

Cold seep enrichment yields piezotolerant, obligate hydrocarbon degraders

Van Landuyt Josefien

Universiteit Gent: Centrum voor Microbiële Ecologie en Technologie (UGent-CMET), Coupure Links 653, 9000 Gent, Belgium
E-mail: josefien.vanlanduyt@ugent.be

Deep-sea environments can become contaminated with petroleum hydrocarbons. The effects of the hydrostatic pressure in the deep sea on microbial oil degradation is poorly understood. Here we performed long-term enrichments (100 days) from a natural cold seep while providing optimal conditions to sustain high hydrocarbon degradation rates. Through enrichments performed at high hydrostatic pressure (HHP) and ambient pressure (AP) and by using control enrichments with marine broth, we demonstrated that both pressure and carbon source can have a big impact on the community structure. In contrast to previous studies, hydrocarbonoclastic OTUs remained dominant at both AP and HHP, suggesting piezotolerance of these OTUs over the tested pressure range. Twenty-three isolates were obtained after isolation and dereplication. After re-cultivation at HHP, an *Alcanivorax* sp. showed promising piezotolerance in axenic culture. Furthermore, preliminary co-cultivation tests showed synergistic growth between some isolates which shows promise for future synthetic community construction. Overall, more insight into the effect of HHP on oil degrading communities was obtained as well as several interesting isolates, e.g. a piezotolerant hydrocarbonoclast, with which future deep-sea bioaugmentation could be further investigated.

Keywords: Deep-sea; Oil bioremediation; Piezotolerance; Hydrocarbonoclastic bacteria; Synthetic; Microbial communities