



Interannual variation of the Yellow Sea Cold Water Mass in the long-term high resolution regional ocean reanalysis

The Yellow Sea Cold Water Mass (YSCWM) is a hydrographic feature shaped by the interplay of complex bottom topography and the seasonal variability of circulation, driven by monsoonal wind forcing in Yellow Sea (YS). The YSCWM plays important roles, such as potentially weakening typhoon intensification and affecting biogeochemical production and cycling in the YS region. Various studies have linked variations in the YSCWM to large-scale climate variability modes, including the El Niño-Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO) and Arctic Oscillation(AO) (Song et al., 2009; Park et al., 2011; Wei et al., 2013; Guo et al., 2021). In this study, we investigate the interannual variability of YSCWM using a high-resolution ($1/24^\circ$) regional ocean reanalysis for the Northwest Pacific, produced by Pukyong National University and Korea Institute of Ocean Sciences and Technology, covering period from January 1993 to December 2022. Our findings confirm a strong correlation between the winter PDO index and the YSCWM volume, corroborating previous research (LI et al., 2015). The AO index influences winter wind patterns, which in turn affect the volume of the YSCWM. The consistent phase change of both the PDO and the Arctic Oscillation (AO) contributes to the significant decadal variability of YSCWM intensity. (Guo et al., 2021). The high-resolution regional ocean reanalysis for the Northwest Pacific demonstrates that the PDO and AO indices significantly influence and modulates the YSCWM. However, further investigation is needed to clarify the underlying mechanisms. Guan (1963) indicated that winter air temperatures might affect the variability of YSCWM temperatures. Future research will analyze winter air conditions to gain a more comprehensive understanding of these interactions.

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