

Impact of the mesoscale eddies on the western boundary current over the entire western North Pacific

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Although many previous studies have suggested that the mesoscale eddies affect the variations of the Kuroshio and Ryukyu current systems, the generated regions and paths to the western boundary have not been well explained yet. We constructed a mesoscale eddy tracking dataset using FORA-WNP30 in conjunction with Okubo-Weiss parameters to investigate the effects of eddies on the western boundary current over the entire North Pacific. We observed that cyclonic eddies with relatively long durations (>120 days) were mainly generated around the southern Kuroshio Extension region, while anti-cyclonic eddies were generated around the subtropical counter current. In addition, we found that the cyclonic eddies propagate westward along the Kuroshio region and reach the western boundary, while the anti-cyclonic eddies propagate westward from their regions of origin and thereafter reach the Kuroshio recirculation region and Ryukyu current. The comparison of the Ryukyu-current at a depth of 600 m and the number of times the meso-scale eddies passed over the Ryukyu current demonstrated that the weakening (strengthening) of the northward current in the northern part of the Ryukyu region was consistent with the number of times the cyclonic (anti-cyclonic) eddies passed over the northern part of the Ryukyu current.

Keywords: mesoscale eddy, Kuroshio, Ryukyu current