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The Impact of Meso-Scale Eddies on the Subtropical Mode Water in the Western North Pacific

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Abstract Based on the temperature and salinity from the Argo profiling floats and altimeter-derived geostrophic velocity anomaly (GVA) data in the western North Pacific during 2002–2011, the North Pacific Subtropical Mode Water (NPSTMW) distribution is investigated and cyclonic and anti-cyclonic eddies (CEs and AEs) are constructed to study the influence of their vertical structures on maintaining NPSTMW. Combining eddies identified by the GVA data and Argo profiling float data, it is found that the average NPSTMW thickness of AEs is about 60 dbar, which is thicker than that of CEs. The NPSTMW thicker than 150 dbar in AEs accounts for 18%, whereas that in CEs accounts for only 1%. About 3377 (3517) profiles, which located within one diameter of the nearest CEs (AEs) are used to construct the CE (AE). The composite AE traps low-PV water in the center and with a convex shape in the vertical section. The 'trapped depth' of the composite CE (AE) is 300 m (550 m) where the rotational velocity exceeds the transitional velocity. The present study suggests that the anticyclonic eddies are not only likely to form larger amounts of NPSTMW, but also trap more NPSTMW than cyclonic eddies.

Key words thickness of NPSTMW; meso-scale eddies; swirl velocity; trapped depth

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