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学 位 論 文 内 容 の 要 旨

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学 位 論 文 題 名

Spatial variation in community dynamics in intertidal sessile assemblages (岩礁潮間帯固着生物群集における群集動態の空間変異)

One of the essential issue in ecology is to reveal the causes and consequences of temporal variability in assemblages sharing the same resources. In this study, I examined the spatial variation in community dynamics and its processes by analyzing decadal time series data of rocky intertidal sessile assemblages along the Pacific coast of eastern Hokkaido, Japan.

In chapter2, I examined two fundamental questions in community ecology regarding the relationship between seasonal changes in community structure and environmental gradient: (i) How does the magnitude of seasonal changes in community structure vary along an environmental gradient? (ii) How do the processes driving seasonal changes in community structure vary along an environmental gradient? I found that the magnitude of seasonal changes in community structure was the largest at mid shore. The major processes driving seasonal changes in community structure changed vertically, reflecting the indirect influence of vertical distributions of species. An unexpected finding was that the magnitude of seasonal changes in community structure did not reflect the strength of seasonal variation in the physical environment.

In chapter3, I examined the underlying mechanisms of compositional dynamics of intertidal sessile assemblages and its spatial variation by parameterizing discrete Lotka-Volterra model. I found that compositional dynamics was under strong regulation by intraspecific density-dependence. I also found that the spatial variation in the compositional dynamics largely depended on community-wide magnitude of stochasticity mainly caused by environmental stochasticity. These results suggest that even if the community is under strong regulation by density dependence, properties of community dynamics, such as the compositional turnover and the temporal compositional variance, largely depend on environmental stochasticity.

The implications of this study are twofold. First, the vertical pattern of seasonal changes in community structure more strongly reflects the indirect influence that vertical changes in the physical environment have on the vertical distribution of species than the direct effect caused by vertical differences in the physical environment. Second, even if the community is under strong regulation by intraspecific density dependence, properties of community dynamics, such as the compositional turnover and the temporal compositional variance, largely depend on environmental stochasticity.