

## Seasonal and interannual variations in calcium carbonate saturation state in Tokyo Bay

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Calcium carbonate saturation state ( $\Omega$ ) was observed at 2 stations in Tokyo Bay from April 2011 to December 2017, on a monthly basis.  $\Omega$  was high in summer surface water and low in summer bottom water. Biological uptake of  $\text{CO}_2$  and remineralization of organic matter was a main cause of the seasonal variation of  $\Omega$  in surface and bottom waters, respectively. Freshwater input and warming/cooling also alters  $\Omega$  in Tokyo Bay. Aragonite undersaturation was observed in bottom water in August 2013 and July 2014. These coincided with periods when hypoxic conditions were observed for about 2 weeks. Analysis of  $\text{pCO}_2$  and AOU indicate that undersaturation was caused by regeneration of massive organic matter, including denitrification process. This study revealed seasonal and interannual variations in  $\Omega$  and their controlling factors. It was also found that benthic organisms in Tokyo Bay have been already experiencing episodic aragonite undersaturation.

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