

The community structure of deep-sea macrofauna in an area of interest for deep-sea mining

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Deep-sea areas characterized by the presence of polymetallic nodules are getting increased attention due to their potential commercial and strategic interest for metals such as nickel, copper and cobalt. The polymetallic nodules occur in areas beyond the national jurisdiction, regulated by the International Seabed Authority (ISA). Anno 2016, the ISA has allocated license areas for the exploration of potential mining for polymetallic nodules to fifteen contractors. Under these exploration contracts, contractors have the obligation to determine the environmental baseline in the exploration areas. Despite a large number of scientific cruises to the central east Pacific Ocean, still very little published data on the macrofaunal biodiversity and community structure is available for the abyssal fields of the Clarion-Clipperton Fracture Zone (CCFZ). This study focused on the macrofaunal abundance, diversity and community structure in three comparable, mineable sites located in the license area of Global Sea Mineral Resources N.V. A rather homogeneous but diverse macrofaunal community associated with the sediment from polymetallic nodule areas was observed at a scale of 10s to 100s of km. However, slight differences in the abundance and diversity of Polychaeta between sites can be explained by a decline in the estimated flux of particulate organic carbon (POC) along a southeast-northwest gradient, as well as by small differences in sediment characteristics and nodule abundance. The observed homogeneity in the macrofaunal community is an important prerequisite for assigning areas for impact and preservation reference zones. However, a precautionary approach regarding mining activities is recommended, awaiting further research during the exploration phase on environmental factors structuring macrofaunal communities in the CCFZ. For instance, habitat heterogeneity, which was shown to structure macrofauna communities at larger spatial scales, has to be taken into account in future studies. Unless the rather limited number of samples taken in the current study (12 box cores), a large fraction (59-85%) of the macrofaunal genus/species diversity has been characterized in this study.

Keywords: polymetallic nodules; macrofauna; deep sea; CCFZ; biodiversity; community structure