

Contributions of rare and abundant species to the functional diversity of deep-sea hydrothermal vent communities

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A paradox of deep-sea invertebrate assemblages is that rare species are a common observation and abundant species are few in number. For example, in replicate samples from Manus Basin hydrothermal vent fields, 3 species accounted for 85% of the total abundance (24,805 individuals) and 30 species with fewer than 10 individuals accounted for 60% of the species richness (49 species total; Collins et al. 2012). Despite the apparent prevalence of rare species at hydrothermal vents, their ecological importance is unknown. Discussion of ecological importance of rare species in the deep sea is currently restricted to microbial research (e.g., Sogin et al. 2006). Rare microbial species may enable community-level processes (e.g., primary production, community respiration and elemental recycling) to remain stable over broad ranges of environmental factors (e.g., temperature and light; Caron and Countway 2009). The relative contribution of species to ecosystem functions can be investigated indirectly by comparing biological traits of species within an assemblage (i.e., characteristic such as body size, reproductive mode, feeding guild). This study uses biological trait analysis to investigate the contribution of Manus Basin hydrothermal vent fauna to the functional diversity of three faunal assemblages (i.e., *Alviniconcha* spp., *Ifremeria nautilei*, *Eochionelasmus ohtai*) at three spatial scales (i.e., replicate, mound and field). Indices for Functional Distinctiveness, Insurance and Vulnerability highlight differences between the contributions of rare and abundant taxa. Indices for Functional Richness, Divergence and Evenness highlight differences in functional diversity among faunal assemblages and across different spatial scales.