Analysis of Wind and Waves from SWIM on-board CFOSAT

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Résumé

The significant wave height (SWH) and wind from the CFOSAT/SWIM is validated using the Jason-3 and global buoy data. The collocated Jason-3/ buoy data and SWIM observations used for the validation have a spatial-temporal window of 50 km and 30 minutes. The nadir observations are found to be at par with the traditional altimeters. The non-nadir observations are also found to be of fair quality. A detailed comparison of the data available from two different data version has also being carried out for the month of March 2020. The result indicated a fair degree of improvement in the data in terms of error between the previous version and current version of data processing chain. Based on the validation inputs the current version data for month of November has been utilized for wave height assimilation in WaveWatch-3 model operational at Indian Space Research Organization (ISRO). The choice of the month is not arbitrary. Novembers are marked for intense cyclonic activity over Indian Ocean with frequent high wind and wave conditions. The data assimilative wave forecasting system assimilates the SWH measurements from SARAL/AltiKa, Jason3 and Sentinel 3. This wave model configuration is used for assessing the impact of assimilating SWH from CFOSAT on wave forecast over the North Indian Ocean region. Initially, model is spun-up for 15 days starting from 15th October 2020 to 01st November 2020, using the winds obtained from National Centre for Medium Range Weather Forecasting (NCMRWF), India. No assimilation is performed during the spin-up period. Then three sets of model forecasts are generated for a period from 01st to 30th November 2020. In the first experiment, forecasts are generated without any assimilation, called the control run. In the second set of simulations, only Jason3 measurements are assimilated and in the final experiment both Jason3 and SWIM measured SWH are assimilated. For SWIM assimilation, SWH measurements from nadir (1Hz data) and off-nadir (based on whole combined spectrum) beams are used. Forecasted SWH along the North Indian Ocean region is validated using the buoy observations available during the study period, particularly during the tropical cyclone case 'Nivar'. The validation results suggest that CFOSAT has a positive impact on the improvement of model predictability.

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