

## **Spreading and conversion of the North Pacific Tropical water in the Philippine Sea**

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The North Pacific Tropical Water (NPTW), as a subsurface salinity maximum, is swept to the Philippine Sea after subduction. In this study the spreading and conversion of the NPTW in this region are investigated using existing hydrographic profiles of WOD09 and Argo floats. In general, spreading of the NPTW is closely associated with the advection the NEC, Mindanao Current (MC), and Kuroshio. Estimated for water saltier than 34.8 psu, the southward (northward) transport of the NPTW is 5.5 (4.6) Sv by the MC (Kuroshio) at 8oN (18oN). Fields of geostrophic current, sea level variation, and potential vorticity suggest that the southward spreading is basically dependent on the MC, whereas its northward spreading can be achieved by both the Kuroshio advection along the coast and mesoscale eddy stirring away from the coast. The NPTW also undergoes a prominent freshening in the Philippine Sea, which is more significant for its upper part due to diapycnal mixing with fresh surface water. The vertically uneven salinity change makes the subsurface salinity maximum occur on denser isopycnal surfaces in the MC and Kuroshio. Salinity decrease is extremely fast along the NEC-MC path, especially in the MC. This is partly attributed to water mass stratification which makes the water vulnerable to diapycnal mixing. Explaining the along-path salinity change by diapycnal mixing yields an equivalent diapycnal diffusivity of  $O(10e-4 \text{ m}^2 \text{ s}^{-1})$  in the MC. This elevated diffusivity may be associated with turbulence induced by strong vertical shear of the MC.