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A model study on seasonal spatial-temporal variability of the Lagrangian Residual Circulations in the Bohai Sea

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The spatial distribution and seasonal variation of the tide-induced Lagrangian Residual Circulations (LRC hereafter), wind-driven LRC, and the coupling dynamic characteristics were simulated using ECOM, given the Hellerman and Rosenstein global monthly-mean wind stresses. The results showed that the tide-induced LRC of the harmonic constituent M2 bears an identical pattern in four seasons in the Bohai Sea: the surface one is weak with random directions; however, there exist a southeast current from the Bohai Strait to the Laizhou bay, and a weakly anticlockwise gyre in the south of the Bohai Strait for the bottom layer LRC. The magnitude of bottom layer tide-induced LRC is larger than the surface one, and moreover, it contributes significantly to the whole LRC in the Bohai Sea. Unlike the identical structure of the tide-induced LRC, the wind driven LRC varies seasonally under the prevailing monsoon. It forms a distinct gyre under the summer and winter monsoons in July and January respectively, but it seems weak and non-directional in April and September.

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