Estuarine to Shelf Sea Modelling with the General Estuarine Transport Model (GETM)

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The General Estuarine Transport Model (GETM), a Public Domain three-dimensional free-surface model based on hydrostatic primitive equations is presented here. GETM which has been specifically designed for coastal and estuarine applications, contains a number of features which support the application to shallow stratified and non-stratified waters: stable drying and flooding algorithm, high-order turbulence closure schemes, generalised vertical coordinates, high-order advection schemes. The parallelisation of the code allows for efficient computation of large domains at high resolution. Specifically, the turbulence modelling, the drying and flooding algorithm and the generalised vertical coordinates will be presented in some detail. The latter includes construction of vertically adaptive grid strategies, which allow for optimisation of vertical resolution with respect to e.g. stratification, shear and boundary layers. Some idealised examples for the potential of such adaptive grids will be shown.

Four typical GETM applications will be demonstrated: (i) a Wadden Sea simulation with tidal flow around barrier islands, (ii) an estuary simulation for the tidal Elbe (Germany) with formation of an Estuarine Turbidity Maximum (ETM), (iii) a simulation of lateral exchange processes in Lake Geneva (Switzerland), (iv) a high-resolution Baltic Sea - North Sea Simulation.

Some future extensions of GETM will also be briefly discussed.