
Wave spectra data assimilation based on spectral partitioning to cross assigned wave systems

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Résumé

Wave spectra data assimilation is an effective way to improve the accuracy of wave modelling. In October 2018, a campaign involving the Chinese-French Oceanic SATellite (CFOSAT) successfully collected joint, synchronized observations of high precision wave spectra and the large-scale high resolution wind field for the first time. The campaign built a momentous data foundation used for further development of the wave spectra assimilation method. In using the two-dimensional directional spectra from CFOSAT, this paper optimizes the spectral partitioning method to analyze the relationship between the evolution of the different wave systems and the variability of the wind field in the East China Sea. Moreover, the physical mechanism is identified for the specific wave systems generated by a (i) monsoon, (ii) typhoon and (iii) other meteorological processes. An inhomogeneous and anisotropic background error correlation function of the specific wave system is calculated by integrated wave modelling. On above basis, the exact matching method of the observed and modelled wave systems is explored used to establish a series of wave spectra data assimilation experiments. In comparison with the significant wave height data assimilation, this work analyzes and evaluates the advantages and feasibility of the wave spectra assimilation method in order to further improve the accuracy of wave modelling. The results can be applied to maritime transportation, marine engineering construction, naval defense and other oceanographic research.

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