SPATIAL AND TEMPORAL DISTRIBUTION PATTERNS OF MEGABENTHIC TAXONOMIC COMPOSITION AND FUNCTIONAL TRAITS IN EURASIAN-ARCTIC SEAS

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Understanding how biodiversity distribution patterns of marine biotas vary across multiple spatial gradients and scales is of great importance for informing basic research and developing sound conservation and sustainable-use management policies. Such understanding should consider both taxonomic and functional aspects. Here, the distribution of 164 megabenthic taxa (141 species and 23 genera), collected from trawl catches at a total of 2,869 locations distributed across Eurasian-Arctic shelf seas (Barents, White, Kara, Laptev and East Siberian Seas) between 1848 to 2003, have been analyzed. In addition to taxonomic composition and diversity, functional characteristics of the fauna were assessed with regard to 16 morphological, life-history, and behavioral functional traits of the taxa, with a total of 70 fuzzy-coded modalities, at four spatial gradients (regional (overall), bathymetric, regional (shelf only), latitudinal/longitudinal) and two temporal scales (seasonal, semi-centennial). The megabenthic fauna was taxonomically characterized by the predominance of arthropods, mollusks, echinoderms and polychaetes, corroborating previous findings from the study. Functionally, the fauna was dominated by taxa with laterally compressed body forms, chitinous skeletons, sexual brooding, benthic/direct larval development, free-living habits, burrowing adult movement, low mobility, predatory feeding habit, primary consumer trophic level, soft substratum affinity, surface deposition bioturbation, low tolerance, epibenthic environmental position, shelf depth range, and Arctic-boreal distribution. Functional diversities varied less than taxonomic diversity along all spatial gradients and temporal scales considered in this study, and benthic assemblages were more homogeneous in functional than in taxonomic terms. This difference has important ecological implications and can help to better understand the important coupling between pelagic and benthic food webs, the role of environmental drivers of benthic diversity patterns, and the vulnerability to natural and anthropogenic disturbances, especially those related climate change.