

# Satellite observation of internal waves converting polarity in the South China Sea

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According to Synthetic Aperture Radar (SAR) imaging mechanism, the oceanic internal solitary waves (ISWs) can be well recognized. In this study, the polarity conversion of ISWs in the South China Sea (SCS) is investigated using 10-years SAR images from 1999 to 2009. It is found that most of the ISWs in SCS are the depression ISWs. However, in region of the continental shelf of the SCS, some elevations ISWs can be identified. In the total of the 500 oceanic internal wave SAR images used in this study, 32 of them exhibit oceanic internal wave polarity conversion.

Moreover, it is found that the elevation ISWs do not show seasonal-locking characteristic. ISWs are found nearly in every season. The bottom topography, hydrological conditions and local thermocline structure which are generally regarded as the conditions for the generation of the elevation ISWs are further explored. Taking the two-layer KdV theory, it is found that ISWs in SCS exhibit a time gap of about 12.4 hours. This time gap is well consistent with the period of local semi-diurnal tide. Our findings thus strongly suggest that the elevation ISWs in SCS can be evolved from the depression ISWs in SCS, which are generally originated from Luzon strait.

Keywords: oceanic internal solitary waves, polarity conversion, depression ISWs