

Benthic functional diversity along small scale natural sediment gradients: Do functional aspects vary synchronously with species composition?

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Benthic macrofauna in the North Sea is subjected to a wide variety of anthropogenic stressors, which have a significant impact on community composition. In order to understand how these communities react to anthropogenic influences, the effect of natural environmental variation, such as temperature, salinity, or sediment characteristics, must first be understood. It is generally known that natural variation causes differences in the classical biological measures, such as the species diversity of benthic communities, however there is a paucity of studies regarding the response of functional diversity. Due to the tight linkage of functional diversity to ecosystem processes, it is important to understand these functional aspects of community diversity for understanding changes in ecological processes as a whole, and ultimately the effects on vital ecosystem services and goods.

This study determined changes in functional diversity of benthic macrofaunal communities along natural sediment gradients on small spatial scales (i.e. ~5 km). Soft-bottom assemblages including infauna and epifauna in the Sylt outer reef area of the North Sea were examined, with functional diversity being based on functional traits. Changes in functional diversity are compared to species diversity and relationships present are discussed. For the first time, this study examines if there are functional changes along sediment gradients on such a small scale. The results thus deliver valuable insight on the potential effects of community changes on ecosystem functioning and process-driven changes in assemblages. Further, the outcomes provide an important framework for ecological monitoring and impact assessments for future North Sea projects.

Keywords: functional diversity; biodiversity; benthic assemblages; environmental gradient; sediment