学位論文内容の要旨

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学 位 論 文 題 目

北太平洋温帯域から寒帯域における麻痺性貝毒原因渦鞭毛藻
Alexandrium tamarense の生理生態学的研究

To understand the growth dynamics of the toxic dinoflagellate *Alexandrium tamarense*, the occurrences of this species were investigated in Osaka Bay, Funka Bay, eastern Bering Sea shelf and Chukchi Sea. The research areas ranged from the almost southernmost to the northernmost point of its distribution in the northern hemisphere.

In the Osaka Bay, monthly changes of the *A. tamarense* vegetative cells and environmental factors were investigated at two fixed stations from January to May 2008. In addition to the field observations, a bioassay with *A. tamarense* axenic monoculture was carried out to specify the growth limiting nutrient in the bay. As a result, higher densities of *A. tamarense* and depletions of PO_4-P and SiO_2-Si were observed in surface layer in spring. The bioassay suggested that phosphorous limited *A. tamarense* growth at surface water during March and April while nitrogen-limitation at bottom water. These conditions were suggested to allow only *A. tamarense* to utilize limited nutrients by diel vertical migration, while competing diatoms were limited their growth by the lack of P or Si in surface layer.

In the Funka Bay, the changes of the spatial abundance and distribution of the toxic dinoflagellates *A. catenella/tamarense* cysts were investigated before The 2011 Tohoku Earthquake and the huge Tsunami (August 2010) and after the Tsunami (May 2011, August 2011, May 2012 and August 2012). The occurrence of *A. catenella/tamarense* vegetative cells was also investigated after the Tsunami. As a result, a significant increase of the cysts was observed after the Tsunami. Furthermore, *A. tamarense* bloom and toxin contamination of scallops occurred in Funka Bay in 2011. These results strongly suggested that the mixing of the bottom sediments by the Tsunami caused the accumulation of the toxic *Alexandrium* cysts in the surface of bottom sediment through the process of redeposition in the Funka Bay. Moreover, this cyst deposition was thought to contribute to the toxic bloom formation as a seed population in 2011 spring.

Occurrences of abundant *A. tamarense* cysts were first revealed from the eastern Bering Sea Shelf and Chukchi Sea, Arctic Ocean. In addition, as a result of the analysis of seawater samples collected from the 166ºW transect in the eastern Bering Sea shelf for six years (2004, 2005, 2006, 2009, 2012 and 2013), high densities of *A. tamarenese* were detected in the Middle Shelf Domain during the warm period by the climate regime shift. By the survey in Chukchi Sea shelf in the summer of 2013, *A. tamarense* bloom was detected from the offshore of the Point Hope where Pacific Water and ice melt water mixed. These results suggested that the recent warming by the climate regime shift and global warming has contributed to the bloom occurrences of *A. tamarense* in the eastern Bering Sea and Chukchi Sea.