

# Non-seasonal variability of the Kuroshio shelf intrusion and its associated changes in the ocean environment over the East China Sea during 1993-2017

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The Kuroshio in the East China Sea (ECS) exhibits strong variability over the northeast of Taiwan; weakening of the Kuroshio has been understood to be associated with shelf-ward shift of the Kuroshio axis, which induces shelf intrusion of the Kuroshio water. The Kuroshio intrusion plays an important role for understanding the characteristics of water masses over the shelf region that, in turn, influences ocean environment in the marginal seas. In this study, non-seasonal variability of the intrusion, which was reported to be more significant in comparison with its seasonal variability, is examined during 1993-2017.

The Kuroshio intrusion index was defined based on the Empirical Orthogonal Function analysis of satellite-altimetry-derived geostrophic velocity data. The composite analysis of oceanic and atmospheric variables according to the intrusion index reveals that strong Kuroshio intrusion is associated with increase of sea surface temperature and eddy kinetic energy, strengthening of northwesterly wind and upward surface heat flux in the continental shelf region. The strong Kuroshio intrusion would also be related to sub-mesoscale eddy variability inside the ECS, and its relationship is discussed by examining surface drifter data over the region.

Keywords: Kuroshio, shelf intrusion, East China Sea, sub-mesoscale eddy