

Size matters at deep-sea hydrothermal vents: different diversity and habitat fidelity patterns of meio- and macrofauna

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Marine Ecology Progress Series 520: 57–66 (2015)

Supplement

Table S1. Macrofaunal species abundance per 10 cm² is shown for each sample from the Pompeii worm habitat (P1 – P5) and the basalt habitat (B1 – B4). For each species the taxon is given (AN = Annelida, AR = Arthropoda, CH = Chordata, MO = Mollusca). **Bold** numbers indicate abundance > 1 individual per 10 cm²

| Species | Taxon | P1 | P2 | P3 | P4 | P5 | B1 | B2 | B3 | B4 |
|-----------------------------------|-------|-------------|-------------|-------------|-------------|-------------|------|------|------|-------------|
| <i>Alvinella caudata</i> | AN | 1.06 | 0.35 | 3.37 | 2.54 | 1.21 | | | | |
| <i>Alvinella pompejana</i> | AN | 3.1 | 1.31 | 2.48 | 6.76 | 3.03 | | | | |
| <i>Amphisamytha galapagensis</i> | AN | 0.09 | 0.06 | | | | 0.53 | 0.68 | | 0.05 |
| <i>Archinome rosacea</i> | AN | | | | | | 0.2 | 0.27 | | |
| <i>Branchinotogluma</i> sp. 1 | AN | | | | | | | | | 0.22 |
| <i>Flabelliderma</i> sp. 1 | AN | | | | | | 0.02 | | 0.04 | 0.03 |
| <i>Galapagomystides aristata</i> | AN | | | | | | | | | 0.05 |
| <i>Glycera tessellata</i> | AN | | | | | | | 0.15 | | |
| <i>Hesiolyra bergi</i> | AN | 0.97 | 0.61 | 0.89 | 3.38 | 0.61 | | | | |
| <i>Hesiospina vestimentifera</i> | AN | | | | | | | | | 0.05 |
| Juvenile polychaete | AN | | | | | | | | | 0.03 |
| Juvenile polynoid polychaete | AN | | | | | | | 0.04 | | |
| <i>Lepidonotopodium williamse</i> | AN | | | | | | | | | 0.03 |
| Nectochaeta larvae | AN | | | 0.18 | | | | | | |
| <i>Nereis sandersi</i> | AN | | | | | | 0.13 | 0.11 | | |
| <i>Nicomache arwidsoni</i> | AN | | | | | | | 0.11 | | |
| <i>Ophryotrocha akessoni</i> | AN | 0.18 | 0.12 | 0.18 | | 0.61 | 0.02 | | | 0.73 |
| <i>Paralvinella grasslei</i> | AN | 0.35 | 0.41 | 0.35 | 2.54 | | | | | 0.05 |
| Syllidae sp. 1 | AN | | | | | | 0.02 | | | |
| Amphipod sp. 4 | AR | | | | | | 0.02 | 0.04 | | |
| <i>Bythograea thermydron</i> | AR | | 0.06 | | | | | | | |
| <i>Dahlella caldariensis</i> | AR | | | | | | | | | 0.22 |
| <i>Typhlotanais</i> sp.1 | AR | | | | | | 0.02 | | | 0.22 |
| <i>Ventiella sulfuris</i> | AR | 1.06 | 2.13 | 0.18 | | 2.42 | 0.07 | | | 6.88 |
| Tunicate | CH | | | | | | | | 0.04 | |
| <i>Gorgoleptis spiralis</i> | MO | | | | | | | | | 0.03 |
| Juvenile gastropod | MO | | | | | | 0.15 | 0.19 | | |
| Juvenile limpet | MO | | | | | | 0.11 | 0.23 | | 0.11 |
| <i>Lepetodrilus ovalis</i> | MO | | | | | | | | | 0.11 |
| <i>Lepetodrilus cristatus</i> | MO | | | | | | | | | 0.03 |
| <i>Lepetodrilus elevatus</i> | MO | | 0.03 | 0.35 | | | | | 0.19 | 0.81 |
| <i>Lepetodrilus galriffensis</i> | MO | | 0.03 | 0.18 | | | | | | |
| <i>Rhynchopelta concentrica</i> | MO | | | | | | | | 0.04 | 0.16 |

Table S2. Total abundance, species richness and species abundance of meiofauna and macrofauna from vent-distant samples collected ~1 km away from the AST axis at the 9°N EPR. Meiofauna and macrofauna (meio, macro) species are given according to higher taxa (AN = Annelida, AR = Arthropoda, CH = Chordata, MO = Mollusca, COP = Copepoda, NEMA = Nematoda, OSTR = Ostracoda) for vent-distant sample B1 (v-d B1), and vent-distant samples S1 (v-d S1) and S2 (v-d S2). Shared species with the AST at vents and bare basalt are indicated by x. x* species were not included in Gollner et al. (2010; PLoS ONE 5(8): e12321, doi:10.1371/journal.pone.0012321) (benthopelagic species), but were observed by S. Gollner. Calanoida, Corycaeidae, Oncaeidae are here counted as 1 species each. In brackets: shared species including yet unpublished information from samples collected by S. Gollner and M. Bright in the AST after 2006 (unpublished shared species in the AST include *Barathricola rimensis*, *Ectinosoma* sp. 3, *Sarsameira* sp. 2, *Tisbe* sp. nov. 1, *Tisbe* sp. 2, Nematoda sp. 2)

| | Taxon | Size | v-d B1 | v-d S1 | v-d S2 | AST vent | AST basalt |
|--|-------|-------|--------|--------|--------|----------|------------|
| Abundance | | Macro | 53 | 0 | 6 | | |
| | | Meio | 101 | 20 | 55 | | |
| Species richness | | Macro | 9 | 0 | 5 | | |
| | | Meio | 13 | 8 | 32 | | |
| Species | | | | | | | |
| <i>Ophryotrocha akessoni</i> | AN | Macro | 1 | 0 | 0 | x | x |
| Polychaeta off-axis sp. 1 | AN | Macro | 0 | 0 | 1 | | |
| Polynoid off-axis sp. 1 | AN | Macro | 1 | 0 | 0 | | |
| Amphipoda off-axis sp. 1 | AR | Macro | 1 | 0 | 0 | | |
| Amphipoda off-axis sp. 2 (juv) | AR | Macro | 1 | 0 | 0 | | |
| Amphipoda off-axis sp. 3 (juv) | AR | Macro | 1 | 0 | 0 | | |
| Cumacea | AR | Macro | 0 | 0 | 2 | | |
| Isopoda off-axis sp. 1 (juv) | AR | Macro | 0 | 0 | 1 | | |
| Isopoda off-axis sp. 2 | AR | Macro | 1 | 0 | 0 | | |
| Isopoda off-axis sp. 3 | AR | Macro | 0 | 0 | 1 | | |
| Isopoda off-axis sp. 4 (juv) | AR | Macro | 0 | 0 | 1 | | |
| Tunicate (?) | CH | Macro | 5 | 0 | 0 | | |
| Appendicularia | CH | Macro | 41 | 0 | 0 | x* | x* |
| Gastropoda off-axis sp. 1 | MO | Macro | 1 | 0 | 0 | | |
| <i>Ameira</i> sp. nov. 1 | COP | Meio | 1 | 0 | 2 | x | x |
| <i>Amphiascus</i> sp. 1 (aff. varians) | COP | Meio | 0 | 0 | 3 | x | x |
| <i>Aphotopontius acanthinus</i> | COP | Meio | 13 | 0 | 1 | x | |
| <i>Argestes angolaensis</i> (?) | COP | Meio | 0 | 0 | 1 | | |
| <i>Barathricola rimensis</i> | COP | Meio | 0 | 1 | 1 | (x) | (x) |
| <i>Ectinosoma</i> sp. 3 | COP | Meio | 0 | 0 | 1 | (x) | |
| <i>Idyella</i> sp. 1 | COP | Meio | 0 | 0 | 2 | | |
| <i>Idyella</i> sp. 2 | COP | Meio | 0 | 0 | 1 | | |
| <i>Keraia</i> juvenile | COP | Meio | 0 | 0 | 1 | | |
| <i>Marsteinia</i> sp. 1 | COP | Meio | 0 | 0 | 1 | | |
| <i>Marsteinia</i> sp. 2 | COP | Meio | 0 | 0 | 1 | | |
| <i>Mesocletodes</i> sp. nov. 2 | COP | Meio | 0 | 1 | 0 | | |
| <i>Misophrioida</i> sp. 1 | COP | Meio | 0 | 0 | 1 | | |
| <i>Neobradia</i> sp. 1 | COP | Meio | 0 | 0 | 1 | | |
| Paranannopidae juvenile | COP | Meio | 0 | 0 | 1 | | |
| <i>Pontostratiotes</i> sp. 1 | COP | Meio | 0 | 1 | 0 | | |
| <i>Pontostratiotes</i> sp. 2 | COP | Meio | 1 | 0 | 0 | | |
| Pseudotachiidae sp. 1 | COP | Meio | 1 | 0 | 0 | | |
| <i>Sapphirina</i> sp. nov. 3 | COP | Meio | 1 | 0 | 0 | | |
| <i>Sarsameira</i> sp. 2 | COP | Meio | 0 | 0 | 2 | | (x) |
| Siphonostomatoida sp. 1 | COP | Meio | 0 | 0 | 1 | | |
| Siphonostomatoida sp. 2 | COP | Meio | 0 | 0 | 1 | | |
| Siphonostomatoida sp. 3 | COP | Meio | 0 | 0 | 1 | | |
| <i>Stygiopontius hispidulus</i> | COP | Meio | 2 | 3 | 1 | x | x |
| <i>Tachidiopsis</i> sp. 1 | COP | Meio | 0 | 0 | 1 | | |
| <i>Tisbe</i> sp. 2 | COP | Meio | 1 | 0 | 0 | (x) | (x) |

| | | | | | | | |
|------------------------------------|-------|------|----|---|----|-----|-----|
| <i>Tisbe</i> sp. nov. 1 | COP | Meio | 2 | 5 | 13 | (x) | (x) |
| Calanoida | COP | Meio | 32 | 5 | 2 | x* | x* |
| Corycaeidae | COP | Meio | 10 | 0 | 0 | x* | x* |
| <i>Microsetella norwegica</i> | COP | Meio | 2 | 0 | 0 | x* | x* |
| Oncaeidae | COP | Meio | 34 | 2 | 2 | x* | x* |
| <i>Chromadorita</i> (?) sp. 1 | NEMA | Meio | 0 | 0 | 1 | x | x |
| COK (<i>Chromadorida</i> ?) sp. 2 | NEMA | Meio | 0 | 0 | 1 | | |
| Epsilonematidae sp. 1 | NEMA | Meio | 0 | 0 | 2 | | |
| Epsilonematidae sp. 2 | NEMA | Meio | 0 | 0 | 2 | | |
| <i>Microlaimus cyatholaimoides</i> | NEMA | Meio | 0 | 0 | 1 | | |
| Nematoda sp. 2 | NEMA | Meio | 0 | 0 | 2 | (x) | |
| Nematoda sp. 3 | NEMA | Meio | 0 | 0 | 1 | | |
| <i>Oncholaimus</i> sp. 1 | NEMA | Meio | 1 | 0 | 0 | | |
| <i>Paracyatholaimus</i> sp. 4 | NEMA | Meio | 0 | 0 | 1 | | |
| <i>Thalassomonhystera fisheri</i> | NEMA | Meio | 0 | 2 | 0 | x | x |
| <i>Xylocythere vanharteni</i> | OSTRA | Meio | 0 | 0 | 2 | x | x |

Table S3. Results of bootstrapping (bt, 10000 resamplings each) used to test for significant differences in abundance per 10 cm², observed species richness (S_{obs}), species richness after identifying 300 individuals (S_{m300}), species richness at a sample coverage of 98% ($S_{Cm0.98}$) and Shannon diversity (H'_{loge}) between the habitats P (Pompeii worm), T (tubeworm), M (mussel), and B (basalt) for (A) meiofauna and (B) macrofauna. (C) Bootstrapping results for meiofauna versus macrofauna in the four habitat types (P, T, M, B) tested for abundance per 10 cm², S_{obs} , S_{m300} , $S_{Cm0.98}$ and H'_{loge} . Higher (>) and lower (<) values of meiofauna (me) and macrofauna (ma) indices are indicated for each habitat. Significant results after classical Bonferroni-correction are marked in **bold**. In brackets: results of non-parametric Kruskal-Wallis tests

(A) Meiofauna

| Habitat | Abund. 10 cm ⁻² | S_{obs} | S_{m300} | $S_{Cm0.98}$ | H'_{loge} |
|---------|----------------------------|---------------------------------|---------------------------------|----------------------------------|--------------------------------|
| P - T | 0.29 (0.35) | < 0.001 (0.45) | < 0.001 (0.53) | < 0.001 (0.53) | < 0.001 (0.09) |
| T - M | 0.81 (1) | < 0.001 (0.59) | < 0.001 (0.73) | < 0.001 (1) | < 0.001 (1) |
| M - B | 0.003 (0.49) | 0.58 (1) | 0.21 (1) | < 0.001 (1) | 0.07 (1) |
| P - M | < 0.001 (1) | < 0.001 (0.01) | < 0.001 (0.02) | < 0.001 (0.06) | < 0.001 (0.04) |
| P - B | < 0.001 (0.12) | < 0.001 (< 0.01) | < 0.001 (0.002) | < 0.001 (< 0.001) | < 0.001 (0.17) |
| T - B | 0.32 (1) | < 0.001 (0.53) | < 0.001 (0.25) | < 0.001 (0.12) | 0.2 (1) |

(B) Macrofauna

| Habitat | Abund. 10 cm ⁻² | S_{obs} | S_{m300} | $S_{Cm0.98}$ | H'_{loge} |
|---------|---------------------------------|---------------------------------|--------------------------------|--------------------------------|-----------------------|
| P - T | < 0.001 (< 0.01) | < 0.001 (< 0.01) | < 0.001 (0.03) | < 0.001 (0.07) | < 0.001 (0.06) |
| T - M | < 0.001 (0.68) | < 0.001 (0.62) | 0.28 (1) | 0.95 (1) | 0.06 (0.89) |
| M - B | < 0.001 (0.24) | 0.002 (0.99) | 0.84 (1) | 0.76 (1) | 0.52 (1) |
| P - M | < 0.001 (0.50) | < 0.001 (0.14) | < 0.001 (0.19) | 0.006 (0.41) | 0.13 (1) |
| P - B | 0.51 (1) | 0.09 (1) | 0.003 (0.6) | 0.024 (0.56) | 0.29 (1) |
| T - B | < 0.001 (< 0.01) | < 0.001 (0.03) | 0.41 (1) | 0.66 (1) | 0.005 (0.38) |

(C) Meiofauna-Macrofauna

| Habitat | Abund. 10 cm ⁻² | H'_{loge} | |
|---------|---------------------------------|-------------|---------------------------------|
| P | < 0.001 (< 0.01) | me > | < 0.001 (< 0.01) |
| T | 0.21 (0.08) | | 0.06 (< 0.01) |
| M | < 0.001 (0.04) | me > | < 0.001 (0.02) |
| B | 0.08 (0.25) | | 0.06 (0.02) |

| Habitat | S_{obs} | S_{m300} | $S_{Cm0.98}$ |
|---------|--------------------------------|--------------------------------|--------------|
| P | 0.47 (0.67) | 0.85 (0.92) | 0.07 (0.17) |
| T | < 0.001 (0.01) | 0.71 (0.63) | 0.51 (0.63) |
| M | < 0.001 (0.02) | < 0.001 (0.02) | me> |
| B | < 0.001 (0.02) | < 0.001 (0.02) | me> |

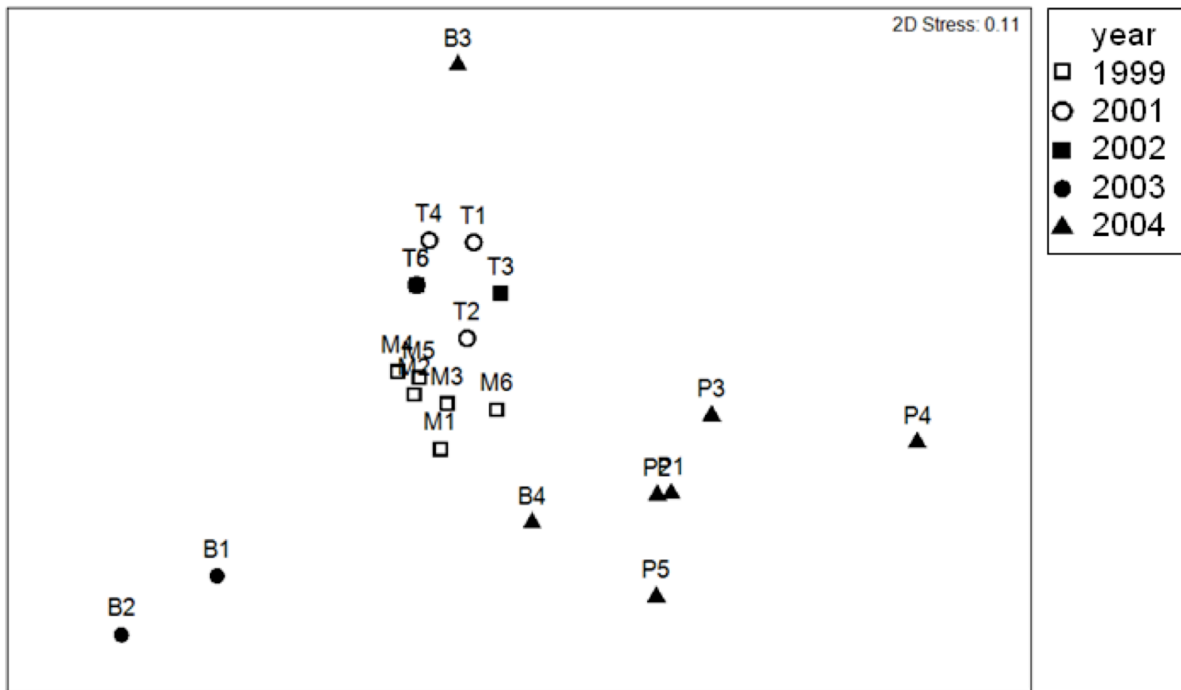


Figure S1. Two-dimensional MDS configuration plot (data standardized, square-root transformed; similarity based on Bray-Curtis similarity) of macrofauna data from Pompeii worm (P1-P5), tubeworm (T1-T6), mussel (M1-M6) and basalt habitats (B1-B4). Symbols indicate the year of sampling