

## ***Interactive comment on* “The influence of decadal oscillations on the oxygen and nutrient trends in the Pacific Ocean” by Lothar Stramma et al.**

### **Anonymous Referee #2**

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First, I am a physical oceanographer with insufficient knowledge on biogeochemistry, so I am not confident if I can properly judge this manuscript.

Biogeochemical measurements are definitely more difficult than physical ones, and the time series in each region shown in the manuscript must be valuable themselves. Nevertheless, Secs. 3.2 through 3.4, which should be the main result of this manuscript (inferred from its title), shows rough analyses with little plausible physical mechanisms. My biggest question is, in Sec. 3.2, why the authors show a linear trend for the whole period after 1976 (Fig. 3 and other figures) although they state that “the period 1998 to 2013 is dominated by negative seasonal mean PDO indices and is typically considered as a cool (negative) PDO phase” (Page 5, Line 3-5). If they are to see the relation between the biogeochemical variability and PDO, don't they need to calculate the trend

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for each of three periods (-1976, 1977-1998, and 1998-2013)? Furthermore, although “it is expected that during cold PDO phases the oxygen will decrease and the nutrients increase in the eastern equatorial and tropical Pacific, while during warm PDO periods the oxygen should increase and the nutrients decrease” (Page 13, Line 11-13), the observed trends in areas E, D, G were opposite. So, what is the mechanism? As a non-expert in this field, I feel a bit hard to find what the new findings of this manuscript are.

Other comments:

Sec. 2.1: Subtropical cell (STC) is an ocean circulation component and is not temporospatial variability. Therefore, I feel odd to see that STC is aligned with climate variability such as PDO, NPGO, and ENSO as a controlling factor.

Sec. 2.2: The authors' data do not cover the western part of the North Pacific Ocean (Fig. 2). Why not the authors use the 137E repeat hydrographic section maintained by the Japan Meteorological Agency since 1967 although one of them belongs to the agency? With high temporal resolution and large spatial (meridional) extent, the section is expected greatly to fill the data gaps.

Page 14, Line 19-20, “probably caused by water masses propagating by 5 to 15 years from Oyashio region into this part of the North Pacific”: why do the authors consider horizontal advection for the area P only?

Secs. 3.2-3.4: If the authors are to extract decadal variability superimposed on the long-term trend (Sec. 3.1), it is better to examine the time series after subtracting the long-term trend.

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