



Seasonal variations in triple oxygen isotopes and gross oxygen production in the Sagami Bay, central Japan

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ABSTRACT: We studied daily, diurnal, and seasonal variations in triple oxygen isotopes in the Sagami Bay from May to October 2002. The variations in composition of triple oxygen isotopes are in association with changes in concentrations of dissolved oxygen (DO) and chlorophyll *a* (Chl *a*). The lowest $^{17}\Delta$ anomaly (excess ^{17}O) was found during October and the highest in August. There was a prominent subsurface $^{17}\Delta$ anomaly maximum during June and August because of photosynthesis below the mixed layer and reduced gas exchange. The $^{17}\Delta$ anomaly was positively correlated with DO and Chl *a*, but with large scatter. The gross oxygen production (GOP) computed on the basis of triple oxygen isotopes is almost double the value given by the standard oxygen incubation method. This could possibly be because of inability to measure O_2 uptake rates in the light bottle and the consequent assumption that respiration is the same in light and dark bottles. GOP measured by a fast repetition rate fluorometer showed large daily variability, whereas GOP given by the $^{17}\Delta$ anomaly is within daily variability. This suggests that the $^{17}\Delta$ anomaly method measures average GOP over the residence time of DO in the mixed layer.

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