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Influence of nutrient fluxes on phytoplankton community and harmful algal blooms along the coastal waters of southeastern Arabian Sea

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Abstract

The seasonal variation in phytoplankton composition as well as the influencing factors on phytoplankton community were examined for the coastal waters of Kochi, southeastern Arabian Sea during 2015. The elevated flux of total nitrogen (TN) and silica (Si) during the summer monsoon (SM) induced the harmful algal blooms (HABs) of *Scrippsiella trochoidea* ($11.9 \times 10^5 \text{ cells L}^{-1}$) and *Karenia mikimotoi* ($6 \times 10^5 \text{ cells L}^{-1}$) near the inlets of Kochi estuary. Blooms of *S. trochoidea* were recorded for the first time in the Indian waters. The satellite data of chlorophyll-*a* showed the significant correlation with insitu observations of phytoplankton abundance and provided a better understanding of the spatio-temporal distribution. The canonical correspondence analysis indicates that the increased TN and Si fluxes and lower temperature induced the HABs during the SM. The reduction in the load of N and Si in the coastal waters of southeastern Arabian Sea is essential for controlling the HABs.

Keywords: Harmful algal bloom, Nutrient flux, *Scrippsiella trochoidea*, Coastal water, MODIS Aqua, Arabian Sea

1. Introduction

Phytoplankton are an important component of the aquatic food chain and because of their spontaneous response to changes in environmental conditions, nutrient composition and anthropogenic stress they are often used as ecological indicators (Cloern, 1996; Sin et al., 1999; Lawrenz et al., 2013; Sathicq et al., 2016). Anthropogenic activities in and around the coastal areas are increasing rapidly and pose a threat to the aquatic ecosystems (Diaz and Rosenberg, 2008; Mangalaa et al., 2017). Many estuarine-coastal systems are shifting from nitrogen (N) limitation to an N surplus because of anthropogenic inputs ultimately leading to eutrophication (Bricker et al., 1999). Worldwide, aquatic ecosystems have been negatively

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