



Water masses variability in the Southern Pacific during the last decade in a density-spiciness space

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The ocean water masses variability is intimately linked to the atmospheric changes as they are imprinted at the ocean surface by the climate natural modulation on interannual to decadal time scales. These surface conditions are partially retained in the ocean interior by subduction during the late winter.

In this study we address the main processes implied in the interannual to decadal variability of the interior water masses in the South Pacific over the period 2006-2015 using an optimal interpolated Argo product (ISAS). Instead of using temperature and salinity coordinates, we performed our computations in a density-spiciness ($\sigma - \tau$) space.

We found the main positive volume trends located within the SubAntarctic Mode Waters (SAMW) density range, i.e. $\sigma=26.9 \text{ kg m}^{-3}$ with spiciness values that increase towards the west ($\tau=0.2-0.4$). These $\sigma-\tau$ classes are associated with an absolute salinity that ranges between 34.3 and 34.7 g kg^{-1} and conservative temperature between 6.5°C and 7.6°C. Strong negative volume trends appear in the range of the Antarctic Intermediate Waters (AAIW), between the density classes of $\sigma=27.3 \text{ kg m}^{-3}$ and 27.6 kg m^{-3} at a single spiciness value of $\tau=-0.2$. The associated absolute salinity ranges between 34.4 and 34.8 g kg^{-1} and their conservative temperature between 3.1°C and 2.2°C from lighter to denser levels respectively.

We estimated water mass transformation to infer the relative contribution of the diapycnal and isopycnal mixing fluxes and the role of the subduction/obduction and the flow across the domain limits in the mean volume change of the interior water masses.