

Inter-annual changes in summer phytoplankton community composition in relation with water mass variability in the East China Sea

*QIAN XU¹, Chiho Sukigara^{9,2}, Joaquim I. Goes^{3,2}, Helga do Rosario Gomes^{3,2}, Yuanli Zhu², Shengqiang Wang⁴, Anglu Shen⁵, Eligio de Raus Maure², Takeshi MATSUNO⁶, Yuji Watanabe⁷, Sinjae Yoo⁸, Joji Ishizaka²

1. Nagoya University, 2. Institute for Space-Earth Environmental Research, Nagoya University, 3. Lamont Doherty Earth Observatory, Columbia University, 4. Nanjing University of Information Science & Technology, 5. East China Sea Fishery Research Institute, Chinese Academy of Fishery Science, 6. Research Institute for Applied Mechanics, Kyushu University, 7. The General Environmental Technos Co., LTD, 8. Korea Institute of Ocean Science and Technology, 9. Center for Marine Research and Operations, Tokyo University of Marine Science and Technology

Surface distribution of phytoplankton communities were investigated in July 2009, 2010, 2011 and 2013 in the mid-shelf East China Sea (ECS) which comes under the influence of Changjiang River Diluted Water (CDW) and the Kuroshio current. Phytoplankton distribution based on CHEMTAX analysis of HPLC-pigments revealed the dominance of cyanobacteria and prochlorophytes in the eastern ECS which was perennially under influence of the oligotrophic Kuroshio surface water in all four years. Towards the west, in the mid-shelf ECS, the composition of phytoplankton communities varied from year to year. Diatoms dominated in 2009 and 2013 when dissolved inorganic phosphate (DIP) concentrations were higher than during the other two years. On the other hand, cyanobacteria, chlorophytes and other groups composed a mixed population of phytoplankton during the high-nitrate-years of 2010 and 2011. Cluster analysis based on the information of phytoplankton community composition, together with PCA analysis of shipboard hydrographic, nutrient and biological data for all four years helped confirm that summer phytoplankton community structure of the ECS is regulated by mixing of water masses and variability of nutrient status within them. Our results show that elevated DIP concentrations favor the growth of diatoms and dinoflagellates. The primary pathway for DIP inputs in all probability being via upwelling induced by the on-shelf intrusion of Kuroshio Intermediate Waters along the coast of China, and eastward advection of DIP-rich CDW with phytoplankton blooms lead to variations on phytoplankton compositions in the mid-shelf ECS.

Keywords: phytoplankton community, the East China Sea, Changjiang diluted water, phosphate limitation, inter-annual variations