Geophysical Research Abstracts
Vol. 20, EGU2018-13246, 2018
EGU General Assembly 2018

The upgraded global CMEMS-MFC waves system : improvements and efficiency for ocean/waves coupling

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Ocean waves play an important role in the physical processes at the sea surface. The most accurate description of the sea state is crucial for a better coupling between ocean and wave models. To this end the global CMEMS-MFC waves system is upgraded with major improvements regarding to the surface stress, additional use of satellite wave data in the assimilation and a better grid scale down to 1/10°.

The upgraded CMEMS-MFC waves system for the global scale is based on the wave model MFWAM and the assimilation of satellite wave data developped at Météo-France. The design V4 system takes into account the surface currents provided by the CMEMS-PSY4 ocean forecasting system with a daily update. The second change is a better resolution of 1/10° and this leads to adjustment of the physics of the model MFWAM regarding to the dissipation source terms and a philipps tail spectrum is used as a diagnostic for the high frequency part of the wave spectrum. This latter is implemented for a consistent variation of the surface stress for intermediate and high wind speed. In other respects the assimilation system is updated by including Sentinel-3A level 3 wave data, which are inter-calibrated with other altimeters missions. These data are provided by the TAC-waves in the frame of CMEMS. The assimilation of SAR directional wave spectra provided by Sentinel-1A and 1B is also achieved and improves the forecast of swell directional properties in all basin oceans.

The waves system design V4 is validated with altimeters and buoys wave data for the year 2017. Results show a significant improvement in normalized scatter index and bias for integrated wave parameters. Coupling experiments using the global V4 system reveals a very promising results, which open the implementation in operations for the phase 2 of CMEMS program. This will be discussed in the final paper.