EMS Annual Meeting Abstracts
Vol. 21, EMS2024-165, 2024, updated on 05 Aug 2024
https://doi.org/10.5194/ems2024-165
EMS Annual Meeting 2024

Ocean-wave-atmosphere-coupling in the AROBASE modelling system for coastal wave warning and sensitivity to momentum flux parametrisation

Fleur Nicolay[1], Cindy Lebeaupin Brossier[1], Alice Dalphinet[2], Marie-Noëlle Bouin[1,3], Joris Pianezze[4], François Bouttier[1], and Jonathan Beuvier[1]

[1]CNRM, Université de Toulouse, Météo-France, CNRS, Toulouse, France (fleur.nicolay@meteo.fr) (cindy.lebeaupin-brossier@meteo.fr) (marie-noelle.bouin@meteo.fr) (francois.bouttier@meteo.fr) (jonathan.beuvier@meteo.fr)

[2]Météo-France, DIROP/MAR/RD, Toulouse, France (alice.dalphinet@meteo.fr)

[3]Laboratoire d'Océanographie Physique et Spatiale, Ifremer, University of Brest, CNRS, IRD, Brest, France (marie-noelle.bouin@meteo.fr)

[4]Laboratoire d'Aérologie (LAERO), Toulouse, France (joris.pianezze@aero.obs-mip.fr)

The AROBASE (AROme-BAsed coupled SystEm) project aims to develop a coupled kilometre-scale numerical forecasting system incorporating ocean, waves, aerosols/chemistry and land surface models around the fine-scale AROME (Application of Research to Operations at MEsoscale) numerical weather prediction model. The AROBASE modelling system aims to improve : 1. our understanding of meteorological processes and interactions between the different environmental components; 2. the realism of the simulations by precisely and consistently representing these phenomena and by taking into account the complexity of the exchange processes between components; 3. the forecast of severe meteorological events by improving the representation of interactions at fine scale.

One important step is the evaluation of ocean-atmosphere-waves-coupling in AROBASE in the frame of Météo-France's coastal wave warning system. To assess the ability of AROBASE to better represent meteorological extremes leading to such coastal hazards, various modelling configurations are tested using the SURFEX (SURface EXternalisée) surface model, the MFWAM wave model of Météo-France derived from WAM (WAve Model) and the NEMO (Nucleus for European Modelling of the Ocean) ocean model. Different combinations of these models and different momentum flux parametrisations are used to evaluate the coupling impact and the improvement of both the marine and numerical weather forecasts.

The first case study is the Eunice storm, which impacted the British Islands and Northern France on February 18, 2022, causing extensive damages due to strong winds. Eunice is also characterised by a high swell combined with a high tidal coefficient that caused large flooding locally. The modelling results will be compared to satellite and *in situ* observations, as well as operational outputs of AROME and MFWAM.