A numerical study on the dynamics of seasonal velocity variation in the East China Sea

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In our previous study, we investigated the seasonal velocity variations at different depths over the entire Kuroshio path. It showed that the upper layer (< ~500 m depth) velocity variation over the entire Kuroshio path has a coherent seasonal feature, which reaches a maximum in July and a minimum in autumn or winter, over most of the regions along the Kuroshio path. However, the lower layer velocity (> ~500 m depth, in the continental slope area from the east of Luzon Island to the east of the Ryukyu Island chain) shows a reversed seasonal variation with a maximum in winter. Several numerical experiments were carried out to clarify the essential mechanisms. Although it was shown that the local wind stress upon the current region is a key factor for the seasonal velocity variation in the upper layer, the detailed driving mechanism has been still unknown. Thus, we perform further numerical experiments to clarify the concreate mechanism in this study. Using a rectilinear regional model with idealized continental slope, we have successfully reproduced the seasonal velocity variation of the jet (the Kuroshio) by the seasonal wind stress variation over the jet. It turns out that the velocity of the jet increases (decreases) when the wind stress is directed to downstream (upstream) direction of the jet. We will report the concrete process underlying acceleration and deceleration processes of the upper layer velocity related to the local wind stress.

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