

In situ mineral colonization samplers reveal patters in microbial community composition, structure, and succession

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Microbes can use solid phase minerals as both electron donors and acceptors, and thus minerals may exert a selective pressure on microbes colonizing their surfaces. Little is known about the extent of this selection. Hydrothermal vent chimneys are ideal to investigate these microbe-mineral interactions. In order to examine the extent to which solid-state minerals influence community structure in hydrothermal vent chimneys, we designed and deployed novel sampling devices called ISMACS (in situ mineral associated colonization samplers), with which we incubated a variety of minerals in vent fluid. Gross community composition did not vary significantly with mineralogy. Certain taxa did appear to be significantly more abundant on specific minerals. We found evidence that communities exposed to a mix of mineral substrates were more diverse than single-mineral communities, and that hematite-hosted communities were less diverse than other minerals. We also identified taxa that may represent early and late colonizers in this ecosystem. These data indicate that mineral substrate is not the primary driver of community structure in hydrothermal vent chimneys, but that it plays an important role in the diversity, succession, and metabolism of these microbial communities – especially in rare taxa.