

Study on the Three-Dimensional Flow Structure of the Kuroshio Extension Jet using ARMOR3D

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The Kuroshio Extension (KE) jet is a representative current in the subtropical circulation of the North Pacific. It is to be supplied high-temperature and high-salinity seawater to there from the low latitude and it has a significant impact on the material circulation due to its particularly large flow rate. The north-south gradient of water temperature and salinity in the surrounding area is significantly larger than that of other areas because of the location of the low-temperature and low-salinity subarctic circulation to the north of the current. In addition, numerous mesoscale eddies are continuously generated and dissipated in the vicinity, causing the eastward flow of the KE jet to be unstable and unsteady, and to meander in a north-south direction. Previous studies have classified the KE into stable and unstable periods based on the length of the flow axis and fluctuations in the kinetic energy of the current, and these fluctuations are said to be on the order of 10 years. However, in the KE region, which has such characteristic seawater, studies have so far mainly used data from the sea surface and models, and three-dimensional analyses based on observation data have not been conducted very often. In this study, we calculated kinetic energy of the mean current and eddy kinetic energy using the ARMOR3D data on water temperature, salinity, and geostrophic current provided by CMEMS (Copernicus Marine Environment Monitoring Service). The purpose of this study is to discuss two changes with respect to vertical direction and time from the results. Then, the characteristics of the three-dimensional structure of the flow will be compared with previous findings.

Keywords: Kuroshio Extension, Kinetic Energy, Eddy Kinetic Energy