

Kuroshio intrusion into the South China Sea revealed by radium isotopes

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The intrusion of Kuroshio, a typical western boundary current in the north Pacific, into the South China Sea (SCS) through the Luzon Strait has a significant impact on the marine biogeochemistry of SCS. To reveal the extent of the intrusion, we investigated distributions of ^{226}Ra and ^{228}Ra in the surface water of the northern South China Sea (NSCS) in May-July of 2014. The surface activity of ^{228}Ra showed a remarkable spatial variation, in the range of 0.67-23.45 dpm 100 L⁻¹. The lowest ^{228}Ra appeared in the Luzon Strait, indicating the intrusion of radium-deplete Kuroshio water. The activity of ^{228}Ra is increasing in NSCS with the distance from the Luzon Strait due to mixing with SCS water. In contrast, ^{226}Ra was more evenly distributed, 4.63-9.82 dpm 100 L⁻¹. The intrusion of Kuroshio into SCS through Luzon Strait was quantified using a three end-member mixing model based on the conservation of ^{226}Ra and salinity. The fraction of Kuroshio water in SCS was estimated to range from 5% to 71%.