Year-to-year variation in chlorophyll-*a* concentration in the Bohai Sea

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1. Introduction

The year-to-year variation in nutrient concentration in the Bohai Sea related to that in the Yellow River discharge has been investigated (e.g.Hayashi et al., 2004) but that in chlorophyll-*a* concentration in the Bohai Sea has not been clarified yet. We reveal the year-to-year variation in chlorophyll-*a* concentration in the Bohai Sea using SeaWiFS data from 1998 to 2005 in this paper.

2. Satellite data

The horizontal and temporal resolutions of SeaWiFS data are 1.1 km x 1.1 km and 1 day, respectively. The usual algorism for estimation chlorophyll-*a* concentration from the visible band signals of SeaWiFS (for open sea water) is not available in the Bohai Sea because the water in the Bohai Sea is not Case I water (open sea water) but Case II water (turbid coastal water). Therefore we make the much-up data for obtaining the calibration curve to estimate the sea-surface chlorophyll-*a* concentration in the Bohai Sea from SeaWiFS data based on our observations in 2004 and 2005 and Gao et al. (2003) (Fig.1).

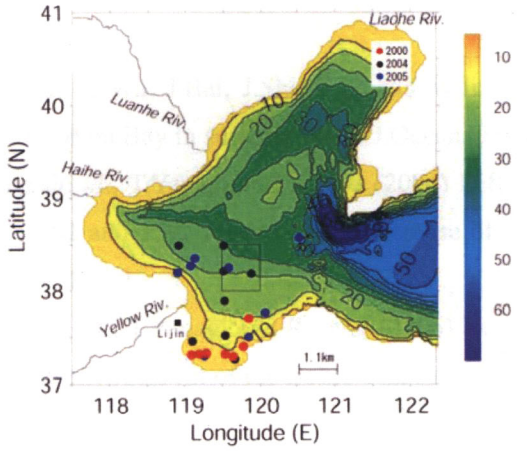

Fig.1 Observation points of sea surface chlrophyll-*a* in the Bohai Sea.

Correlation between observed chlorophyll-*a* and estimated chlorophyll-*a* by the usual algorism of SeaWiFS before or after 4 days of field observation is shown in Fig.2.

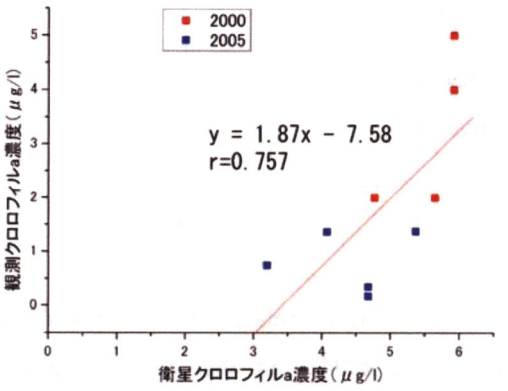

Fig.2 Correlation between observed chlorophyll-*a* and estimated chlorophyll-*a*.

3. Results

By using the calibration line shown in Fig.2, we estimate the sea surface chlorophyll-*a* concentration in the squared area shown in Fig.1 in the central part of the Bohai Sea from the SeaWiFS data in oder to avoid high turbid water around the Yellow River mouth.

The year-to-year variation in the estimated sea-surface chlorophyll-*a* in the central part of the Bohai Sea is shown in Fig.3 with that in Sea Surface Temperature (SST), solar radiation and Yellow River discharge.

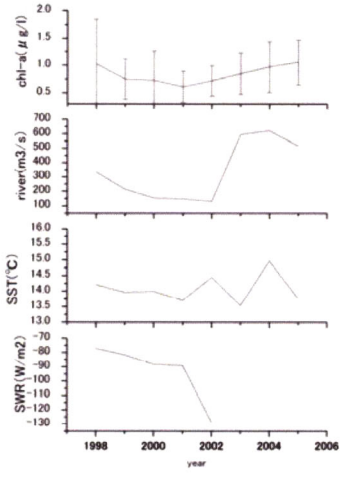

Fig.3 Year-to-year variations in sea-surface chlorophyll-*a* in the Bohai Sea, Yellow River discharge, SST and solar radiation in the Bohais Sea.

The year-to-year variation in the sea-surface chlorophyll-*a* does not have good correlation between those of SST and solar radiation but it has a good correlation to that of the yellow River

discharge from Fig.3. This is due to that the Yellow River discharge controls the nutrient (Dissolved Inorganic Phosphorus; DIP) concentration in the Bohai Sea as shown in Fig.4 and DIP is the limiting factor of primary production in the Bohai Sea (Hayashi et al., 2006), that is, large (small) river discharge results in high (low) DIP and high (low) chlorophyll-*a* concentrations in the Bohai Sea.

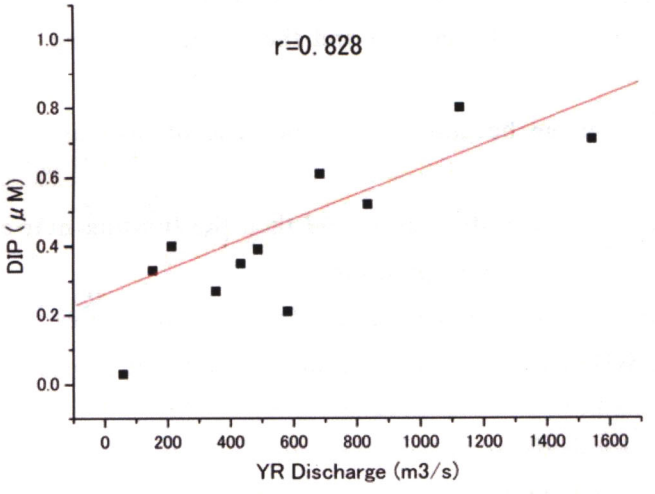

Fig.4 Correlation between DIP in the Bohai Sea and the Yellow River discharge.

3. Conclusion

When the Yellow River discharge is large (small), DIP concentration becomes high (low) in the Bohai Sea and it results in high (low) sea-surface chlorophyll-*a* concentration in the Bohai Sea.

References

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