The ecological context for the study of biodiversity of the macrofauna of the CCFZ

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Describing and understanding macrofauna community patterns in the nodule province of the Clarion-Clipperton Fracture Zone (CCFZ) is essential to meet both the obligations for contractors to assess impacts potentially arising from their activities and the need for the International Seabed Authority (ISA) to ensure effective protection for the marine environment in the Area.

The structure of abyssal macrobenthic communities however poses severe constraints to meet these goals. Nodule growth is conditioned by very low sedimentation rates. Food resources reaching the seafloor at the abyssal depth of nodule provinces are thus limited and the fauna consequently sparse. Despite low level of resources, the benthic fauna is however unexpectedly species rich. This combination of low densities and high species richness is challenging, from both a statistical and an ecological point of view.

In statistics, the main issue is related to the positive relationship between statistical power and sample size. Statistical power is defining the ability of a sampling design to detect changes in a community metric. As the sample size in number of specimens is low, this must be counterbalanced by increased sample size in number of replicates in order to achieve reasonably high statistical power. Power-cost analyses may question the feasibility of a sampling strategy with high statistical power.

In ecology, the issues are rather theoretical. How can species co-exist and maintain viable populations in such a resource poor environment? Several hypotheses, derived from metacommunity theory, may explain abyssal diversity patterns. These hypotheses have different implications in terms of vulnerability and biodiversity conservation.

These issues will be discussed to highlight the crucial need for taxonomic standardization and rationalization of sampling efforts in the Clarion-Clipperton Fracture Zone.