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 which affects local weather, ocean circulation, and productivity. In the Philippine setting, upwelling activities are enhanced during northeast monsoon due to the configuration of its islands and favorable wind direction. This study aims to investigate upwelling variability and trends along the waters of Northwest Luzon, Palawan, and Zamboanga Peninsula using sea surface and vertical temperature from a reanalysis dataset and an upwelling index based on Ekman transport. It also aims to assess how ENSO modulates upwelling along the study areas. The GLORYS12V1, a global reanalysis dataset with a daily and 1/12° resolution will be used for the surface and vertical analysis of temperature while ERA5, a fifth-generation atmospheric reanalysis produced by ECMWF, will be used for the wind-derived upwelling index. With the lack of an available high-resolution ocean model, this study opts to use vertically resolved global ocean model for analyzing subsurface processes predicted by wind-derived upwelling index that can be derived from global (low-) to local (high-resolution) atmospheric models that are more readily available.

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