

## Structure and variability of the Kuroshio current in the Tokara Strait

\*Zhao-Jun Liu<sup>1</sup>, Hirohiko Nakamura<sup>2</sup>, Xiao-Hua Zhu<sup>1</sup>, Ayako Nishina<sup>2</sup>, Xinyu Guo<sup>3</sup>, Menghong Dong<sup>1</sup>

1. Second Institute of Oceanography, China, 2. Kagoshima University, Japan, 3. Ehime University, Japan

Transverse-vertical structure and temporal variability of the Kuroshio current across the Tokara Strait during 2003–2012 measured by ferryboat acoustic Doppler current profiler (ADCP) with a 2-km horizontal resolution and a 2-day interval are presented. The Kuroshio passing through the Tokara Strait exhibits a nearly permanent multicore velocity structure. The mean eastward Kuroshio transport is 25.84 Sv ( $1 \text{ Sv} \equiv 10^6 \text{ m}^3 \text{ s}^{-1}$ ) and the net baroclinic transport relative to 700 m is 19.57 Sv. The seasonal variation of the Kuroshio transport via the Tokara Strait is a “W”-shaped curve with a maximum in July and a second maximum in December–January. The baroclinic transport shows seasonal variation similar to that of the undecomposed transport, with a maximum in July. However, the barotropic transport displays a reversed seasonal variation—a “V”-shaped distribution—with a maximum in December. In the empirical orthogonal function (EOF) analyses of the cross-sectional velocity, with the exception of the well-known meander (EOF1: 41.1%) and transport (EOF2: 26.3%) modes, the third mode (EOF3: 19.2%) is first observed. The EOF3 mode exhibits a band-like structure, with a smaller horizontal scale than the first two EOF modes; such a band-like structure may be related to the wakes in the lee of the Tokara Islands. Additional analysis based on high-resolution JCOPE-T reanalysis data revealed that (1) many vortexes were generated around the Tokara Strait due to the strong flow-topography interaction; (2) the intensities of the island-induced wakes depend on the Kuroshio path position around the Tokara Strait.

Keywords: Tempo-spatial variations, Kuroshio, Tokara Strait