EGU2020-2502
https://doi.org/10.5194/egusphere-egu2020-2502
EGU General Assembly 2020

Evolution of Internal Solitary Waves on the Slope-shelf Topography in the Northern South China Sea

Shuya Wang[1,2], Qun Li[2], Xu Chen[1], Jing Meng[3], and Saisai Li[3]
[1]Key Laboratory of Physical Oceanography / Collaborative Innovation Center of Marine Science and Technology (CIMST), Ocean University of China and Qingdao National Laboratory for Marine Science and Technology, Qingdao, China
[2]Polar Research Institute of China (PRIC), Shanghai, China
[3]College of Oceanic and Atmospheric Sciences, Ocean University of China, Qingdao, China

Based on a non-hydrostatic two-dimensional and high-resolution model, evolution of internal solitary waves (ISWs) on the typical slope-shelf topography in the northern South China Sea is investigated numerically, and the influences of the initial amplitude, seasonal stratification and topographic characteristics are analyzed with a series of sensitivity runs. The results indicate that the initial amplitude affects the fission of ISW, resulting in three wave groups for large ISW and two wave groups for small ISW. In addition, the generation of mode-2 waves is influenced since energetic beams are engendered by large initial ISW, which impact the pycnocline and generate the mode-2 ISWs. Seasonal stratification has significant impacts on the evolution of the ISW. In winter, the changing sign of the nonlinearity coefficient at the bump near the shelf break implies the inversion of polarity of the ISW. Therefore, the transmitted and fissioned waves behave differently from those in summer and annual stratifications. Furthermore, the speed and energy of the leading wave are minimal in winter but maximal in summer. The bump near the continental shelf has two impacts: promoting the fission of the incident ISW and generating mode-2 ISWs by increasing the Ursell number (the ratio of nonlinear coefficient to dispersion coefficient). However, the formation of the trailing nonlinear wave packet is not affected by these factors, despite of the variations in detail in sensitivity runs.

How to cite: Wang, S., Li, Q., Chen, X., Meng, J., and Li, S.: Evolution of Internal Solitary Waves on the Slope-shelf Topography in the Northern South China Sea, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-2502, https://doi.org/10.5194/egusphere-egu2020-2502, 2020