

## **Roles of mode waters in formation and maintenance of central water in the North Pacific**

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Three-dimensional distributions of the Turner angle (Tu) and the potential vorticity (PV) of the main pycnocline water in the subtropical North Pacific (10°-50°N, 120°E-120°W) are described using large number of in-situ CTD data taken by the Argo profiling floats during June to October of 2001-2009 to clarify the detailed distribution of the central water and the mode waters and the relationship between these water masses. The ventilated part of the main pycnocline water (potential density less than 26.7 kg /m<sup>3</sup>) in the subtropical gyre generally displays a sharp peak of Tu value of 59° in the histogram. The Tu histograms on 10° x 10° geographical boxes mostly show mode Tu value of 59° as well but also show some regional differences, suggesting some kinds of relations with the North Pacific mode waters. To further investigate the relationship, the appearance probability density function of the central water defined as the main pycnocline water with Tu = 56° - 63° and that of the mode waters with PV lower than critical value on each isopycnal surface were analyzed. The distribution area of Central Mode Water (CMW) corresponds so well with that of the central water that direct contribution of CMW to the formation and maintenance of the central water is suggested. On the other hand, the distribution areas of Subtropical Mode Water (STMW), Eastern STMW (ESTMW), and Transition Region Mode Water (TRMW) do not correspond to that of the central water. Nevertheless, indirect contributions of these mode waters on the formation and maintenance of the central water through modification of ESTMW and TRMW by salt-finger type convection and/or diapycnal mixing of STMW with other water masses such as CMW or North Pacific Intermediate Water (NPIW) are suggested.