Geophysical Research Abstracts
Vol. 15, EGU2013-9318-1, 2013
EGU General Assembly 2013


# Implementation of 3D wave forcing terms in the HYbrid Coordinate Ocean Model

Cédric Ody (1), Jean-François Filipot (1), Annick Pichon (1), Cyril Lathuilière (1), and Rémy Baraille (2)

(1) Service Hydrographique et Océanographique de la Marine, Brest, France (cedric.ody@shom.fr), (2) Service Hydrographique et Océanographique de la Marine, Toulouse, France

Waves may influence the circulation in coastal regions at temporal and spatial scales that are larger than the periods and wavelengths of the waves respectively. The setup of the mean sea surface level or longshore currents are two examples of coastal processes that are generated by the mean effects of waves. Although simple models have been shown to provide reasonable estimates of setup and mean currents, the prediction of such wave-induced mechanisms has been improved since the recent development of theories on 3D wave-current interactions. Amongst these theories, the works of Ardhuin et al. (2008) and Mc Williams et al. (2004) give rise to forcing terms that may be used in existing circulation models.

Under some assumptions on the shear of the mean current, the two previous works derive similar expressions for the wave forcing terms. In this talk, we will detail and discuss the implementation of these 3D terms in the HYbrid Coordinate Ocean Model (HYCOM, Bleck 2002). We will focus in particular on the hybrid and layered features of the code. The hybrid coordinate, which allows to use distinct vertical coordinates in a same simulation, requires to reformulate the wave forcing terms with a generalised vertical coordinate. Then, these terms must be averaged on each layer of the water column.

Two academic tests are investigated to validate the numerical implementation : the gently sloping bottom of Ardhuin (2008) and the plane beach of Haas and Warner (2009). Forcing terms are calculated with simple numerical methods under classical assumptions on conservation of wave properties. The results obtained with distinct configurations are shown to agree with the analytical or numerical known solutions. To conclude, we will discuss the impact of wetting and drying in numerical simulations.