Tracing the decaying swell across Pacific with CFOSAT SWIM data

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Résumé

a very long distance in the ocean. In this study, the in-situ data from NDBC buoys located openly to the southwest are used to determine the potential destination of swells propagating from the westerlies for southern hemisphere. Meanwhile, the CFOSAT SWIM data and ERA-5 model data are used to trace back the trajectories and the sources of these swells. Accordingly, we find 25 routes of swells originated from 4 series of ocean storms. It is shown that magnitude of decaying rate of swell energy increases with the spectral width of initial swell field. In addition, the general rate of increase for peak wavelength is an order of 0.1m/km, which is apparently the spectral width dependent. These are mainly due to the higher degree of dispersion and angular spreading for broader spectra. We compare the variation of swell significant wave height (SWH) along the propagating route with the results based on the wave-turbulence interaction theory proposed by Babanin and find that the data recorded by retracing basically agree with the theoretical results. The dissipation rates of swells are calculated based on the air-sea interaction theory proposed by Ardhuin, and the maximum value is about 5×10-7m-1. Recently, we update the results with the latest version of SWIM data, the overall conclusions remain. However, some cases have to be eliminated for not satisfying the criteria for selection of same swell component.

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