

The Internal Wave Observation in the Tsushima Strait using SAR, Optical and Altimetry Image Data

Yessy Arvelyna, Masaki Oshima

Tokyo University of Marine Science and Technology
Department of Marine Information System Engineering

yessy_a@e.kaiyodai.ac.jp

ERS1/2 SAR and ASTER image data during 1993-2004 period have been observed for internal wave detection in the Tsushima Strait. Internal wave feature in image is observed using wavelet coefficient on decomposition image and spectral reflectance analysis. Various wavelet transforms, e.g. Haar wavelet, Symlet wavelet, Biorthogonal wavelet, Coif wavelet and Daubechies wavelet, are tested comparably with different level of synthesize image on horizontal, diagonal, and vertical detail, and approximation to study the internal wave characteristic in image. Internal wave features were detected as curve pattern in decomposition image with higher wavelet coefficient (>36) than sea surface (<10) on horizontal and vertical detail coefficient of image transforms at level 2-5. Smoother result of internal wave shape can be formed using higher scale resolution of image at level 5 and higher number of vanishing moments such as Daubechies wavelet-db5, Symlet wavelet-sym5, and Discrete Meyer wavelet. The internal wave is modeled using Combined Korteweg the Vries model. Non linier speed of internal wave is calculated about 85cm^{-1} . The altimetry data products from Topex/Poseidon and Jason-1 data are used to predict the internal wave generation. The observation results show the propagation of internal waves were varied between NW-SW at eastern channel and N-SW at western channel of Tsushima Strait, parallel to the direction of the geostrophic current. At NE coast off Tsushima Island, the direction is on S/SE direction. It is suggested that the internal waves were sourced from south coast off Tsushima Island and south coast off the Japan Sea. They were possibly tidally generated and formed due to bathymetric change.