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On the upgrade of the assimilation of CFOSAT, Sentinel-1 and Sentinel-3B wave data in CMEMS-GLO wave system

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The assimilation of satellite wave data into the global CMEMS-MFC wave system ensures an accurate description of the sea state and therefore a better estimate of momentuim and heat fluxes at the ocean/atmosphere interface. New wave data have been available since the launch of the Chinese-French satellite CFOSAT on October 29, 2018. The instrument SWIM (Surface Waves investigations for Measurements, Hauser et al. 2016) embarked on CFOSAT provides both significant wave height at nadir look direction and directional wave spectra on the several incidence angles (4,6,8 and 10°) . The SWIM wave spectra have a detection limit for waves with wavelength of 70 meters which is better than SAR of Sentinel-1 (roughly 200 m).
This work aims to evaluate the impact of these new data on wave forecasting and global wave products provided by CMEMS. We examine also the complementary impact of the assimilation of SAR and SWIM wave spectra during the analysis and forecast periods. Several assimilation tests in the wave model MFWAM have been implemented by taking into account the sensitivity to wavelength cut-off for the SAR and SWIM wave spectra. Validation of results has been developed with independent altimetry wave data and buoys. We will focus on a statistical analysis of the results for the different ocean basins. In this work we will also discuss the contribution of the assimilation of Sentinel-3B significant wave heights since the end of the tandem phase with Sentinel-3A in November 2018.
In other respects, the update of the assimilation system will be tested for storm cases event and cyclonic season in the indian ocean. We will also discuss the impact of the assimilation of CFOSAT, Sentinel-1 and altimetry missions on the ocean/waves coupling. To this end coupled runs of the models MFWAM and NEMO have been implemented. Validation of surface key parameters such as Surface Sea Temperature, mixed layer and surface currents from coupled runs will be analysed. Particular attention will be dedicated to ocean regions with swell dominant regime and strong wave/currents interactions.
Further comments and discussions will be presented in the final paper.