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*Supplement of*

## **Projections of oceanic N<sub>2</sub>O emissions in the 21st century using the IPSL Earth system model**

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1 The  $O_2$  modulating function  $f(O_2)$  in P.OMZ is defined as,

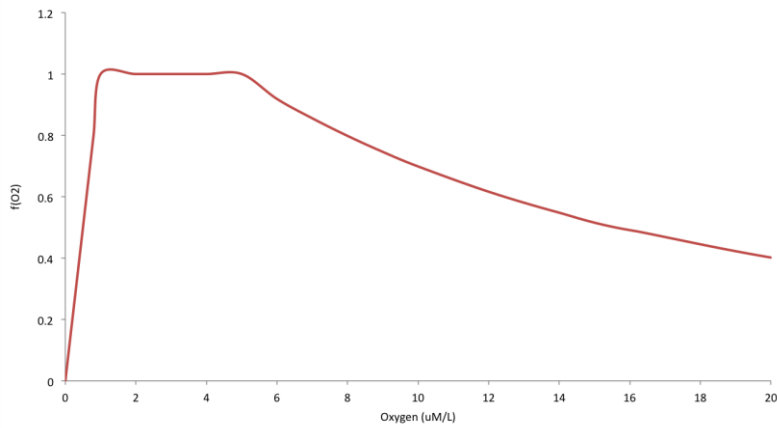
$$f(O_2) = \begin{cases} \frac{O_2}{O_2^{*1}} & O_2 < O_2^{*1} \\ 1 & O_2^{*1} < O_2 < O_2^{*2} \\ 0.7 \cdot \exp - 0.5(O_2 - O_2^{*2})/O_2^{*2} + \\ 0.3 \cdot \exp - 0.05(O_2 - O_2^{*2})/O_2^{*2} & O_2 \geq O_2^{*2} \end{cases}$$

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3 where  $O_2^{*1}$  is  $1 \mu\text{mol L}^{-1}$  and  $O_2^{*2}$  is  $5 \mu\text{mol L}^{-1}$ . The shape of the function is shown in Fig. S1.

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5 Fig. S1: Oxygen modulating function  $f(O_2)$  in the low- $O_2$  production pathway term included  
6 in P.OMZ from Goreau et al. (1980).

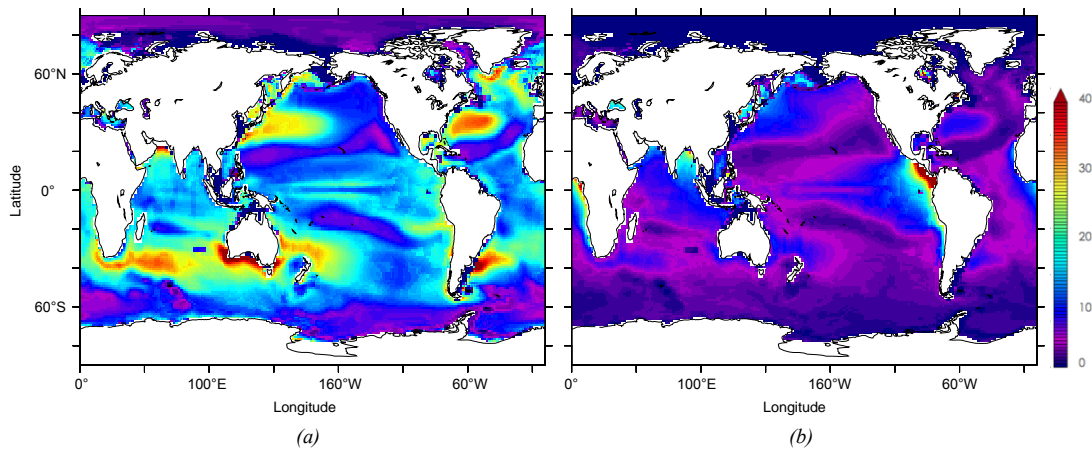


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9 Fig. S2: Vertically integrated (a) high- $O_2$  and (b) low- $O_2$  production pathways (in  $\text{gN m}^{-2} \text{yr}^{-1}$ )  
10 in P.OMZ for the averaged 1985 to 2005 historical simulation.

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