

Island-mass effect on the phytoplankton and zooplankton community in south of Japan

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The Izu Ridge brings high plankton production via its island-mass effect, which brings up subsurface nutrients to surface layer. Previous reports on island-mass effect around the ridge have been based on observation in the summer-early autumn and reports in spring, when many small pelagic fish species spawn, are scarce. As the Kuroshio flow through the ridge, island-mass effect on zooplankton, which takes more time to grow than phytoplankton, should be appear in eastern (downstream) area. Thus wider area around the ridge should be examined for the effect on zooplankton. In the present study, we examined island-mass effect of the Izu-Ridge on phytoplankton and zooplankton, based on satellite data and zooplankton data in the broad area south of the Honshu.

The Sea surface chlorophyll concentration (SSChl, MODIS-Aqua) in the area bounded by 135.5-142.0 E and 30.0-37.0 N was examined for the grids with depths of > 500 m. Zooplankton samples were collected by vertical tow (0-150 m) of the NORPAC net with 0.335 mm mesh in the area south of Honshu in February to March of 1963-2017. Samples were fixed in 5% formalin-sea water and copepod biomass was estimated in the laboratory by Bench-top Video Plankton Recorder. The relationships between plankton biomass and distance to the Honshu coast and to the Izu Ridge were examined.

The SSChl declined as distance to the Honshu coast increased. But high SSChl was observed in several areas 150-250 km away to the coast. These areas were mainly located around the Izu Ridge, 32-33.5N, and interpreted as caused by island-mass effect when the Kuroshio flowed in offshore path. The copepod biomass was high around the Honshu coast (<50 km). Stations with high copepod biomass were observed in the 100-200 km north-east (downstream) of the Izu Ridge, but they were located near the Honshu, around the Boso peninsula. Island-mass effect of the Izu-ridge on zooplankton biomass thus cannot be distinguished from the coastal effect and the effect should be examined by rate process (spawning rate and/or growth rate) in species level.

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