High resolution wind forcing effects on coastal circulation and eddy formation around a cape

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The interplay between wind forcing and topographic features as headlands and capes has been shown in various works about shallow water hydrodynamics. Changes in wind speed and in the wind stress curl have been associated with the observed variability of the instabilities around promontories. This numerical study is aimed to assess the role of wind stress and bathymetry resolution on eddy formation and on the circulation around capes.

The case study is the Promontorio of Portofino, a blunt prominent cape in the Eastern Ligurian Sea. To obtain a realistic circulation, the Princeton Ocean Model (POM) is forced by the output of the regional model SYMPHONIE simulating the Western Mediterranean circulation from 2001 to 2003 at a spatial resolution of 3 km. Moreover, POM is run using different bathymetry resolutions and surface conditions calculated from winds coming from atmospheric models with different spatial resolutions. The models are BOLAM21, BOLAM7 and WINDS, which have horizontal resolution of $\Delta x = 21$ km, 7 km and 0.8 km, respectively.

In order to assess if higher temporal resolution winds affect the results, the same simulations are run using two different forcing frequencies, namely 3 and 24 hours. Finally, the effects of different drag coefficient values in the bulk formula for the computation of the wind stress, are also tested.