

## Decadal salinity variation in the western North Pacific correlated with the strength of the Oyashio and the Kuroshio Extension

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Decadal changes in salinity around the density ( $\sim 1026.8 \text{ kg m}^{-3}$ ) of North Pacific Intermediate Water (NPIW) were investigated in the regions from the Oyashio to the Kuroshio Extension (KE), called as the Mixed Water Region (MWR), based on the long-term-data-sets provided from numerical reanalysis. Based on the reanalysis data provided by an ocean forecast system of the Japan Fisheries Research and Education Agency (FRA-ROMS; 1992–2012, horizontal resolutions of  $0.1^\circ$ ), we found that during increase of the Oyashio velocity in the upstream region, negative salinity anomaly accompanied with the southward velocity at the density was enhanced between  $144\text{--}145^\circ\text{E}$  just south of  $40^\circ\text{N}$ . In addition, to examine influences from the downstream region of the Oyashio, we made a lag-correlation analysis focusing on the decadal variation of KE stability calculated from the zonal average ( $142\text{--}165^\circ\text{E}$ ) of the meridional gradient of the sea surface height ( $34.5\text{--}37.0^\circ\text{E}$ ) as the KE strength (KES). The result showed that signals of significant negative correlation appeared around the density from Hokkaido to the north region of KE. Through the composite analysis based on the KE stability, we found that the stable KE could also lead similar anomaly distribution around the north region of KE. We examined relationships between decadal tendency and each component of salinity fluxes at the density along the north-south boundary of the region of  $38\text{--}40^\circ\text{N}$ , and  $142\text{--}145^\circ\text{E}$ . Concerning estimation of the salinity fluxes, we employed time-mean components ( $S$ ,  $V$ ) and eddy components ( $s'$ ,  $v'$ ), and then, we calculated products of them ( $Sv'$ ,  $s'V$ ,  $s'v'$ ). Decadal tendency of salinity ( $ds'/dt$ ) was negatively correlated with the meridional difference of  $Sv'$  ( $-0.5 < r < -0.47$ , 95% confidence interval). Whereas  $Sv'$  at northern boundary was also negatively correlated with  $ds'/dt$  ( $-0.45 < r < -0.42$ ), the correlation between  $ds'/dt$  and  $Sv'$  at southern boundary was small ( $0.03 < r < 0.07$ ). The result suggested that the southward Oyashio would play an important role for decadal salinity variation in the MWR.

Keywords: North Pacific Intermediate Water, Decadal variation, Oyashio, Kuroshio Extension