Spatial pattern of spring phytoplankton community in the coastal waters of northern Zhejiang, East China Sea

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The spatial pattern of phytoplankton community can indicate potential environmental variation in different water bodies. In this context, spatial pattern of phytoplankton community and its response to environmental and spatial factors were studied in the coastal waters of northern Zhejiang, East China Sea using multivariate statistical techniques. Results showed that 94 species belonging to 40 genera, 5 phyla were recorded (the remaining 9 were identified to genus level) with diatoms being the most dominant followed by dinoflagellates. Hierarchical clustering analysis (HCA), nonmetric multidimentional scaling (NMDS), and analysis of similarity (ANOSIM) all demomstrated that the whole study area could be divided into 3 subareas with significant differences. Indicator species analysis (ISA) further confirmed that the indicator species of each subarea correlated significantly with specific environmental factors. Distance-based linear model (Distlm) and Mantel test revealed that silicate ($SiO_3 2-$), phosphate (PO43-), pH, and dissolved oxygen (DO) were the most important environmental factors influencing phytoplankton community. Variation portioning (VP) finally concluded that the shared fractions of environmental and spatial factors were higher than either the pure environmental effects or the pure spatial effects, suggesting phytoplankton biogeography were mainly affected by both the environmental variability and dispersal limitation. Additionally, other factors (eg., trace metals, biological grazing, climate change, and time-scale variation) may also be the sources of the unexplained variation which need further study.