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Biodiversity patterns, environmental drivers and indicator species on a high-temperature hydrothermal edifice, Mid-Atlantic Ridge

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ABSTRACT

Knowledge on quantitative faunal distribution patterns of hydrothermal communities in slow-spreading vent fields is particularly scarce, despite the importance of these ridges in the global mid-ocean system. This study assessed the composition, abundance and diversity of 12 benthic faunal assemblages from various locations on the Eiffel Tower edifice (Lucky Strike vent field, Mid-Atlantic Ridge) and investigated the role of key environmental conditions (temperature, total dissolved iron (TdFe), sulfide (TdS), copper (TdCu) and pH) on the distribution of macro- and meiofaunal species at small spatial scales (< 1m). There were differences in macro- and meiofaunal community structure between the different sampling locations, separating the hydrothermal community of the Eiffel Tower edifice into three types of microhabitats: (1) cold microhabitats characterized by low temperatures (<6°C), high TdCu (up to 2.4 ± 1.37 µmol l^{-1}), high pH (up to 7.34 ± 0.13) but low TdS concentrations (<6.98 ± 5.01 µmol l^{-1}); (2) warm microhabitats characterized by warmer temperatures (>6°C), low pH (<6.5) and high TdS/TdFe concentrations (>12.8 µmol l^{-1}/>1.1 µmol l^{-1} respectively); and (3) a third microhabitat characterized by intermediate abiotic conditions. Environmental conditions showed more variation in the warm microhabitats than in the cold