Geophysical Research Abstracts
Vol. 19, EGU2017-2192-2, 2017
EGU General Assembly 2017

Investigation on Swells of the East China Sea

Aifeng Tao (1,2) and Chao Wu (3)

(1) Key Laboratory of Coastal Disaster and Defence(Hohai University), Ministry of Education, Nanjing, China (aftao@hhu.edu.cn), (2) Hohai University, College of Harbor Coastal and Offshore Engineering, Nanjing, China (aftao@hhu.edu.cn), (3) Dianmi Network Technology Co., LTD., Nanjing, China(644647386@qq.com)

In the recent decades, more and more human activities, including different kinds of marine structures and large ships, have been present in the East China Sea. It is necessary to fasten our attentions on the marine safety issues, particularly on the extreme waves. Because it has been known that the density of extreme waves may increase with Typhoon in the future with the global climate changing. The extreme waves can be induced not only by Typhoon in summer, but also by East Asian cold waves in winter for this special sea area. And the swells also can be very dangerous because the swells may result in the resonance with floating structures, including the ships. Focusing on the investigation of swells in the East China Sea, the hindcast for waves in the past ten years will be performed by the numerical model Wave Watch III based on the historical climate data. The numerical calculation domain covers the whole North West Pacific. Then the swells will be separated and analyzed from the simulated wave fields. Both the characteristics and the generation mechanisms of the swells will be investigated. Particularly, the swells, which propagating across the Ryukyu chain from east to west, will be analyzed in details.

We used the CCMP & Myers wind data to run the WW3 model and reproduced the global wave fields in 2010-2014. After separating swell and wind sea from mixed waves, we studied the spatial and temporal distribution of swell in East China Sea and the formation mechanism of swell in East China Sea.The significant wave heights of swells in the East China Sea are mainly distributed in the 0.1-2.5m, the interval with the highest frequency of occurrence is 0.1-0.5m, and the proportion is about 50%. The spectrum peak periods of swells are mainly distributed in the 4-15s, the interval with the highest frequency of occurrence is 9-15s., and the proportion is about 25%. In terms of spatial distribution[U+FF0C]swells increase gradually from the offshore to deep sea, and also increase gradually from the north to the South. Moreover, the values of swells in the sea outside the Ryukyu Chain are significantly greater than the values of swell in the area within Ryukyu Chain. Also, the differences of the spatial distributions of swell in different years are small and have a high similarity.The swells in East China Sea are affected by the wind filed in East China Sea and swells come from other adjacent sea areas. From the composition analysis of influence factors under different meteorological conditions, it can be seen that during the non-typhoon scenarios, the swells generated by the local wind account for the largest proportion, accounting for about 38% of the simulation time zone. During the typhoon scenarios, the swells come from the adjacent sea account for the largest proportion, which is about 43% of the simulation time zone. From the composition analysis of influence factors of a year, it is known that in about half of a year, the swells in East China Sea are composed of swells generated by the local wind field and swells come from the adjacent sea. In about 25%-30% time of a year, the swells in East China Sea are only propagating from the adjacent sea. In about 5% time of a year, the swells in East China Sea are only generated by the local wind field.