# Investigating Sea Surface and Vertical Temperature Variability in Philippine Upwelling Sites Using a Three-Dimensional Global Ocean Reanalysis

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## ABSTRACT

Through Ekman transport and pumping, wind-driven upwelling brings colder, saltier, and nutrient rich water from deeper ocean to the upper ocean, in turn affecting local weather, ocean circulation, and productivity. In the Philippine setting, upwelling activities are enhanced during northeast monsoon due to the interaction of the winds with the islands and coast. Using GLORYS12V1 ocean reanalysis and ERA5 wind data, this study investigated upwelling variability and trends along the waters of Northwest Luzon, Palawan, and Zamboanga Peninsula. Subsurface cold temperature doming was observed northwest of Luzon at 56m depth while near-shore temperature doming was detected along coasts of Palawan and Zamboanga at 8m and 40-56m depths respectively. EOF analysis and correlation revealed that during ENSO warm phase, Luzon and Palawan (except $UI_{ET}$) had warmer anomalies while and Zamboanga had colder anomalies indicating that ENSO has a slackening effect on Luzon and Palawan and enhancing effect on Zamboanga domain at surface. Temperature changes are more sensitive to variability caused by ENSO at lower depths compared to results at surface level as suggested by the correlation of EOF temporal component and ONI.

***Keywords:*** *SST, Reanalysis dataset, GLORYS12V1, Philippine Seas, Upwelling sites*