Tsunami Hazard Assessment at GuangHai Bay of the South China Sea

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ABSTRACT
The COMCOT model from Cornell University has been optimized, which was validated by 2011 Japan tsunami. The simulation results agreed well with the DRAT buoys from NOAA center. Assessment were implemented by tsunami sources of Manila Trench to evaluate tsunami hazards for the GuangHai Bay of the South China Sea (SCS). The tsunami hazard rank criteria recommended by UNESCO/IOC and the State Oceanic Administration of China has been applied in this paper. Tsunami hazards classifications were divided for the GuangHai Bay by analyzing the simulation results. Preliminary assessment of tsunami hazards have been completed in the paper.

KEYWORDS: COMCOT; optimized; Assessment; Tsunami Hazard.

INTRODUCTION
In recent decades, the 2004 Indian earthquake tsunami and the 2011 Japan earthquake tsunami have caused huge loss of life, property and environmental damage to coastal areas. Considerable efforts have been devoted to study the basic theory of tsunami and improving the tsunami warning system, the coastal countries have also carried out the risk assessment of tsunami disasters for major coastal projects and key support targets.

According to the study of potential tsunami seismic fault zones from USGS, the Manila Trench is regarded as the most likely source for tsunami hazards (Li and Yuan, 2016), which will undoubtedly threaten the coast of China. Many studies mainly focused on the tsunami research (González and Geist, 2009; Burbidge and Cummins, 2009; Heidarzadeh and Kijko, 2011; Megawati and Shaw, 2009; Anawat and Imamura, 2012). The research of potential tsunami disaster in the South China Sea has been extended from the South China Sea to the coastal areas of the mainland (Yu and Ye, 2001; Yu and Wang, 2011; Wang and Yu, 2012; Ren and Wang, 2018; Zhang and Niu, 2020; Yuan and Li, 2021). The criteria of tsunami hazard grade issued by UNESCO/IOC and the China is used to grade the tsunami hazard in the GuangHai Bay of China, which results will provide technical support for the enhancement of marine services in GuangHai Bay. GuangHai Bay is the power base of GuangDong Province in China. TaiShan power plant, the largest coal-fired power plant in Asia, has been put into operation. An installed capacity of 6 million kilowatts of TaiShan Nuclear Power Plant has already been established and successfully taking into operation. Future, wind power projects will also make the TaiShan city to the largest wind power base in GuangDong. With the all-round development of society and economy in GuangHai Bay, the resources of coastline and inshore sea area decrease sharply, and the conflict of ocean utilization function exists in some areas, which is brings new problems to the sustainable development and utilization of GuangHai Bay. Lack of awareness of the conflict between limited marine resources and high-intensity exploitation, it is necessary to ascertain the potential hazard of marine disasters, to identify regional resilience and to objectively understand the level of marine disaster hazard, which provides authoritative disaster hazard information and scientific decision-making basis for national governments to effectively carry out marine disaster prevention and Emergency Management and guarantee the sustainable development of social economy.

This paper is arranged as follows. Section 2 briefly introduces how to optimize the tsunami model. Section 3 presents validation of the parallel tsunami model. Analysis and evaluation of hazard prevention capability of GuangHai Bay is given in Section 4, and the conclusion is in Section 5.

OPTIMIZE TSUNAMI MODEL
A mature numerical model of tsunami simulation (COMCOT) developed by Cornell University, which is used to simulate the whole process of tsunami generation, propagation and inundation. Its governing equations are based on the vertical average shallow water equations, which calculated by the finite difference method. According to the characteristics and requirements of tsunami propagation in different areas, the model can be nested in multi-grids, and different resolution and calculation settings are selected.

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