

Searching 18.6 year tidal modulation impact in a global gridded ocean oxygen dataset with its improvements

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The 18.6 year modulation of tidal mixing plays important roles in the ocean as reported by regional analyses by Osafune and Yasuda (2006, 2010) and others. In those studies, they found that ocean water properties including dissolved oxygen concentration vary at the 18.6 year period in a manner consistent with the vertical mixing changes due to the tidal mixing modulation. Dissolved oxygen concentration is interesting not only as a tracer but also because it is important in marine ecosystems. In particular, superposition of 18.6 year variability in addition to the oxygen decline trend known as the ocean deoxygenation due to the global warming can cause more serious damages for marine animals in the specific phase of tidal modulation.

The present study aims to understand the impacts of 18.6 year tidal mixing modulation in the ocean oxygen field more systematically than the previous studies did by analyzing a global gridded dataset of dissolved oxygen concentration. A preliminary analysis using the dataset used by Ito et al. (2017 GRL) for upper 1,000 m indicates that the 18.6 year variation of oxygen concentration also occurs in regions where previous studies did not reported tidal modulation influence, including a region near the Izu-Ogasawa Ridge. In order to obtain the better spatial and temporal coverage, the dataset is and will be improved with two steps. One is to expand its vertical coverage to the top 1,000 m to 6,000 m, and the other is to use the latest version of the World Ocean Database released in September 2018. The first step has been completed, and the second step is planned to be completed in this summer. At the presentation, the analysis results based on the latest gridded dataset will be shown.

Keywords: decadal variability, biogeochemistry, climate variability and change