Mar Biodiv
https://doi.org/10.1007/s12526-017-0809-x

SENCKENBERG CrossMark

ORIGINAL PAPER

Benthic nematode biodiversity of the Abzu, Tiamat and Michael Ivanov mud volcanoes located along the SWIM fracture zone (Gulf of Cadiz)

Sofia P. Ramalho[1,2] · **Carlos Ribeiro**[3] · **Christian Hensen**[4] · **Florian Scholz**[4] · **Marianne Nuzzo**[5,6] · **Pedro Terrinha**[6] · **Helena Adão**[7]

Received: 16 March 2017 / Revised: 11 October 2017 / Accepted: 17 October 2017

Abstract Studies that focus on meiofaunal assemblages of deep-sea mud volcanoes show an unpredictable abundance and diversity in a clear response to the different environmental conditions of the seeped sediment. The mud volcanoes Abzu, Tiamat and M. Ivanov (ATI), are located along the SWIM1 fracture zone, in front of the accretionary wedge of the Gulf of Cadiz (AWGC). The geological setting and the fluid geochemical characteristics of the ATI mud volcanoes are different from those located within the AWGC. The main aim of this study is to describe and compare the spatial and vertical distributions of the meiofauna and nematode assemblages from the ATI mud volcanoes, the Porto mud volcano located in the AWGC, and a non-seep site (Site 2) as reference. The pore-water on the uppermost sediment layers has compositions close to the near-bottom seawater. The meiofauna abundances were generally lower and the vertical distribution of the assemblages showed a typical pattern, gradually decreasing towards depth. The lack of spatial patterns of the standing stocks contrasts with the spatial variability of diversity and biomass, related to the differences in the nematode assemblages that are distinct between ATI, Site 2 and the Porto mud volcano. The ATI and Site 2 assemblages are similar to deep-sea non-seep habitats, and are clearly coupled with the environmental conditions of the bottom seawater. No evidence of seep conditions favouring the development of specialised fauna were found. The lower diversity and the presence of higher dominance species could be driven by distinct seepage conditions of the Porto mud volcano.

Keywords Meiofauna · Nematodes · Diversity · Mud volcanoes · SWIM fault zone · Gulf of Cadiz

Communicated by Y. Shirayama

✉ Helena Adão
hadao@uevora.pt

[1] Departamento de Biologia & CESAM, Campus Universitário de Santiago, Universidade de Aveiro, 3810-193 Aveiro, Portugal

[2] Marine Biology Research Group, Ghent University, Krijgslaan 281 S8, 9000 Ghent, Belgium

[3] Geosciences Department, University of Évora, Apt 94, 7002-554 Évora, Portugal

[4] GEOMAR Helmholtz-Centre for Ocean Research Kiel, 24148 Kiel, Germany

[5] IGI Ltd., The Granary, Hallsannery, Bideford EX39 5HE, UK

[6] Instituto Português do Mar e da Atmosfera (IPMA), Instituto Dom Luiz - Univ. Lisbon, Rua C do Aeroporto, 1749-077 Lisbon, Portugal

[7] Biology Department & MARE, University of Évora, Apartado 94, 7002-554 Évora, Portugal

Abbreviations

ATI MVs	Abzu, Tiamat and M. Ivanov mud volcanoes
AGFZ	Azores-Gibraltar Fracture Zone
AWGC	Accretionary Wedge of the Gulf of Cadiz
SWIM	South-West Iberia Margin strike-slip faults
HAP	Horseshoe Abyssal Plain

Introduction

Fluid seepage and mud volcanism in marine environments occur in active and passive continental margins (Dimitrov 2002; Kopf 2002). Submarine mud volcanoes (MV) are geological structures driven by upward flow of fluidized sediments, intercalated with periods of hemipelagic sedimentation. Thousands of deep-water mud volcanoes are estimated to exist worldwide varying greatly in water depth, size, morphology, substrate and biogeochemical conditions (Milkov

Published online: 05 November 2017