植物プランクトンの成長制限に基づく全球海洋の生物地球化学的区分
Biogeochemical classification of the global ocean based on phytoplankton growth limitation

*橋岡 豪人[1]、平田 貴文[2]、野口 真希[1]、千葉 早苗[1]
*Taketo Hashioka[1], Takafumi Hirata[2], Maki Noguchi[1], Sanae Chiba[1]

1.国立研究開発法人 海洋研究開発機構、2.北海道大学
1.Japan Agency for Marine-Science and Technology, 2.Hokkaido University

A biological province provides an integrated view of regional characteristics of marine ecosystem and surrounding environment. Various definitions of biological province have been proposed based on regional differences in seasonal variation of satellite derived chlorophyll-a concentration and physical environments represented by temperature and salinity. In this decade, several new biogeochemical data that characterize regional difference in marine ecosystem became available. One is an estimation of phytoplankton community structure from satellite observation. Another is an estimation of limitation factors of phytoplankton growth from modeling studies. Particularly, nutrient limitations characterize regional difference in biogeochemical mechanism, while temperature and light dependencies mainly characterize a latitudinal difference in phytoplankton growth. In our study, we propose a new biogeochemical classification as a combination between the global distributions of the dominant phytoplankton group and their nutrient limitation. Namely, our provinces provide information what type of phytoplankton is dominant/coexist in each region and what type of nutrient limitation is controlling the phytoplankton growth. To obtain a climatological view of nutrient limitation, we used not a specific model result, but a diagnostic estimation based on a classical relationship of nutrient limitation (Michaelis-Menten formula) with observed macronutrients from World Ocean Atlas 2013 and a multi-model median of iron/ammonium concentration from model intercomparison projects, Coupled Model Intercomparison Project (CMIP5) and MARine Ecosystem Model Intercomparison Project (MAREMIP). Based on our classification, it revealed that the background mechanism, i.e., limitation factor of phytoplankton growth, is regionally different even if the same type of phytoplankton dominates. On the other hand, even in the geographically separated regions that recognized as the different provinces in the previous studies based on chlorophyll variability, the similarity in biogeochemical mechanism among provinces has been found. This result suggests that the regions with different mechanism potentially responds to climate change differently, even if the current ecological property seems the same between provinces.

キーワード：海洋生態系、生物地球化学的海洋区、生態系モデリング
Keywords: Marine Ecosystem, Biogeochemical provinces, Ecosystem Modeling