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# Implementation of the barotropic tide in oceanic circulation models. Current tests with the NEMO model

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This study proposes a new methodology for implementing the barotropic tide in an ocean general circulation model (OGCM). The assumptions underlying this methodology are that the best barotropic tide solutions are computed by specialized models and that the fields that should be accurately reproduced by the OGCM are the transport fields from the specialized tide model. The target/reference solution for the OGCM is thus the projection of the tide model on the OGCM grid, for each tidal harmonic.

The proposed methodology involves little change of the OGCM modeland yields almost exactly the reference solution, with a cost that is belowmost of the current methodologies. It relies on the modification of the tidepotential, or more accurately, on the replacement of all terms associatedwith the tide (tide potential, self attraction and loading, tide dissipation, ...) by a general tide forcing term in the barotropic momentum equationwhich is calculated from the –known- reference solution.

The tide forcing terms can be tricky to calculate as they depend on details of the OGCM numerical schemes (for both temporal and spatial operators). A general procedure, automatically adapting the chosen schemes, is proposed for their calculation, so that the procedure is independent of the model.

Tests with academic configurations are first proposed to validate the methodology and its implementation, and the OGCM is chosen to be the NEMO (Nucleus for European Modelling of the Ocean) model.

A global ¼° configuration with realistic bathymetry and with FES tide solutions (Finite Element Solution) are then performed. Current tests show that when FES solutions are crudely interpolated on the NEMO grid, the methodology exactly reproduces the FES fluxes, but the associates NEMO SSH is very noisy in regions where FES has high resolution. This problem is currently addressed. To get rid of this problem, fluxes must be carefully integrated along each grid cell, so that the reproduced SSH is exactly an average of the FES SSH within the NEMO grid cell. Hopefully, we will be able to present final –clean- solutions at the conference.