Variations of Ocean Vortex Train of Green Island from Satellite Imagery

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Kuroshio, a western boundary current, flows quickly and steadily along the east coast of Taiwan. The ocean vortex train induced by the Kuroshio on the leeside of Green Island, which is a small islet at the path of Kuroshio off southeast Taiwan, is investigated in this study. The horizontal scale and characteristics of the ocean vortex train are analyzed with five kinds of satellite imagery, including optical imagery from SPOT (Satellite Pour l'Observation de la Terre) and Formosat-2 satellites, as well as synthetic aperture radar imagery from ERS-2 (European remote sensing satellite), ALOS (Advanced Land Observing Satellite), and Sentinel-1. Satellite altimetry data and moored acoustic Doppler current profiler (ADCP) are used to calculate the velocity of Kuroshio. The ADCP data show that the velocity is enhanced on the left of the vortex train when it is formed on the leeside of Green Island. The data derived from MODIS (Moderate-resolution Imaging Spectro-radiometer) also show that the sea surface temperature of recirculation water is more than 2^{o}C colder and the chlorophyll-a concentration is two times higher than the surrounding waters. Wind forcing may affect the vortex train obviously. The averaged aspect ratio and dimensionless width of vortex train derived from available satellite images are 2.09 and 2.02, respectively for the cases of southerly, and are 1.91 and 2.76, respectively for the cases of northerly.

Keywords: Kuroshio, Green Island, vortex train, satellite imagery

