# The generalized Flather lateral open boundary condition

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The barotropic lateral open boundary conditions are reviewed and a formal derivation of the generalized Flather boundary condition is shown which allows to apply scale dependent approximations in a consistent way. One of the main conceptual problems in the Flather (1976) lateral boundary condition is the simplification made in its derivation. However, the generalized Flather lateral boundary condition derived in this presentation relaxes all simplifications and use a more complete formulation of the lateral boundary conditions for barotropic normal velocities. After decomposing the nested model fields in 'global' and 'regional' components, we derive two new general lateral boundary conditions, for the barotropic velocity components.

Idealized and realistic numerical experiments are carried out in order to study the impact of the scale selective lateral boundary conditions. The idealized experiments results show significant improvements in the model solution related to the application of the scale selective approach to the lateral boundary conditions. A system composed by a coarse model with rigid lid, covering the entire Mediterranean Sea, and a fine resolution free surface model, reproducing the Adriatic Sea, has been used to evaluate the performance of different boundary conditions in a realistic framework. Three test cases in the realistic framework will be presented and the results discussed.