A functional traits approach to assess differences among assemblages at hydrothermal vents in a marine protected area

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Functional traits offer an innovative approach to characterising community structure, diversity, and sensitivity to disturbance. The high beta-diversity among vent habitats enables exploration of differences in functional diversity between habitats, and prediction of the sensitivity of different vent communities to disturbance through their functional profiles. The Endeavour Hydrothermal Vents Marine Protected Area (EHV MPA) created in 2003, was the first chemosynthetic ecosystem reserve to be established globally. Much of the diversity and biomass within EHV MPA is associated with the tubeworm bushes formed by the phenotypically plastic siboglinid, Ridgeia picescae. We utilise traits to determine if sulphide- and basalt-hosted tubeworm bushes support different taxonomic and functional assemblages. Our selected traits (e.g. mobility and sensory perception) also enable us to assess the sensitivity of vent species to common stressors within Endeavour, such as sampling and submersible activities. Macrofaunal assemblages from approximately 20 tubeworm grabs are characterised from three EHV MPA locations, resulting in functional traits profiles for nearly 40 vent taxa. Bush assemblage diversity and abundance vary according to habitat, with sulphide-hosted tubeworm habitat supporting twice as many macrofaunal individuals as basalt-hosted tubeworm habitat, but only half the number of taxa. We will use the functional profiles to score the sensitivity of common species to identified stressors to test a traits approach to modelling outcomes of anthropogenic disturbance. Our initial work at Endeavour demonstrates how functional traits could be used in broader deep-sea environmental management, such as assessing the sensitivity of communities to deep-sea mining.