

Comparison of spatiotemporal variety between *in-situ* and remote surface chlorophyll in the northern South China Sea

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The chlorophyll *a* (Chl) plays an important role as an indicator to assess phytoplankton biomass in the ocean. Many studies determine the amount of biomass and the level of primary production based on Chl concentrations. However, the difference between *in-situ* and remote Chl values may be influenced by specific factors of time and space. There will be cause an ambiguity in depicting of the marine biogeochemical cycle, if only a remote Chl is used to explore the marine biogeochemistry. Therefore, we conducted 10 cruise from February 2013 to November 2019 at the northern South China Sea (NSCS), collected and analyzed wide covers of surface Chl to assess diversities of *in-situ* and remote Chl. The measured/remote values of Chl in spring, summer, autumn and winter were $0.12 \pm 0.09 / 0.18 \pm 0.01$, $0.22 \pm 0.02 / 0.14 \pm 0.24$, $0.12 \pm 0.01 / 0.11 \pm 0.02$ and $0.28 \pm 0.23 / 0.38 \pm 0.32 \text{ mg m}^{-3}$. The measured surface Chl in summer and winter are higher than the seasons of spring and autumn; the remote Chl is higher in spring and winter than in the seasons of summer and autumn. We can infer that the prevalence of the northeast monsoon and extreme weather events (e.g. typhoons, internal waves) may be main reasons to cause the elevated Chl in winter and summer, respectively. It implies that the satellite data cannot fully reflect the real natures. The measured/remote values in the shelf, slope and basin were $0.26 \pm 0.18 / 0.22 \pm 0.08$, $0.23 \pm 0.15 / 0.20 \pm 0.06$ and $0.18 \pm 0.09 / 0.18 \pm 0.05 \text{ mg m}^{-3}$. Although, the trend of Chl derived from field-measured and remote-sensed are quite similar, the difference of Chl from *in-situ* and remote in the region of shelf is more apparent than in other areas. It may result from the influence of topography. Our preliminary research shows that the spatiotemporal variety between *in-situ* and remote surface Chl is quite significant and the further utilization of remote Chl needs to be calibrated in the NSCS.

Keywords: chlorophyll, satellite, northern South China Sea