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Distribution of chlorophyll *a* in the Yellow Sea

Cho SungHwan · Lee Yoon* · Yoon WonDuk* · Lim DongHyun*

National Fisheries Research and Development Institute (WSFRI) KunSan Labs
*National Fisheries Research and Development Institute (WSFRI)

Introduction

Phytoplankton communities are generally dominated by diatoms in spring and changed to nano- and picoplankton or dinoflagellates groups in summer (Anderson *et al.*, 1994). Many phytoplankton investigators have been used to chlorophyll a as a phytoplankton biomass, as all the phytoplankton contain (Cullen, 1982). The studies of population compositions, primary productivity, chlorophyll a of phytoplankton in the Yellow Sea have been conducted mainly in bays and estuaries with a few studies in the central area of Yellow Sea. This study is to understand the relationship between the environmental factors and chlorophyll a concentration of phytoplankton in terms of the area and depth in the Yellow Sea and also to identify the characteristics of phytoplankton populations occurring at the most productive periods throughout the year.

Material and Methods

The physicochemical data and phytoplankton samples were taken at 52 stations in the central area of Yellow Sea from August 1996 through August 2000 with bimonthly interval. Temperature and salinity were measured by CTD (Sea Bird Electronics, Model SBE 19, and Guildline Model 8710). One liter water samples was taken at each depth for chlorophyll a concentrations, filtered with membrane filter paper (pore size 0.45 ㎛, diam. 47 mm, MFS Co.) and measured by spectrophotometer (Cary 1E, Varian) after the acetone extraction. For th phytoplankton species composition and density estimation another one liter water sample was also taken at surface and preserved with Lugol solution.

Result and Discussion

Sampling sites are devided into three groups by the distance from the coastal lines; mixing, middle and stratified area. Generally higher chlorophyll concentration were found in the mixing with a low yearly variations. Mean values of chlorophyll a at surface water in the mixing zone ranged from 0.10 to 11.32$\mu g\ \ell^{-1}$ with an average of 3.23±3.39$\mu g\ \ell^{-1}$. An extensive high concentration was found below the surface ranging from 0.31 to 5.81$\mu g\ \ell^{-1}$ from April through August. However, significantly lower concentrations were found in the stratified area with an avergae of 1.64±2.03$\mu g\ \ell^{-1}$at surface to 20m depth. Clear peaks of chlorophyll in this area has not been observed since 1999.

Phytoplankton compositions also showed high seasonal variations in the study area. In April 1997, benthic diatom, *Paralia sulcata* dominated in the mixing area. Dinoflagellate *Alexandrium* sp. and *Protoperidinium* spp., and diato *Skelatonema costatum* dominated in the stratified area. In August diatom *Eucam zodiacus*, *S. costatum* and *Chaetoceros* spp., dinoflagellate *Prorocentrum compr* dominated in the mixing and stratified area, respectively. Mixing area in April 1998 was dominated by *P. sulcata, Alexandrium* sp. and diatom *Nitzschia delicatiss Thalassiosira* spp. *Chaetoceros* spp. in the stratified area. In August *Chaetoceros* silicoflagellate *Dictyocha speculum*, diatom *Guinardia flaccida* dinoflagellate *Scripps trochoidea*, diatom *Cylindrotheca closterium*, *N. delicatissima* dominated in the m and stratified area, respectively.

The contributions of size-fractionated chlorophyll concentration to the tota were identified in 1998. Netplankton over 20μm represented more than 50% in all the area in April. This group in the mixing area also represented more than 40% in June and August but their contributions decreased to 26% in the stratified area. After June the contribution of picoplankton (<3μm) in the stratified area increased gradually and showed a peak (>73%) in August. by these observations we can conclude that netplanktons (>20μm) are major component of phytoplankton biomass in the Yellow Sea. However, picoplanktons (<3μm) dominated in the stratified area. This indicated the small sized picoplanktons are competitive under the increased water temperature and irradiance, and low nutrient concentrations (Agawin et al., 2000).

References

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