
CFOSAT Wave Spectrum Observations Compared with Numerical Results and Chinese Gaofen-3 SAR

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Résumé

The Chinese-French Oceanography SATellite (CFOSAT), which was jointly developed by the Chinese National Space Agency (CNSA) and the Centre National d'Etudes Spatiales (CNES) of France, carries a wave spectrometer (Surface Waves Investigation and Monitoring, SWIM) and a rotating fan-beam wind scatterometer (RFSCAT). The SWIM has one nadir and five off-nadir beams to measure ocean surface waves. In this work, we investigated the performance of wave spectrums obtained from CFOSAT at incidence angles of 6°, 8°, and 10° during the period July 2019 to January 2020. Our results revealed a root mean square error (RMSE) of only 0.59 m for the CFOSAT-measured significant wave height (SWH) compared with the SWH simulated by the Simulating Waves Nearshore (SWAN) model. Meanwhile, waves simulated using SWAN are validated against the measurements from the National Data Buoy Center (NDBC) buoys, showing a 0.63-m RMSE for SWH. This analysis indicates that the CFOSAT product is a remarkable resource for wave monitoring over global seas. The simultaneous wave retrievals for 6 cases from Gaofen-3 (GF-3) SAR images were also used to confirm the accuracy of CFOSAT-measured waves at incidence angles of 6°, 8°, and 10°. The general energy of the CFOSAT-measured wave spectra was found to decrease with increasing incidence angle in these cases. Moreover, the CFOSAT-measured wave spectra were most consistent with the SAR-derived wave spectra at an incidence angle of 10°.

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