**Enhancement of chlorophyll-*a* concentration south of Luzon Strait induced from bio-physical interaction during the PDO cold phase**

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***ABSTRACT***

A region of high sea surface chlorophyll-*a* concentration exists along the coast of northern Luzon Island, south of the Luzon Strait, based on a 20-year average. This target region lies west of the Kuroshio main route and east of the South China Sea (SCS). Monthly MODIS-Aqua level-3 data from August 2002 to August 2022 show that surface chlorophyll-*a* concentrations in the target area are significantly higher during the Pacific Decadal Oscillation (PDO) cold phase (negative PDO index) compared to the PDO warm phase (positive PDO index), up to 0.4 mg m-3. Meanwhile, the composite Kuroshio velocity during the months with negative PDO indices indicates that the Kuroshio is accelerating south of the latitude of Luzon Island's northeastern tip (approximately 18°N) and decelerating north of 18°N. This state of current fields traps nutritious materials from the Cagayan River estuary, creating a favorable environment for chlorophyll-*a* blooms. Furthermore, it prevents the low-nutrient Kuroshio from intruding into the SCS via the south of the Luzon Strait, and the presence of high chlorophyll-*a* concentrations lasts longer than the months when the PDO indices are positive.

**Keywords:** chlorophyll-*a* concentration, MODIS-Aqua, PDO cold phase, Luzon Island, Cagayan River