



A box model to represent estuarine dynamics in mesoscale resolution ocean models

Giorgia Verri (1), Nadia Pinardi (1,2), Frank Bryan (3), Yu-Heng Tseng (4), and Giovanni Coppini (1)

(1) CMCC Foundation, Ocean Lab, Lecce, Italy (giorgia.verri@cmcc.it), (2) Università degli Studi di Bologna, Dipartimento di Fisica e Astronomia, Bologna, Italy, (3) National Center for Atmospheric Research, Boulder, Colorado, USA, (4) Institute of Oceanography, National Taiwan University, Taipei City, Taiwan

Reliably representing the net freshwater release at river mouths is a challenging task for global and regional scale ocean modelling. Rivers are well known to strongly affect both the coastal and basin wide circulation and dynamics but the coarse ocean models cannot solve the estuarine dynamics and they are usually forced at river outlets in a simplistic way, with climatological runoff and zero or at most constant salinity. The aim of this study is to provide a reliable representation of the estuarine water exchange and a proper interface between the estuarine and the ocean dynamics. The Ofanto and the Po Rivers owing into the Adriatic Sea are selected as case studies.

Two approaches of the estuarine dynamics (i.e. the Knudsen's relation and an estuary box model jointly developed by UCONN and NCAR institutes) have been tested and compared and we also propose a new method by looking at a comprehensive theory with a reduced number of parameterisations.

The coupling between the estuarine and the ocean modelling is also discussed. A regional ocean model based on the NEMO code and covering the Central Mediterranean Sea is considered. We represent the riverine release following the "natural boundary condition" approach with the addition of the salinity values at river outlets. The validation of the numerical results from the shelf sea on the Po delta shows the most promising statistics for the coupled modelling system based on the newly proposed estuarine box model.