Regional diversity of the Mariana biogeographic region with a closer look at Alviniconcha hessleri, the original "hairy snail"

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Thirty years after the discovery of Alice Springs in the Mariana backarc, we visited both the original vents and two newly located vent fields late last year. Alice Springs still has the same small and limited venting, while the Hafa Adai field features several discrete vents with large chimneys. At Perseverance, the many inactive chimneys signify past activity, but current venting is restricted. Along 600 km of ridge, distances from site to site vary between 140 to 170 km, including two additional backarc sites further south. Combining new with past studies, we find low beta diversity among sites, and a relatively short overall species list. Particularly notable is the paucity of meiofauna. All sites are dominated by the same species of provannid snails and alvinocaridid shrimp, especially in higher fluid flux. In contrast, the adjacent vents of the Mariana volcanic arc host a high beta diversity that we relate to variability in site stability and fluid chemistry, including volatiles. Very few species are shared between arc and backarc even where the geological structures converge in the south. However, many functional similarities occur among species pairs of shrimp, crab, limpets and hairy snails. We returned to the type location for the snail genus, Alviniconcha, to compare populations along the backarc and examine exposure of A. hessleri to short-term venting variability. A grid of 45 temperature loggers over ~ 0.5 m2 area with abundant snails captured a wide range of temperatures recorded at five minute intervals. With additional spot measurements of oxygen and pH, we characterize a wide range in spatio-temporal tolerance in this species.