

Oral Communication 17

## Understanding the ecological consequences of deep-sea mining: cadmium's influence on microbial diversity in pacific seamount sediments

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### Abstract

**Background:** Metal-rich nodules in the deep ocean contain significant quantities of high-value metals such as copper, nickel, and cobalt [1]. Mining deep-sea minerals is considered as an alternative to land mining, to reduce environmental effects and gain geopolitical advantages [1,2]. However, this action may expose deep-sea microbes to toxic concentrations of metals such as cadmium (Cd) which are shown to have an impact on metabolic and biogeochemical processes [3,4]. **Objective:** This study aims to quantify microbial diversity in deep-sea habitats, specifically Pacific Ocean seamounts, while examining the genomic responses caused by various degrees of Cadmium (Cd) exposure. **Methods:** Sediment samples from Pacific Ocean seamounts were collected, 96h pre-exposed to different concentrations of Cd, and later sequenced with 16S rRNA gene sequencing with Illumina MiSeq. Bioinformatics analysis has been conducted to investigate the taxonomic and functional diversity of microbial communities as well as their genomic responses to metal exposure. **Results:** According to the initial findings, the microbial communities in all samples were dominated by bacteria, with also the presence of archaea. Diversity in bacterial communities is higher compared to the archaeal groups. Upon completion of the study, we expect to observe a shift in the diversity of microbes found in sediment samples as Cd concentrations increase. Some microbes may be more resistant to Cd and become more abundant, whilst others may become less abundant. **Conclusions:** Deep-sea mining is expected to have impacts on the microbial communities, possibly hampering the diversity of the communities. A change in microbial diversity can have cascading impacts on the nutrient cycle and the overall health of the ecosystem. Future research should investigate the other aspects of the impacts that can come along with deep-sea mining before the approval of commercial operation.

**Keywords:** deep-sea mining; microbial diversity; gene sequencing; cadmium

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