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TITLE: Comparison between infaunal communities of the deep floor and edge of the Tonga Trench: Possible effects of differences in organic matter supply

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ABSTRACT:

Hadal trenches are characterised by environmental conditions not found in any other environment, thereby providing new opportunities to understand the processes that shape deep-sea benthic communities. Technological advances have led to an increase in the number of investigations in hadal trenches over the last two decades. However, more quantitative samples including the deepest parts of trenches is needed to better understand trends in benthic diversity, abundance, biomass and community structure in these extreme habitats, and how these may be shaped by environmental and/or evolutionary factors. In this study, we describe and compare the abundance, biomass, vertical distribution in the sediment, diversity, and community structure of nematodes and other infauna in sediments from the Horizon Deep (~10 800 m) in the Tonga Trench and a site on the edge of the trench (~6250 m). Mean nematode abundance was six times greater at the Horizon Deep site (387 ind. 10 cm⁻²) than at the trench edge site (65 ind. 10 cm⁻²). A similar pattern was observed for biomass (15 vs 2 µgDW 10 cm⁻², respectively), which likely resulted from elevated organic matter supply at the Horizon Deep site. There was no significant difference in nematode species richness between the two sites, but diversity measured using rarefaction was significantly greater at the trench edge site than at the Horizon Deep site [ES(20); 13.8 vs 7.8]. Dominance was much more pronounced in the Horizon Deep, which may be due to competitive exclusion by a small number of opportunistic species. Nematode community structure differed significantly both between sites and among sediment depth layers. The presence of subsurface peaks in pigment concentrations, bacteria abundance, and nematode abundance at the Horizon Deep site is consistent with a recent turbidite event, and may also reflect high rates of bioturbation by larger fauna resulting from high food availability. Determining the relative influences of different environmental factors on hadal trench benthic communities will require further investigation based on quantitative samples encompassing the trench axis as well as the oceanic and continental slopes.

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