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Abstract

The largest habitat on Earth, the abyssal oceans below 3500 m depth, are commonly assumed to represent a continuous environment due to homogeneity of environmental factors and the lack of physical barriers(McClain and Hardy, 2010; Menzel et al., 2011; Rex and Etter, 2010). Yet, the presence of bathymetric features, such as Mid-Ocean Ridges, and hadal trenches provide a discontinuation. During the Vema-TRANSIT expedition in 2014/2015 to the tropical North Atlantic, a transatlantic transect was studied following the full extent of the Vema Fracture Zone in an east-west direction and including the Puerto Rico Trench (PRT).

The aim of this study was to test whether large bathymetric features represent barriers to dispersal and may lead to differentiation and eventually speciation. In this study, these potential barriers included the Mid-Atlantic Ridge (MAR) and the transition (~3000 m) from the hadal PRT to the adjacent abyss. Genetic differentiation and differences in community structure (species composition) from east and west of the MAR, as well as abyssal and hadal depth zones were tested for using the poor dispersers Macrostylidae (Crustacea, Isopoda) as a model

Distribution patterns showed that certain macrostylid species have ranges extending more than 2000 km, in some cases across oceanic ridges and trench-abyss transitions. Contrastingly, there was a clear signal for geographic population structure coinciding with the east-west division of the Atlantic by the MAR as well as with the abyss-hadal zonation. These results support the hypotheses that depth gradients as well as oceanic ridges reduce dispersal even though barriers may not be absolute. Additionally, positive correlation between genetic- and geographic distances showed that the vast size of the deep sea itself is a factor responsible for creating diversity.