Active metal-cycling microbial communities of polymetallic nodules from the Eastern Pacific Ocean

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The rising demand for minerals and metals is encouraging the great international interest for alternative sources in the deep sea. Deposits of deep-sea polymetallic nodules attracted the attention for a long time because they are rich in nickel, copper, cobalt, and rare earth elements. The environmental consequences of large-scale mining of polymetallic nodules are currently less known. In 2019 the Belgian and German licence area in the Clarion-Clipperton Zone (Eastern Pacific) were studied to obtain further baseline characteristics of the 4000 m deep polymetallic nodule fields. Here, we present: i) diversity and distribution of the present & active microbial communities of polymetallic nodules and ii) abundance and activity of relevant metal-cycling microorganisms by quantification of extracellular enzyme activity and 16S rRNA amplicon sequencing. Further we aim to enrich potential metal-cycling microorganisms and investigate microbial metabolisms by metagenomic/-transcriptomic from polymetallic nodules. Our results may provide a new set of tools for monitoring ecosystem impacts associated with deep-sea polymetallic nodule mining. New regulations are required to protect these areas from irreversible anthropogenic impacts.