

Effects of nutrient supply with strong turbulent mixing on lower-trophic level ecosystem around the Tokara strait

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In recent years, the effects of nutrient supply with strong turbulent mixing on the lower-trophic level ecosystem have received a lot of attention around the Tokara strait, where many seamounts and small islands exist within the route of the Kuroshio in the East China Sea. To investigate these effects, we conducted Lagrangian observations along the Kuroshio from the upstream of the Tokara Strait to the downstream in the autumn of 2017 and 2018. We also investigated responses of phytoplankton assemblages to various nutrient supplies by incubation experiments. The incubation experiments showed significant growth of phytoplankton under the nutrient conditions supplied by the turbulent mixing around Tokara. Although biomass and large-sized fraction of phytoplankton observed in the downstream were higher than those in the upstream, the phytoplankton assemblages in the downstream were affected not only by the turbulent mixing but also by the intrusion of coastal water. Therefore we estimated fractions of the coastal water intruded in the downstream by salinity differences with assuming isopycnal mixing, and removed them to clarify the effects of the turbulent mixing. The biomass of phytoplankton removed the effects of coastal water were smaller than those expected by the incubation experiments without meso-zooplankton grazing. The phytoplankton biomass reduced in the downstream might be due to the meso-zooplankton grazing, and the nutrients supplied with the turbulent mixing might be contributed to maintain meso-zooplankton biomass in the downstream regions.

Keywords: Nutrient, Phytoplankton, Turbulent mixing, East China Sea