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Impacts of two super typhoons on the Kuroshio and marginal seas on the Pacific coast of Japan

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Abstract

High-resolution downscaling ocean modeling was conducted to investigate the impacts of two super typhoons on the Kuroshio in the fall of 2014 off the Kyushu and Shikoku Islands, Japan. The model result was compared with field observations and satellite altimetry. The synoptic and mesoscale oceanic structures around the Kuroshio exhibit a good reproducibility. The typhoons generated near-inertial oscillations (NIOs) and near-inertial internal waves (NIIWs) around the Kuroshio path, particularly on the right side of the typhoon tracks. The NIOs developed in the mixed layer to alter the direction of the Kuroshio by $\sim 30^\circ$. The associated velocity off the Shikoku and Kyushu Islands was significantly decelerated by $\sim 0.2 \text{ ms}^{-1}$. The velocity almost vanished off Kyushu Island and thus induced an unstable fluctuating path shortly after both typhoons passed over that region. The NIIWs were also excited at the thermocline, resulting in the oscillation of the Kuroshio path occurred of the entire water column. In contrast, off Shikoku Island, the typhoons shifted the Kuroshio path northward to enhance the interactions with the topographies. This shift caused considerable eddy shedding from the capes that resulted in mesoscale counterclockwise

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