In these 4 microhabitats/samples, the manifestations of the microbial-mediated process called anaerobic oxidation of methane (AOM; Boetius et al. 2000) is not evident from the sulphate profiles at the investigated depth, as the concentrations remain relatively high through the sediments and never reach 0. Although it was not possible to obtain reliable values for the microhabitats at the periphery of Lam (Plam-B) and CC (Pcc-A and Pcc-B), the model showed that the better fit was achieved with the negative values of upward advection rates.

Fluids in Plam-B, Pcc-A and Lam3 appear to result from a mixing of the bottom seawater and a salt-rich brine. These 3 curves are aligned on the line corresponding to the mixing between the seawater end-members and a brine fluid having a chloride concentration of 830 mmol l<sup>-1</sup> (Fig. S1g,h). Accordingly, the decrease in sulphate concentration with depth appears to be mainly due to the dilution by upward sulphate-free and chloride-rich fluids from the dissolution of Messinian evaporates (Dahlmann & de Lange 2003). Thus, across all sites, the AOM appears to be negligible at the investigated depth.

### Chemical characterisation within the sediments

According to the oxygen profiles (Napoli; Fig. S1a,b) and the photographs taken on board (Amsterdam), the oxygenated layer varied from 7 mm (Pcc-A) to 45 mm (Biv1; Fig. S1a). In contrast, in the Lam microhabitat samples from Napoli and the Red microhabitat samples from Amsterdam, only black reduced sediments with a strong sulphide smell were present (see Table 2 in the main paper).

Oxygen, sulphate and chloride profiles within the sediments were only available for Napoli. In Amsterdam samples, the presence of large clasts prevented the insertion of the microsensor, and the cores could not be sliced.

On Napoli, the Lam microhabitat was characterised by a low penetration of oxygen, with a maximum of 13 mm at Lam3, whereas oxygen penetration was greater in Biv, varying from 27 to 43 mm within the sediments (Fig. S1a). The peripheral sites (Plam and Pcc) were characterised by heterogeneous oxygen penetration between 11 and 35 mm (Fig. S1b).

Chloride concentrations were highly variable among the replicates of Lam and apparently more homogenous in Biv (Fig. S1c) and at the peripheral sites (see Fig. 3d in the main paper) and generally tended to increase with sediment depth. The most important chlorinity increase with depth (from 584 to 890 mmol l<sup>-1</sup>) was observed in the Lam3 microhabitat at 13 cm (Fig. S1c). Lam2 profiles were also erratic with sudden drops at the 2–4 and 6–8 cm layers. In the peripheral sites, chlorinity profiles increased from 584 to a maximum of 739 mmol l<sup>-1</sup> at Pcc-B and showed a regular increase followed by a sudden drop at 12 cm at Plam-B (Fig. S1d).

Over the 18 cm investigated, sulphate concentrations stayed stable or typically decreased with depth (Fig. S1e,f), but were never completely depleted. The most important decrease was observed in Lam3, the site which also had the most important increase in chlorinity, varying from 30.8 mmol l<sup>-1</sup> at the sediment surface to ~3 mmol l<sup>-1</sup> at 13 cm depth (Fig. S1e). Similar to the chloride concentrations, sulphate concentrations varied less in the Biv microhabitats (Fig. S1e) as well as at peripheral sites (Fig. S1f). Pcc-B had a very stable profile, from the surface to 17 cm depth while on Pcc-A, values varied from 31.0 mmol l<sup>-1</sup> at the sediment–water interface to 19.9 mmol l<sup>-1</sup> at 9 cm depth (Fig. S1f). Similarly, Plam-A was homogenous with depth, whereas Plam-B decreased from 30.9 to 23.3 mmol l<sup>-1</sup> at 11 cm depth (Fig. S1f).

Visual inspection suggests an inverse relationship between chloride and sulphate concentrations in Lam3 and its periphery. Thus, when chloride concentrations showed a slight increase (Fig. S1c,d), sulphate concentrations decreased with depth (Fig. S1e,f). Accordingly, mean chlorinity and sulphate profiles were negatively correlated within Lam and P(lam+cc) microhabitats (Kendall's  $\tau = -0.6$  with  $p < 0.001$  in Lam;  $\tau = -0.5$  with  $p < 0.01$  in P[lam+cc]), whereas they were positively correlated within Biv (Kendall's  $\tau = 0.71$  with  $p < 0.001$ ).

### Meiofaunal abundance, density, composition and $\alpha$ -diversity

Despite the large sieve mesh size used (250  $\mu\text{m}$ ), specimens corresponding to meiofaunal groups (copepods, ostracods, nematodes) were found in our samples (Tables S1, and see Tables S6 & S9 in Supplement 2). On Napoli, the highest mean meiofaunal density was observed at the periphery of Lam with 10 788 ind.  $\text{m}^{-2}$  (Table S2) while the lowest were found in CC and at the reference site with respectively 772 and 116 ind.  $\text{m}^{-2}$  (Table S2). Overall, on active seep sites (Biv, Lam, CC), the highest meiofaunal densities were found on Lam (8967 ind.  $\text{m}^{-2}$ ; Table S2).

On Amsterdam, mean meiofaunal densities reached 28 700 ind.  $\text{m}^{-2}$  in Biv and dropped to 1129 ind.  $\text{m}^{-2}$  in CC, lower than the macrofaunal density from the same microhabitat. Overall, at active seep sites (Biv, Lam, CC), the highest mean macrofaunal density was found in Red while the highest meiofaunal density was found in Biv (28 700 ind.  $\text{m}^{-2}$ ; Table S3). As for macrofauna, overall meiofaunal densities were much higher within soft sediment microhabitats on Amsterdam than those on Napoli (Tables S2 & S3).

The nematodes dominated the meiofauna in all Napoli microhabitats (Table S1, and see Table S6 in Supplement 2), with the percentage of abundance decreasing from Biv, to Lam and then to CC. The second dominant meiofaunal group was crustaceans (mainly copepods and ostracods) in all microhabitats (Table S1). At the peripheral sites, the nematodes were still the dominant meiofaunal taxon with equal proportions in Plam and Pcc (>96%; Table S1). The second most important taxon was ostracods at Plam and harpacticoid copepods at Pcc. The reference site exclusively harboured nematodes (51.7%) and copepods (48.3%). Overall, meiofauna >250  $\mu\text{m}$  represented from ~35.3% (in CC) to more than ~71% (on Lam) of the total faunal abundance on Napoli (see Table 6 in the main paper), while at the peripheral sites, it represented from ~36% of the total abundance in Pcc to ~79% in Plam (Table S1).

On Amsterdam, meiofauna >250  $\mu\text{m}$  was largely dominated by the nematodes in Biv and Red with ~91% of the total abundance, whereas they contributed slightly more in CC with 96% of the meiofaunal abundance (Table S1). No meiofauna was observed at the reference site. Harpacticoid copepods and ostracods were the other meiofaunal taxa found in Amsterdam active sites (Table S1). Copepods were also represented in CC by 2 orders: harpacticoids and calanoids. In addition to noticeable differences in the number of individuals in the replicates from each microhabitat, the relative abundances of the meiofauna varied from one microhabitat to the other with abundances of ~43% in Red to over 82% in the Biv microhabitat (Table S1).

When comparing the 2 mud volcanoes (MVs), the nematodes were clearly the dominant meiofaunal taxon of the active sites (Table S1), with a slightly lower proportion in carbonate crusts from Napoli (73% of the total faunal abundance). Crustaceans and especially harpacticoid copepods were the second most dominant meiofaunal taxon, except on Biv at both MVs and at Plam on Napoli, where ostracods were the second most dominant meiofaunal taxon (Table S1).

### Vertical distribution of the fauna within the sediments

The vertical distribution of macro- and meiofauna was assessed on all cores collected within the Biv microhabitats on both MVs, and within the Red microhabitat on Amsterdam (Fig. S2). A decrease in macrofaunal abundances was observed from the surface to the deeper layers in the Biv (Napoli) and Red (Amsterdam) microhabitats (Fig. S2a). The trend was slightly different in the Biv microhabitat on Amsterdam, where a maximum abundance was observed at 3–5 cm depth (Fig. S2a) due to the presence of cirratulid polychaetes, tanaids and aplacophorans. Approximately 50% of the total macrofaunal abundance in the Napoli Biv microhabitat, that included poriferans, cnidarians, paraonid and terebellid polychaetes as well as orbitestellid gastropods, was concentrated in the first centimetre, whereas it did not exceed 21% for the same microhabitat on Amsterdam (Fig. S2a). The macrofauna appeared to have a more homogenous distribution with depth in the Amsterdam Biv microhabitat. In contrast, the macrofauna within Red from Amsterdam was concentrated in the uppermost sediment layers, with most fauna (71%) being located within the top 3 cm (Fig. S2a) where dorvilleid, spionid and terebellid polychaetes and vesicomylid bivalves were found.

On both MVs, meiofauna reached a maximum abundance within the 0–5 cm layer in Red and Biv microhabitats (Fig. S2b). Below 5 cm depth, meiofaunal abundance decreased, reaching less than 1% in the >10 cm layer (Fig. S2b).

The high density of Siboglinidae tubes in the Lam microhabitat on Napoli samples prevented the slicing of the cores for vertical analysis. Nevertheless, we observed that most of the macrofauna was located at the sediment–water interface within the first 0–1 cm layer where the tubes were visible. Numerous organisms such as phyllodocid polychaetes, mytilid bivalves or small motile crustaceans (i.e. amphipods) were living within or associated with the tubes (see Table 4 in the main paper).

## Macrofaunal biomass

The vertical distribution of the biomass was estimated in the Biv microhabitats from both MVs and also in the Red microhabitat from Amsterdam (Fig. S2c). In the Napoli Biv microhabitat, a peak was observed at 3–5 cm, with up to 80% of the total biomass, especially due to the presence of paraonid and frenalate polychaetes and an echiurid (see Table 4 in the main paper). The biomass decreased quickly, reaching almost 0 at >10 cm. In the Amsterdam Biv microhabitat, 2 peaks were observed: the first in the uppermost layer (0–1 cm) where vesicomid bivalves, isopod and tanaid crustaceans constituted more than 60% of the total biomass (see Table 4 in the main paper), the second peak at 3–5 cm (Fig. S2c). Below this depth, biomass decreased gradually until it reached almost 0 at >10 cm. In contrast, in Red, the biomass decreased gradually from the surface to the deepest 10 cm layer (Fig. S2c).

In the Biv microhabitats, the distribution of biomass did not present the same trend as the macrofaunal abundance (Fig. S2a,c). This can probably be attributed to variation in the size distribution of organisms in each layer, with a large proportion of small individuals in the 1–3 cm layer, and a predominance of larger specimens in the 0–1 cm layer. On the other hand, the distribution of biomass appeared to follow that of abundance in the Red microhabitat (Amsterdam), with the highest values in the uppermost layer and a gradual decrease with depth (Fig. S2a,c).

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Table S1. Meiofaunal (retained by a 250 µm mesh) relative abundance (%) of each taxon in the active microhabitat sites on the Napoli mud volcano (MV): sediments with bivalve shells (Biv, n = 3), *Lamellibrachia* (Lam, n = 3), carbonate crusts (CC, n = 3), sediments from the periphery of the Lam microhabitat (Plam, n = 4), sediments from the periphery of the CC microhabitat (Pcc, n = 4) and the reference site (Ref, n = 1); and on the Amsterdam MV: Biv (n = 2), reduced sediments (Red, n = 4), CC (n = 3) and Ref (n = 1). Total relative abundances for each taxonomic group are highlighted in **bold**. \*: taxonomic level used for alpha-diversity analyses (mostly at the family level), und = undetermined. All sampling was performed during the MEDECO cruise in 2007

Taxonomic group	Napoli						Amsterdam			
	Biv	Lam	CC	Plam	Pcc	Ref	Biv	Red	CC	Ref
<b>Nematoda (Total)</b>	<b>92.19</b>	<b>86.43</b>	<b>73.27</b>	<b>96.41</b>	<b>95.28</b>	<b>51.72</b>	<b>91.03</b>	<b>91.47</b>	<b>96.30</b>	<b>0</b>
<b>Crustacea (Total)</b>	<b>7.81</b>	<b>13.57</b>	<b>26.73</b>	<b>3.59</b>	<b>4.72</b>	<b>48.28</b>	<b>8.47</b>	<b>8.53</b>	<b>3.70</b>	<b>0</b>
<b>Copepoda-Harpacticoida</b>										
Miraciidae*										
<i>Typhamphiascus confusus</i>	0	0.19	7.92	0.12	0.21	0	3.75	0.41	0	0
<i>Haloschizopera tenuipes</i>	0	0	0	0	0.41	0	0	0	0	0
<i>Amphiascus</i> sp.	0	0	0.99	0	0	0	0	0	0	0
<i>Amphiascoides</i> sp.	0	0	0	0	0	0	0.09	0	0	0
Ameiridae*										
<i>Sarsameira</i> sp.	0	0	1.98	0	0	0	0	0	0	0
Tisbidae*										
<i>Tisbella</i> sp.	0	1.86	0	0	0	0	0.09	0.14	0	0
Ectinosomatidae*										
<i>Bradya</i> sp.	0.78	0	8.91	0.23	0.41	0	0.96	0	0	0
<i>Halectinosoma</i> sp.	0	0	0	0	0	0	0	5.17	1.85	0
Pseudotachidiidae*										
<i>Psammis longipes</i>	0	0	0.99	0	0	0	0.09	0	0	0
<i>Pseudotachidiidae</i> sp.	0	0	0	0	0	0	0	0.14	0	0
Cerviniidae*										

<i>Cerviniella</i> sp.	0	0	0	0.46	0.21	0	0.35	0	0	0
<b>Argestidae*</b>										
<i>Eurycletodes</i> sp.1	0	0	0	0.23	0.21	0	0	0	0	0
<i>Eurycletodes</i> sp.2	0	0	0	0	0.210	0	0	0	0	0
<i>Argentes</i> sp.	0	0	0	0	0	0	0.61	0	0	0
<b>Tetragonicipitidae*</b>										
<i>Tetragonicipes</i> sp.	0	0	0	0	0.82	0	0	0	0	0
Und Harpacticoida	0	0.19	2.97	0.12	1.03	0	0.09	0.07	0	0
<b>Copepoda-Cyclopoida</b>										
<b>Oncaeidae*</b>										
<i>Oncaea</i> sp.	0	0.19	0	0	0	0	0	0	0	0
<b>Cyclopinidae*</b>										
<i>Cyclopina</i> sp.	0	0	0.99	0	0	0	0.09	0.07	0	0
<i>Cyclopoida</i> sp.2	0	0	0.99	0	0.21	0	0	0.07	0	0
<b>Copepoda-Calanoida</b>										
Und Calanoida*	0.78	5.02	0.99	0	0.21	0	0	0	1.85	0
Und Copepoda*	0	0	0	0	0	48.28	0	0	0	0
<b>Ostracoda</b>										
<b>Pontocyprididae*</b>										
<i>Propontocypris</i> cf. <i>levis</i>	0	5.76	0	0.12	0	0	0	0	0	0
<i>Argilloecia</i> sp.	0	0.37	0	0.35	0	0	2.70	0.34	0	0
<b>Polycopidae*</b>										
<i>Polycope orbulinaeformis</i>	1.56	0	0	0	0	0	0	0	0	0
<i>Polycope quadridentata</i>	0	0	0	0	0	0	0.09	0	0	0
<i>Polycope</i> sp.1	1.56	0	0	0	0	0	0.09	0	0	0
<i>Polycope</i> sp.2	0	0	0	0	0.21	0	0	0	0	0
<i>Polycope</i> cf. <i>dispar</i>	0.78	0	0	0	0	0	0	0	0	0
<i>Polycope</i> cf. <i>vasfiensis</i>	2.34	0	0	1.39	0	0	0	0	0	0
<i>Polycope tholoformis</i>	0	0	0	0.58	0.21	0	0	0	0	0
Und <i>Polycope</i> sp.	0	0	0	0	0.21	0	0	0	0	0
% Meiofauna / total fauna	47.2	70.6	35.3	78.7	36.3	52.7	82.3	42.7	48.6	0
<b>Total abundance (number of individuals)</b>	<b>128</b>	<b>538</b>	<b>101</b>	<b>863</b>	<b>487</b>	<b>29</b>	<b>1148</b>	<b>1470</b>	<b>54</b>	<b>0</b>

Table S2. Biological descriptors of the studied microhabitats for the Napoli mud volcano sampled in the Mediterranean Sea. The observed taxonomic richness is given at the family level. The number equivalents of the Shannon and Simpson indices are given in *italics*. Only the meiofauna retained by a 250  $\mu$ m mesh was considered in this study. The highest values are highlighted in **bold**. n = 3 for all microhabitats + periphery, except for the reference site where n = 1. ES50: expected richness for a sample of 50 individuals; -: not measured. Microhabitat descriptions as in Table S1

Biological descriptor	Bivalve shells	<i>Lamellibrachia</i>	Carbonate crusts	Periphery (Plam, Pcc)	Reference site
Mean ( $\pm$ SD) meiofaunal densities (ind. m <sup>-2</sup> )	2133 $\pm$ 902	8967 $\pm$ 5445	772 $\pm$ 921	<b>Plam: 10788 <math>\pm</math> 9913</b> Pcc: 6088 $\pm$ 8113	116
Mean Jaccard's similarity	0.21	<b>0.62</b>	0.24	Plam:0.26 / Pcc:0.23	-
Total richness ( $S_{obs}$ )	4	6	7	Plam:7 / Pcc:9	2
Nematoda richness ( $S_{obs}$ )	1	1	1	Plam:1 / Pcc:1	1
Copepoda richness ( $S_{obs}$ )	2	4	6	Plam:4 / Pcc:7	1
Ostracoda richness ( $S_{obs}$ )	1	1	0	Plam:2 / Pcc:1	0
ES50	3	4	<b>6</b>	Plam:2 / Pcc:3	2
Shannon ( $H_e'$ )	0.32	0.54	<b>0.90</b>	Plam:0.20 / Pcc:0.20	0.69
Exp ( $H_e'$ )	<i>1.38</i>	<i>1.72</i>	<b>2.46</b>	<i>1.22 / 1.22</i>	<i>1.99</i>
Simpson ( $D_{GS}$ )	0.15	0.24	<b>0.41</b>	Plam:0.07 / Pcc:0.07	0.50
1 / (1 - $D_{GS}$ )	<i>0.17</i>	<i>1.32</i>	<b>1.70</b>	<i>1.07 / 1.07</i>	<i>1.99</i>
Evenness ( $J'$ )	0.20	0.30	0.86	Plam:0.10 / Pcc:0.10	<b>0.99</b>

Table S3. Biological descriptors of the studied microhabitats for the Amsterdam mud volcano sampled in the Mediterranean Sea. The observed taxonomic richness is given at the family level. The number equivalents of the Shannon and Simpson indices are given in *italics*. Only the meiofauna retained by a 250  $\mu\text{m}$  mesh was considered in this study. The highest values are highlighted in **bold**. n = 2 for the bivalve shell microhabitat, n = 4 for the reduced sediments, n = 3 for the carbonate crusts and n=1 for the reference site. ES50: expected richness for a sample of 50 individuals; -: not measured. Microhabitat descriptions as in Table S1

<b>Biological descriptor</b>	<b>Bivalve shells</b>	<b>Reduced sediments</b>	<b>Carbonate crusts</b>	<b>Reference site</b>
Mean ( $\pm$ SD) meiofaunal densities (ind. $\text{m}^{-2}$ )	<b>28700 <math>\pm</math> 26799</b>	18375 $\pm$ 12390	1129 $\pm$ 1643	None
Mean Jaccard's similarity	<b>0.42</b>	0.30	0.33	–
Total richness ( $S_{\text{obs}}$ )	<b>10</b>	7	3	0
Nematoda richness ( $S_{\text{obs}}$ )	<b>1</b>	1	1	0
Copepoda richness ( $S_{\text{obs}}$ )	<b>7</b>	5	2	0
Ostracoda richness ( $S_{\text{obs}}$ )	<b>2</b>	1	0	0
ES50	<b>4</b>	3	3	0
Shannon ( $H_e'$ )	<b>0.43</b>	0.39	0.18	–
Exp ( $H_e'$ )	<b>1.54</b>	<i>1.48</i>	<i>1.20</i>	–
Simpson ( $D_{\text{GS}}$ )	<b>0.17</b>	0.16	0.07	–
1 / (1 – $D_{\text{GS}}$ )	<b>1.20</b>	<i>1.20</i>	<i>1.08</i>	–
Evenness ( $J'$ )	0.19	0.20	<b>0.17</b>	–

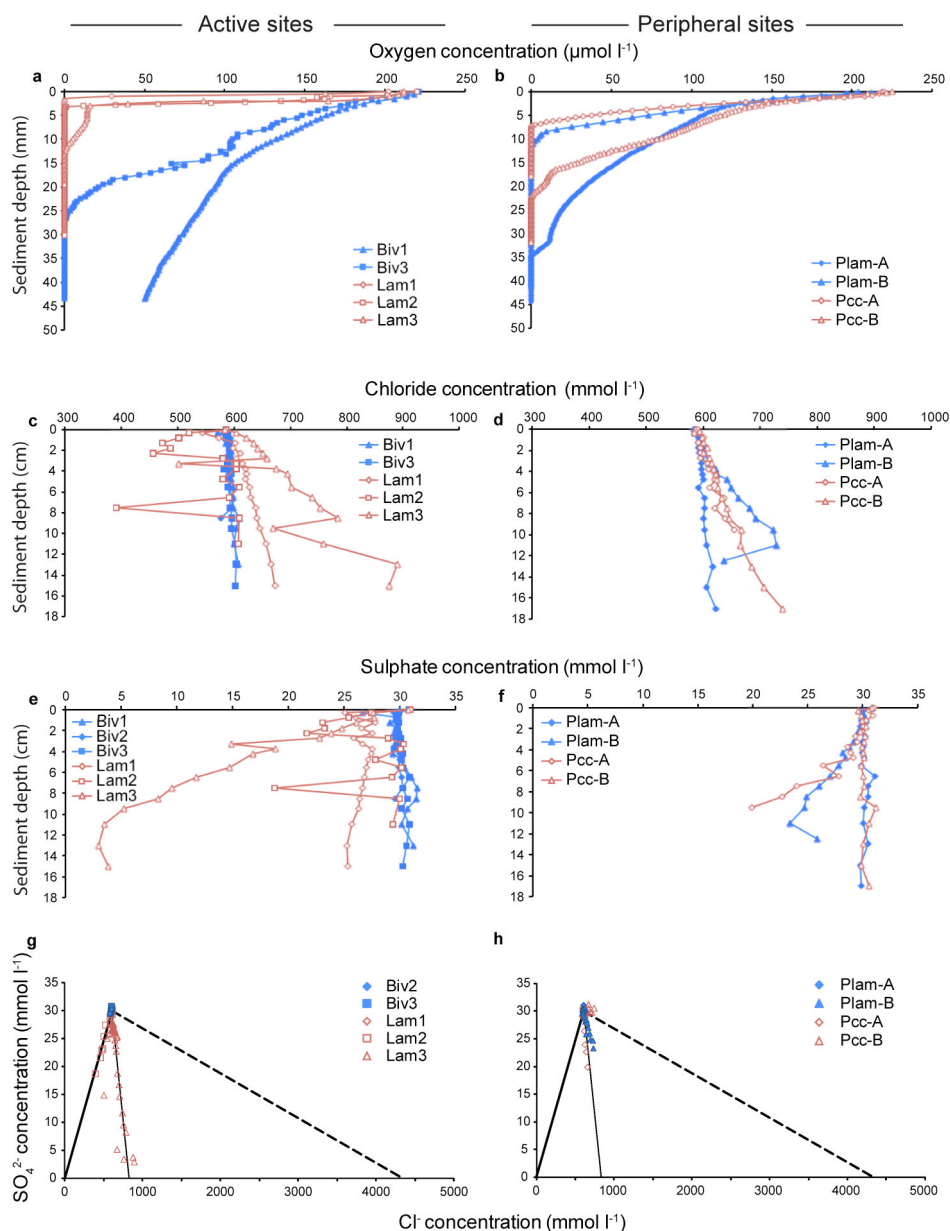


Fig. S1. (a, b) Dissolved oxygen, (c, d) chloride and (e, f) sulphate profiles measured in porewater extracted from tube cores sampled in sediments from the Napoli mud volcano active sites: sediments with bivalve shells and the *Lamellibrachia* microhabitat (a, c, e) and sediments from peripheral sites (b, d, f) located at the immediate (2 to 22 m) periphery from active carbonate crust (Pcc) and *Lamellibrachia* (Plam) sites. Relationship between the chloride and sulphate concentrations in porewater (g, h). The solid and broken lines represent the mixing lines between the bottom seawater and fresh water, and the bottom seawater and a brine with a chloride concentration of 4330  $\text{mmol l}^{-1}$  recovered at this area (Haese et al. 2006), respectively.

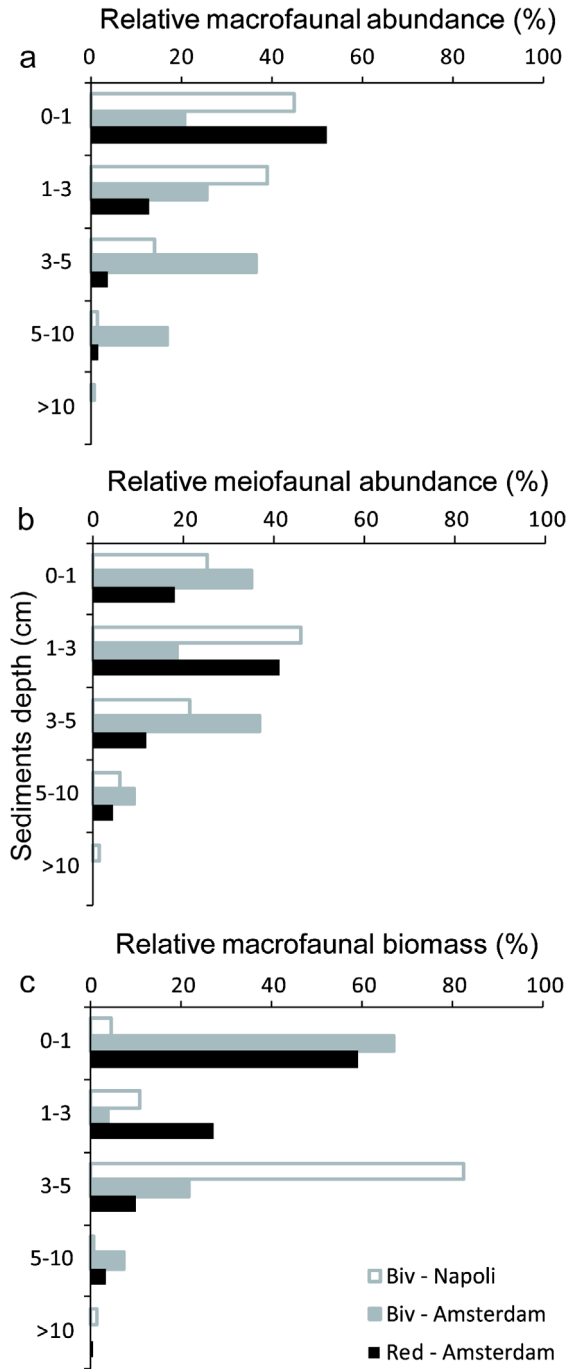


Fig. S2. Vertical distribution of the (a) macrofaunal and (b) meiofaunal mean relative abundances and (c) relative macrofaunal biomasses within the sediments in the microhabitats sampled on Napoli and Amsterdam mud volcanoes



**Supplement 2.** Absolute abundances of the macro- and meiofauna in each sample from Napoli and Amsterdam mud volcanoes.

Table S4. Macrofaunal (>250 µm) absolute abundances per replicate of each taxon in the active microhabitats studied on the Napoli mud volcano: sediments with bivalve shells (Biv, n = 3), *Lamellibrachia* (Lam, n = 3), carbonate crusts (CC, n = 3) and the reference site (Ref, n = 1). Total relative abundances for each taxonomic group are highlighted in **bold**. Total abundance and total density per replicate are also given. \*: taxonomic level used for alpha-diversity analyses (mostly family level). juv: juvenile, Und.: undetermined. All samples were taken during the MEDECO cruise (2007)

Taxonomic group	Bivalve shells			<i>Lamellibrachia</i>			Carbonate crusts			Ref
	Biv1	Biv2	Biv3	Lam1	Lam2	Lam3	CC1	CC2	CC3	
<b>Porifera (Total)</b>	<b>4</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>31</b>	<b>4</b>	<b>15</b>	<b>0</b>
Demospongia*	3	7	0	0	0	0	15	4	15	0
Hexactinellida*	1	1	0	0	0	0	16	0	0	0
<b>Cnidaria (Total)</b>	<b>10</b>	<b>9</b>	<b>10</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>20</b>	<b>3</b>	<b>2</b>	<b>1</b>
<b>Anthozoa – Zoantharia</b>										
Parazoanthidae*										
<i>Isozoanthus</i> sp.1	0	0	0	0	0	0	10	0	0	0
<b>Anthozoa – Actiniaria</b>										
Sargatiidae*										
<i>Sagartiogeton</i> sp.	0	0	0	0	0	1	1	0	0	0
Und. Sargatiidae	2	1	2	0	0	0	0	0	0	0
<b>Medusozoa – Scyphozoa</b>										
Und. Scyphozoa*	8	8	8	0	1	0	9	3	2	1
<b>Polychaeta (Total)</b>	<b>13</b>	<b>22</b>	<b>36</b>	<b>25</b>	<b>21</b>	<b>60</b>	<b>28</b>	<b>6</b>	<b>12</b>	<b>16</b>
Capitellidae*	0	0	0	0	0	0	4	1	0	2
Cirratulidae*	0	0	2	0	0	0	0	0	0	2
Dorvilleidae*	0	0	1	0	2	1	0	1	0	0
Glyceridae*	0	0	0	0	0	0	0	0	0	1
Hesionidae*	0	1	0	0	6	10	0	0	1	0
Orbiniidae*	1	0	1	0	0	0	0	0	0	2
Paraonidae*	6	12	17	0	0	0	0	0	0	0
Phyllodocidae*	0	0	0	2	0	10	5	0	0	0
Pilargidae*	0	0	1	0	0	0	2	0	1	0
Scalibregmatidae*	0	0	0	0	0	0	0	0	0	1
Serpulidae*	0	0	0	0	0	0	10	0	5	0
Siboglinidae-Frenulata*										
<i>Siboglinum</i> sp.	4	4	9	0	0	0	0	0	0	0
Siboglinidae-Obturata*										
<i>Lamellibrachia anaximandri</i>	0	0	0	23	8	25	2	0	0	0
Spionidae*	1	0	1	0	1	3	2	2	1	5
Syllidae*	0	1	0	0	0	0	0	0	0	0
Terebellida*	1	4	4	0	4	11	3	2	3	1
Und. larvae	0	0	0	0	0	0	0	0	1	0
Und. Polychaeta	0	0	0	0	0	0	0	0	0	2
<b>Bivalvia (Total)</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>
Mytilidae*										
<i>Idas</i> aff. <i>modiolaeformis</i>	1	0	0	1	1	0	2	0	0	0
Und. Bivalvia	0	0	0	0	0	0	3	0	0	0
<b>Gastropoda (Total)</b>	<b>4</b>	<b>9</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>10</b>	<b>16</b>	<b>7</b>	<b>19</b>	<b>0</b>
Calliotropidae*										
<i>Putzeysia wiseri</i>	0	2	0	0	0	0	3	0	3	0
Orbitestellidae*										
<i>Lurifax vitreus</i>	4	2	1	0	0	0	10	6	7	0
Skeneidae*										
Unid. Skeneidae	0	0	0	0	0	8	0	0	0	0
Conidae*										
<i>Taranis moerchi</i>	0	0	1	0	0	0	1	0	2	0
Cocculinidae*										
<i>Coccopigya</i> sp.	0	0	0	0	0	0	1	0	0	0
Cuspidariidae*										
<i>Cuspidaria</i> sp.	0	2	0	0	0	0	0	0	0	0
Und. Gastropoda	0	3	1	1	1	2	1	1	7	0

<b>Aplacophora (Total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>
Chaetodermatidae*										
<i>Falcidens guttuosus</i>	0	0	0	0	0	0	0	0	0	2
<b>Sipuncula (Total)</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>
Phascolosomatidae*										
<i>Apionsoma murina</i>	1	1	0	0	0	0	0	0	0	0
Golfingiidae*										
<i>Nephasoma</i> sp. juv	0	0	0	0	0	0	0	0	1	0
<i>Nephasoma liljeborgi</i>	0	0	0	0	0	0	2	0	1	0
Und. Sipuncula	0	0	0	0	0	0	0	0	0	3
<b>Echiuria (Total)</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Echiuridae*										
<i>Echiurus abyssalis</i>	1	0	0	0	0	0	0	0	0	0
<b>Nemerta (Total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>
Und. Nemerta*	0	0	0	0	0	0	0	0	0	2
<b>Crustacea (Total)</b>	<b>7</b>	<b>2</b>	<b>2</b>	<b>5</b>	<b>12</b>	<b>85</b>	<b>7</b>	<b>2</b>	<b>4</b>	<b>2</b>
<b>Amphipoda-Gammaridae</b>										
Sebidae*										
<i>Seba</i> sp.	0	0	0	0	0	0	2	1	0	0
Lysianasidae*										
<i>Orchomene grimaldii</i>	0	0	0	1	0	12	0	0	0	0
Calliopiidae*										
<i>Bouvierella carcinophila</i>	0	0	0	0	7	46	0	0	0	0
Stegocephalidae*										
<i>Stegocephaloides christianiensis</i>	0	0	0	0	0	0	1	0	2	0
Und. Gammaridae	0	0	0	0	0	15	0	0	0	0
<b>Cumacea</b>										
Diastyloidae*										
<i>Diastyloides serrata</i>	4	0	0	0	0	0	0	0	0	0
<b>Isopoda-Asellota</b>										
Munnopsidae*										
<i>Disconectes</i> sp.1	1	0	0	0	0	0	0	0	0	0
<i>Disconectes</i> sp.2	0	0	1	0	0	0	0	0	0	0
Desmosomatidae*										
<i>Chelator</i> sp.	0	0	0	0	0	0	2	0	1	0
<i>Eugerdia</i> sp.1	0	0	0	0	0	0	1	0	0	0
Und. Desmosomatidae	0	0	0	0	0	0	1	0	0	0
<b>Isopoda-Epicaridae</b>										
Und. Epicaridae*	0	0	0	0	0	1	0	0	0	0
<b>Leptostraca</b>										
Und. Leptostraca*	0	0	0	4	5	11	0	0	0	0
<b>Tanaidacea</b>										
Agathotanaidae*										
<i>Paragnathotana</i> sp.	1	0	0	0	0	0	0	0	0	0
Leptognathiellidae*										
Leptognathiellidae sp.1	1	1	1	0	0	0	0	1	1	0
Leptognathiellidae sp.2	0	1	0	0	0	0	0	0	0	0
Und. Tanaidacea*	0	0	0	0	0	0	0	0	0	2
<b>Total abundance (number of individuals)</b>	<b>41</b>	<b>51</b>	<b>51</b>	<b>32</b>	<b>36</b>	<b>156</b>	<b>109</b>	<b>22</b>	<b>54</b>	<b>26</b>
<b>Total density (Number of ind. m<sup>-2</sup>)</b>	<b>2050</b>	<b>2550</b>	<b>2550</b>	<b>1600</b>	<b>1800</b>	<b>7800</b>	<b>2565</b>	<b>343</b>	<b>1949</b>	<b>104</b>

Table S5. Macrofaunal (>250 µm) absolute abundances per replicate of each taxon in the peripheral microhabitats studied on the Napoli mud volcano: sediments from the periphery of the *Lamellibrachia* microhabitat (Plam, n = 4) and sediments from the periphery of the carbonate crust microhabitat (Pcc, n = 4). Total relative abundances for each taxonomic group are highlighted in **bold**. Total abundance and total density per replicate are also given. \*: taxonomic level used for alpha-diversity analyses (mostly family level), \*\*: values used for alpha-diversity only for Plam; juv: juvenile, Und.: undetermined. All samples were taken during the MEDECO cruise (2007)

Taxonomic group	Periphery of <i>Lamellibrachia</i>				Periphery of carbonate crusts			
	Plam1	Plam2	Plam3	Plam4	Pcc1	Pcc2	Pcc3	Pcc4
<b>Cnidaria (Total)</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Anthozoa - Actiniaria</b>								
Und. Actiniaria*	0	0	1	0	0	0	0	0
<b>Polychaeta (Total)</b>	<b>50</b>	<b>17</b>	<b>13</b>	<b>23</b>	<b>28</b>	<b>70</b>	<b>18</b>	<b>20</b>
Capitellidae*	1	2	0	1	0	0	0	0
Cirratulidae*	25	5	2	5	2	5	0	1
Dorvilleidae*	0	0	1	0	1	3	0	0
Glyceridae*	1	1	0	0	0	0	0	0
Lumbrinereidae*	0	0	0	0	1	2	0	0
Paraonidae*	9	5	9	17	24	58	7	5
Phyllodocidae*	0	1	0	0	0	0	0	0
Siboglinidae-Frenulata*								
<i>Siboglinum</i> sp.	1	1	0	0	0	0	1	1
Spionidae*	0	1	0	0	0	1	9	13
Terebellida*	13	1	1	0	0	1	1	0
<b>Bivalvia (Total)</b>	<b>5</b>	<b>2</b>	<b>7</b>	<b>29</b>	<b>6</b>	<b>11</b>	<b>5</b>	<b>3</b>
Lucinidae*								
<i>Myrtea amorpha</i>	0	0	2	4	0	0	0	0
Und. Lucinidae	0	0	0	3	0	0	0	0
Thyasiridae*								
<i>Thyasira striata</i>	0	0	0	0	5	0	0	0
<i>Axinulus croulinensis</i>	0	0	0	9	0	0	1	0
Und. Thyasiridae	4	2	3	11	0	0	2	3
Und. Bivalvia	1	0	2	2	1	11	2	0
<b>Gastropoda (Total)</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Und. Gastropoda**	1**	0	0	0	0	0	0	0
<b>Aplacophora (Total)</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>
Chaetodermatidae*								
<i>Falcidens guttuerosus</i>	1	0	1	0	1	0	0	0
<b>Sipuncula (Total)</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Phascolosomatidae*								
<i>Apionsoma murina</i>	0	0	2	0	0	0	0	0
<b>Crustacea (Total)</b>	<b>43</b>	<b>8</b>	<b>19</b>	<b>12</b>	<b>186</b>	<b>493</b>	<b>8</b>	<b>6</b>
<b>Amphipoda-Gammaridae</b>								
Calliopiidae*								
<i>Bouvierella carcinophila</i>	1	0	1	0	0	2	0	0
Oedicerotidae*								
<i>Monoculodes</i> sp.	1	0	1	1	0	1	0	0
<i>Oedicerotidae</i> gen. sp.	1	0	0	0	0	0	0	0
<i>Periculodes</i> aff. <i>longimanus</i>	0	0	1	1	0	0	0	0
<b>Cumacea</b>								
Diastyloidae*								
<i>Diastyloides serrata</i>	2	1	6	7	0	0	0	0
<i>Diastylis</i> sp.	0	0	0	0	0	1	0	2
<b>Isopoda-Asellota</b>								
Munnopsidae*								
<i>Disconectes</i> sp.1	0	0	0	0	0	1	0	0
<i>Ilyarachna</i> sp.1	0	0	0	0	0	2	0	0
<i>Ilyarachna</i> sp. juv	0	0	0	0	0	1	0	0
Und. <i>Ilyarachna</i> sp.	0	0	0	0	0	0	1	0
Desmosomtidae*								
<i>Chelator</i> sp.	0	0	0	0	52	7	2	2
<i>Eugerda</i> sp.1	24	0	0	0	29	11	0	0
<i>Eugerda</i> sp.2	4	3	0	0	4	5	0	0

<i>Eugerda</i> sp.3	0	0	0	0	0	1	0	0
<i>Eugerda filipes</i>	1	0	0	0	1	0	0	0
Und. <i>Eugerda</i> sp.	0	0	0	1	0	2	0	0
<i>Whoia</i> sp.	0	0	0	0	0	1	0	0
<i>Desmosoma</i> aff. <i>tyrrhencium</i>	6	0	1	0	0	0	0	0
<i>Desmosoma</i> aff. <i>elegans</i>	0	0	3	0	0	0	0	0
<i>Desmosoma elegans</i>	0	0	0	0	3	0	0	0
Desmosomatidae juv.	0	0	0	0	1	0	0	0
<b>Tanaidacea</b>								
Pseudotanaididae*								
<i>Pseudotanais</i> sp.	1	0	6	2	0	0	0	1
Agathotanaididae*								
Und. Agathotanaid	1	2	0	0	96	458	5	1
<i>Paragathotanais</i> sp.	0	2	0	0	0	0	0	0
Anarthruridae*	1	0	0	0	0	0	0	0
<b>Total abundances (number of individuals)</b>	<b>100</b>	<b>27</b>	<b>43</b>	<b>64</b>	<b>221</b>	<b>574</b>	<b>31</b>	<b>29</b>
<b>Total density (number of ind. m<sup>-2</sup>)</b>	<b>5000</b>	<b>1350</b>	<b>2150</b>	<b>3200</b>	<b>11050</b>	<b>28700</b>	<b>1550</b>	<b>1450</b>

Table S6. Macrofaunal (>250 µm) absolute abundances per replicate of each taxon in the active microhabitats studied on the Amsterdam mud volcano: sediments with bivalve shells (Biv, n = 2), reduced sediments (Red, n = 4), carbonate crusts (CC, n = 3) and reference (Ref, n = 1). Total relative abundances for each taxonomic group are highlighted in **bold**. Total abundance and total density per replicate are also given. \*: taxonomic level used for alpha-diversity analyses (mostly family level), \*\*: values used for alpha-diversity only for Ref; juv: juvenile, Und.: undetermined. All samples were taken during the MEDECO cruise (2007)

Taxonomic group	Bivalve shells		Reduced sediments				Carbonate crusts			Ref
	Biv1	Biv2	Red1	Red2	Red3	Red4	CC1	CC2	CC3	
<b>Polychaete (Total)</b>	<b>54</b>	<b>74</b>	<b>139</b>	<b>318</b>	<b>141</b>	<b>157</b>	<b>13</b>	<b>25</b>	<b>8</b>	<b>39</b>
Capitellidae*	8	5	0	0	1	0	0	0	0	8
Chrysopetalidae*	0	0	0	0	0	0	0	0	0	20
Cirratulidae*	7	34	0	0	0	0	0	5	0	0
Dorvilleidae*	6	4	44	273	71	77	0	0	0	0
Flabelligeridae*	0	0	0	0	0	0	0	0	0	1
Glyceridae*	1	0	0	0	0	0	0	0	0	0
Hesionidae*	0	0	0	0	0	0	0	0	0	2
Lumbrineridae*	1	1	0	0	0	0	0	0	0	0
Opheliidae*	0	0	0	0	0	0	0	0	0	3
Paraonidae*	29	26	1	0	0	0	1	5	1	1
Phyllodocidae*	1	1	0	0	0	0	0	0	0	0
Sabellidae*	0	0	0	0	0	0	0	0	0	1
Serpulidae*	0	0	0	0	0	0	11	13	6	0
Siboglinidae-Frenulata*										
<i>Siboglinum</i> sp.	0	1	0	0	0	0	0	1	0	0
Spionidae*	1	2	16	1	42	33	1	1	1	0
Terebellida*	0	0	78	44	27	47	0	0	0	3
<b>Bivalvia (Total)</b>	<b>2</b>	<b>21</b>	<b>134</b>	<b>229</b>	<b>484</b>	<b>364</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>
Lucinidae*										
<i>Lucinoma kazani</i>	0	1	0	0	0	0	0	0	0	0
Thyasiridae*										
<i>Thyasira striata</i>	1	3	3	0	0	0	0	1	0	0
Vesicomomyidae*										
<i>Isorropodon perplexum</i>	0	0	1	0	0	0	0	0	0	0
Und. Vesicomomyidae	1	11	130	228	484	364	0	1	0	0
Und. Bivalvia	0	6	0	1	0	0	0	0	0	0
<b>Gastropoda (Total)</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>14</b>
Orbitestellidae*										
<i>Lurifax vitreus</i>	0	1	0	0	0	0	3	3	0	0
Und. Gastropoda**	0	0	0	0	0	0	0	1	0	14**
<b>Aplacophora (Total)</b>	<b>1</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Chaetodermatidae*										
<i>Falcidens guttuosus</i>	1	6	0	0	0	0	0	0	0	0
<b>Polyplacophora</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>
Und. Polyplacophora*	0	0	0	0	0	0	0	0	0	2
<b>Sipuncula (Total)</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Phascolosomatidae*										
<i>Phascolosoma</i> aff. <i>granulatum</i>	1	0	0	0	0	0	0	0	0	0
<b>Nemerta (Total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>
Und. Nemerta*	0	0	0	0	0	0	0	0	0	2
<b>Crustacea (Total)</b>	<b>13</b>	<b>74</b>	<b>7</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>
<b>Amphipoda-Gammaridae</b>										
Oedicerotidae*										
<i>Monoculodes</i> sp.	1	2	0	0	0	0	0	0	0	0
<i>Periculodes</i> aff. <i>longimanus</i>	0	0	4	0	0	1	0	0	0	0
Phoxocephalidae*										
<i>Harpiniopsis</i> sp.	0	1	0	0	0	0	0	1	0	0
Und. Gammaridae	1	0	0	0	0	0	0	0	0	0
<b>Cumacea</b>										
Diastylidae*										
<i>Diastylis</i> sp.	0	0	1	0	2	0	0	0	0	0
<b>Isopoda-Asellota</b>										
Munnopsidae*										
<i>Disconectes</i> sp.1	5	0	0	0	0	0	0	0	0	0

<i>Ilyarachna</i> sp.1	3	1	0	0	0	0	0	0	0	0
<i>Ilyarachna</i> sp.2	0	0	1	0	0	0	0	0	0	0
Desmosomatidae*										
<i>Eugerda</i> sp.1	0	3	0	0	0	0	0	0	0	0
<i>Eugerda</i> sp.2	0	11	0	0	0	0	0	0	0	0
<i>Eugerda</i> sp. juv	0	1	0	0	0	0	0	0	0	0
<i>Pseudogerda atypicum</i>	0	4	0	0	0	0	0	0	0	0
Und. Isopoda	1	2	0	0	0	0	0	0	0	0
<b>Tanaidacea</b>										
Leptognathiellidae*										
Leptognathiellidae sp.1	2	0	0	0	0	0	0	0	0	0
Leptognathiellidae sp.2	0	0	0	0	0	0	0	1	0	0
Pseudotanaidae*										
<i>Pseudotanais</i> sp.	0	1	0	0	0	0	0	0	0	0
Agathotanaidae*										
Und. Agathotanaid	0	45	0	0	0	0	0	0	0	0
<i>Paragathotanais</i> sp.	0	1	0	0	0	0	0	0	0	0
Tanallidae*										
<i>Tanaella</i> sp.	0	1	0	0	0	0	0	0	0	0
Und. Tanaidacea*	0	1	0	0	0	0	0	0	0	0
<b>Decapoda</b>										
Und. Decapoda*	0	0	1	0	0	0	0	0	0	0
<b>Echinodermata</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
Und. Echinoida*	0	0	0	0	0	0	0	0	0	1
<b>Total abundance (number of individuals)</b>	<b>71</b>	<b>176</b>	<b>280</b>	<b>547</b>	<b>627</b>	<b>522</b>	<b>16</b>	<b>33</b>	<b>8</b>	<b>58</b>
<b>Total density (number ind. m<sup>-2</sup>)</b>	<b>3550</b>	<b>8800</b>	<b>14000</b>	<b>27350</b>	<b>31350</b>	<b>26100</b>	<b>1173</b>	<b>2037</b>	<b>640</b>	<b>232</b>

Table S7. Meiofaunal (retained by a 250 µm mesh) absolute abundance per replicate and relative abundances (%) of each taxon in the active microhabitat sites on the Napoli mud volcano: sediments with bivalve shells (Biv, n = 3), *Lamellibrachia* (Lam, n = 3), carbonate crusts (CC, n = 3) and the reference site (Ref, n = 1). Total relative abundances for each taxonomic group are highlighted in **bold**. Total abundance and total density per replicate are also given. \*: taxonomic level used for alpha-diversity analyses (mostly family level), Und.: undetermined. All sampling was performed during the MEDECO cruise (2007)

Taxonomic group	Bivalve shells			<i>Lamellibrachia</i>			Carbonate crusts			Ref
	Biv1	Biv2	Biv3	Lam1	Lam2	Lam3	CC1	CC2	CC3	
<b>Nematoda (Total)</b>	<b>55</b>	<b>40</b>	<b>23</b>	<b>77</b>	<b>111</b>	<b>277</b>	<b>58</b>	<b>12</b>	<b>4</b>	<b>15</b>
<b>Crustacea (Total)</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>14</b>	<b>35</b>	<b>24</b>	<b>20</b>	<b>5</b>	<b>2</b>	<b>14</b>
<b>Copepoda-Harpacticoida</b>										
Miraciidae*										
<i>Typhamphiascus confusus</i>	0	0	0	0	1	0	7	1	0	0
<i>Amphiascus</i> sp.	0	0	0	0	0	0	1	0	0	0
Ameiridae*										
<i>Sarsameira</i> sp.	0	0	0	0	0	0	1	0	0	0
Tisbidae*										
<i>Tisbella</i> sp.	0	0	0	0	10	0	0	0	0	0
Ectinosomatidae*										
<i>Bradya</i> sp.	0	0	1	0	0	0	9	0	0	0
Pseudotachidiidae*										
<i>Psammis longipes</i>	0	0	0	0	0	0	1	0	0	0
Und. Harpacticoida	0	0	0	0	0	1	1	2	0	0
<b>Copepoda-Cyclopoida</b>										
Oncaeidae*										
<i>Oncaea</i> sp.	0	0	0	0	1	0	0	0	0	0
Cyclopinidae*										
<i>Cyclopina</i> sp.	0	0	0	0	0	0	0	1	0	0
Cyclopoida sp.2	0	0	0	0	0	0	0	0	1	0
<b>Copepoda-Calanoida</b>										
Und. Calanoida*	1	0	0	10	13	4	0	0	1	0
Und. Copepoda*	0	0	0	0	0	0	0	0	0	14
<b>Ostracoda</b>										
Pontocyprididae*										
<i>Propontocypris</i> cf. <i>levis</i>	0	0	0	3	10	18	0	0	0	0
<i>Argilloecia</i> sp.	0	0	0	1	0	1	0	0	0	0
Polycopidae*										
<i>Polycope orbulinaeformis</i>	2	0	0	0	0	0	0	0	0	0
<i>Polycope</i> sp.1	2	0	0	0	0	0	0	0	0	0
<i>Polycope</i> cf. <i>dispar</i>	0	1	0	0	0	0	0	0	0	0
<i>Polycope</i> cf. <i>vasfiensis</i>	0	3	0	0	0	0	0	0	0	0
% Meiofauna / Total fauna	59.4	47.8	32.4	74.6	80.7	66.2	41.9	44.7	11.3	52.7
<b>Total abundance (number of individuals)</b>	<b>60</b>	<b>44</b>	<b>24</b>	<b>91</b>	<b>146</b>	<b>301</b>	<b>78</b>	<b>17</b>	<b>6</b>	<b>29</b>
<b>Total density (number of ind. m<sup>-2</sup>)</b>	<b>3000</b>	<b>2200</b>	<b>1200</b>	<b>4550</b>	<b>7300</b>	<b>15050</b>	<b>1835</b>	<b>265</b>	<b>217</b>	<b>116</b>

Table S8. Meiofaunal (retained by a 250 µm mesh) absolute abundance per replicate of each taxon in the peripheral microhabitat sites on the Napoli mud volcano: sediments from the periphery of the *Lamellibrachia* microhabitat (Plam, n = 4) and sediments from the periphery of the carbonate crust microhabitat (Pcc, n = 4). Total relative abundances for each taxonomic group are highlighted in **bold**. Total abundance and total density per replicate are also given. \*: taxonomic level used for alpha-diversity analyses (mostly family level), Und.: undetermined. All sampling was performed during the MEDECO cruise (2007)

Taxonomic group	Periphery of <i>Lamellibrachia</i>				Periphery of carbonate crusts			
	Plam1	Plam2	Plam3	Plam4	Pcc1	Pcc2	Pcc3	Pcc4
<b>Nematoda* (Total)</b>	<b>23</b>	<b>50</b>	<b>429</b>	<b>330</b>	<b>33</b>	<b>363</b>	<b>31</b>	<b>37</b>
<b>Crustacea (Total)</b>	<b>7</b>	<b>16</b>	<b>3</b>	<b>5</b>	<b>11</b>	<b>2</b>	<b>2</b>	<b>8</b>
<b>Copepoda-Harpacticoida</b>								
Miraciidae*								
<i>Typhamphiascus confusus</i>	0	0	1	0	1	0	0	0
<i>Haloschizopera tenuipes</i>	0	0	0	0	2	0	0	0
Ectinosomatidae*								
<i>Bradya</i> sp.	0	0	2	0	2	0	0	0
Cerviniidae*								
<i>Cerviniella</i> sp.	1	3	0	0	0	0	0	1
Argestidae*								
<i>Eurycletoles</i> sp.1	0	0	0	2	1	0	0	0
<i>Eurycletoles</i> sp.2	0	0	0	0	0	0	0	1
Tetragonicipitidae*								
<i>Tetragonicipes</i> sp.	0	0	0	0	4	0	0	0
Und. Harpacticoida	0	0	0	1	0	0	2	4
<b>Copepoda-Cyclopioda</b>								
Cyclopinidae*								
Cyclopioda sp.2	0	0	0	0	0	0	0	1
<b>Copepoda-Calanoida</b>								
Und. Calanoida*	0	0	0	0	0	1	0	0
<b>Ostracoda</b>								
Pontocyprididae*								
<i>Propontocypris</i> cf. <i>levis</i>	1	0	0	0	0	0	0	0
<i>Argilloecia</i> sp.	3	0	0	0	0	0	0	0
Polycopidae*								
Und. <i>Polycope</i> sp.	0	0	0	0	0	0	0	1
<i>Polycope</i> sp.2	0	0	0	0	1	0	0	0
<i>Polycope</i> cf. <i>vasfiensis</i>	2	10	0	0	0	0	0	0
<i>Polycope tholoformis</i>	0	3	0	2	0	1	0	0
% Meiofauna / Total fauna	23.1	71.0	90.9	84.0	16.6	38.9	51.6	60.8
<b>Total abundance (number of individuals)</b>	<b>30</b>	<b>66</b>	<b>432</b>	<b>335</b>	<b>44</b>	<b>365</b>	<b>33</b>	<b>45</b>
<b>Total density (number of ind. m<sup>-2</sup>)</b>	<b>1500</b>	<b>3300</b>	<b>21600</b>	<b>16750</b>	<b>2200</b>	<b>18250</b>	<b>1650</b>	<b>2250</b>



Table S9. Meiofaunal (retained by a 250 µm mesh) absolute abundance per replicate of each taxon in the active microhabitat sites on the Amsterdam mud volcano: sediments with bivalve shells (Biv, n = 2), reduced sediments (Red n = 4), carbonate crusts (CC, n = 3) and the reference site (Ref, n = 1). Total relative abundances for each taxonomic group are highlighted in **bold**. Total abundance and total density per replicate are also given. \*: taxonomic level used for alpha-diversity analyses (mostly family level), Und.: undetermined. All sampling was performed during the MEDECO cruise (2007)

Taxonomic group	Bivalve shells		Reduced sediments				Carbonate crusts			Ref
	Biv1	Biv2	Red1	Red2	Red3	Red4	CC1	CC2	CC3	
<b>Nematoda* (Total)</b>	<b>185</b>	<b>860</b>	<b>279</b>	<b>135</b>	<b>657</b>	<b>269</b>	<b>0</b>	<b>49</b>	<b>3</b>	<b>0</b>
<b>Crustacea (Total)</b>	<b>10</b>	<b>93</b>	<b>40</b>	<b>11</b>	<b>65</b>	<b>14</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Copepoda-Harpacticoida</b>										
Miraciiidae*										
<i>Typhamphiascus confusus</i>	2	41	0	0	5	1	0	0	0	0
<i>Amphiascoides</i> sp.	1	0	0	0	0	0	0	0	0	0
Cerviniidae*										
<i>Cerviniella</i> sp.	2	2	0	0	0	0	0	0	0	0
Argestidae*										
<i>Argentes</i> sp.	2	5	0	0	0	0	0	0	0	0
Tisbidae*										
<i>Tisbella</i> sp.	0	1	0	1	0	1	0	0	0	0
Ectinosomatidae*										
<i>Bradya</i> sp.	1	10	0	0	0	0	0	0	0	0
<i>Halectinosoma</i> sp.	0	0	4	2	59	11	1	0	0	0
Pseudotachidiidae*										
<i>Psammis longipes</i>	0	1	0	0	0	0	0	0	0	0
<i>Pseudotachidiidae</i> sp.	0	0	2	0	0	0	0	0	0	0
Und. Harpacticoida	0	1	0	0	1	0	0	0	0	0
<b>Copepoda-Cyclopoida</b>										
Cyclopinidae*										
<i>Cyclopina</i> sp.	1	0	0	2	0	1	0	0	0	0
Cyclopoida sp.2	0	0	0	1	0	0	0	0	0	0
<b>Copepoda-Calanoida</b>										
Und. Calanoida*	0	0	0	0	0	0	1	0	0	0
<b>Ostracoda</b>										
Pontocyprididae*										
<i>Argilloecia</i> sp.	0	31	34	5	0	0	0	0	0	0
Polycopidae*										
<i>Polycop</i> sp.1	0	1	0	0	0	0	0	0	0	0
<i>Polycope quadridentata</i>	1	0	0	0	0	0	0	0	0	0
% Meiofauna / Total fauna	73.3	84.4	53.3	21.1	53.5	35.2	9.5	59.8	27.3	0
<b>Total abundances (number of individuals)</b>	<b>195</b>	<b>953</b>	<b>319</b>	<b>146</b>	<b>722</b>	<b>283</b>	<b>2</b>	<b>49</b>	<b>3</b>	<b>0</b>
<b>Total density (number of ind. m<sup>-2</sup>)</b>	<b>9750</b>	<b>47650</b>	<b>15950</b>	<b>7050</b>	<b>36100</b>	<b>14150</b>	<b>123</b>	<b>3025</b>	<b>240</b>	<b>0</b>