



Ocean-wave coupling in the UKC4 regional coupled prediction system

Juan Manuel Castillo Sanchez, Huw Lewis, and Alez Arnold

Met Office, FitzRoy Road, Exeter, EX1 3PB, United Kingdom (juan.m.castillo@metoffice.gov.uk)

The UKC4 system is the natural evolution of the UKC2 and UKC3 models developed in the UK Environmental Prediction project, in which an integrated approach to forecasting is investigated with the aim of providing a more accurate prediction and warning of natural hazards. This approach also delivers research benefits through providing tools with which to explore the known interactions and feedbacks between different physical and biogeochemical components of the environment across sky, sea and land.

The new system incorporates models of the atmosphere (Met Office Unified Model), land surface (JULES), shelf-sea ocean (NEMO), ocean waves (WaveWatch III) and biogeochemistry (ERSEM). These components are coupled (via OASIS3-MCT libraries) at kilometre resolution across the UK and the wider north-west European regional domain. The presentation will give an overview of the improvements achieved in terms of new wave physics in the ocean model, atmospheric convection, the use of a spherical multiple cell (SMC) grid in the wave model, data assimilation, coupling frequency, and impact of biogeochemistry, giving some comments on the computational cost of running these systems for efficient research application.

Research will be presented highlighting case study evaluation and showing some key impacts of coupling in the different models, such as the effect of resolution and SMC grids, decrease of sea surface temperatures in summer and near-coastal surface currents due to wave processes, enhancement of coastal storm surge, and the smoothing of the tidal amplitude across the north-west shelf.

The presentation will discuss plans for future development, and the implementation of this regional, high resolution coupled approach in other regions.