



## **Interannual to interdecadal variations of the lower trophic ecosystem and air-sea CO<sub>2</sub> flux in the North Pacific using a 3-D NEMURO model**

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Interannual to interdecadal variations in the physical environment affect marine ecosystems by altering nutrient supply (both across the thermocline and via isopycnal advection). To examine such physical-biological coupling, we embedded NEMURO (North Pacific Ecosystem Model Used for Regional Oceanography; developed by MODEL Task Team of PICES (North Pacific Marine Science Organization)) into a three-dimensional OGCM; CCSR Ocean Component Model (COCO) ver.3.4, and investigated the interannual to interdecadal climate variations in dynamics of the lower trophic ecosystem related to climate regime shift and/or ENSO, using data from 1948 to 2002.

Comparing mean values before and after the late 1976/77 climatic regime shift, primary production decreased in the Oyashio region, subtropical western and eastern Northern Pacific and the Bering Sea, but increased in the central North Pacific. This corresponds to the Pacific Decadal Oscillation (PDO) that indicates interdecadal climate variability in the sub-tropical and tropical Pacific. In the central North Pacific biomass correlates positively with PDO index, while that in the eastern and western North Pacific correlates negatively with PDO.

The model exhibits interannual variability of air-sea flux of CO<sub>2</sub>, which is positively correlated with primary production, i.e., oceanic uptake of CO<sub>2</sub> is high when primary production is high. We will also show the results from the control run which does not include anthropogenic CO<sub>2</sub> increase.