

Mechanism of red tide outbreaks in winter in Ariake Sea

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Aquaculture of fishery resources has been conducted in coastal waters all over the world. In Ariake sea, a region of freshwater influence (ROFI) in Japan, the aquaculture of *Porphyra yezoensis*, namely "Nori", an important fishery resource in Japan, has been conducted in great magnitude during autumn and winter. Its catch amount here is the largest in Japan. Red tide outbreaks frequently occur with the increase in transparency during the aquaculture season, which causes color bleaching of the "nori" and prevents stable production, especially in western area of the inner Ariake Sea. The objective of the present study is to clarify the mechanism of red tide outbreaks in Ariake Sea using numerical simulation and the observed data. The results of numerical simulation revealed that the sea water residence time was long in the area where red tides frequently occurred. There was a high correlative relationship between red tide index (cell number \times duration time) and the water residence time. On the other hand, growth rate of a representative diatom : *Eucampia zodiacus* hardly has a correlation with the red tide index. Numerical simulation results inferred that *Porphyra Yezoensis* aquaculture promoted the red tide outbreaks by increasing the water residence time.

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