

SMALL-SCALE SPATIAL HETEROGENEITY IN STRUCTURAL AND TROPHIC DIVERSITY OF MEIOFAUNA ASSOCIATED WITH METHANE SEEPAGE AT THE DARWIN MUD VOLCANO (GULF OF CÁDIZ)

Pape Ellen¹, Tania Nara Bezerra¹, Heleen Vanneste², Katja Heeschen², Leon Moodley³, Peter van Breugel³ and Ann Vanreusel¹

¹ Research Group Marine Biology, Biology Department, Ghent University, Krijgslaan 281, S8, B-9000 Ghent, Belgium
E-mail: ellen.pape@ugent.be

² National Oceanography Centre, Geochemistry Research Group, University of Southampton Waterfront Campus, European Way, SO14 3ZH Southampton, UK

³ NIOO-CEME, Workgroup of Ecosystem studies, Korrिंगaweg 7, 4401 NT Yerseke, the Netherlands

The Darwin mud volcano (MV) in the Gulf of Cádiz (1100m) was sampled for meiofauna and pore-water geochemistry along a 10-m transect from a seep site on the rim of the crater (referred to as 'black spot' or 'BS') towards the slope. We wanted to know (1) what the small-scale influence is of pore-water composition on meiofaunal distribution (2) if BS sediments are colonized by a specialized community compared to the control sediments (3) the dietary composition of the nematodes as inferred by stable isotope analyses and the change in trophic diversity along the transect, and finally (4) whether higher structural diversity is associated with higher trophic diversity. Both the BS (> 2cm) and the site 2m (> 10cm) from the BS showed signs of anaerobic oxidation of methane, associated with considerable microbial production, which can be fed upon by the meiofauna. Overall, meiofaunal densities and biomass in BS sediments exceeded those in control sediments. Highest meiofaunal densities and nematode biomass were observed at 2m from the BS. This can be attributed to the absence of sulfide in the upper sediment layers in conjunction with the high microbial biomass in the deeper sediment layers. The lower densities in BS sediments are likely due to the high sulfide levels (up to 20 mM), creating a harsh environment for the infaunal community. BS sediments were dominated by *Sabatieria* (44%) and *Desmodora* (20%). *S. vasicola* and *S. punctata* were the dominant species at the BS and were never found at the other sites. Genus diversity increased with increasing distance from the BS, with an MDS analysis revealing a gradual transition in genus composition. Stable isotope analyses revealed nematodes were feeding mainly on free-living sulfur-oxidizing bacteria. However, with increasing distance from the BS, the contribution of photosynthetic carbon to the nematode diet increased, leading to an increase in trophic diversity. Finally, trophic diversity tended to increase with structural diversity.

Keywords: nematodes, mud volcano, stable isotopes.