Parameterization of flow along sloping bottom in a hydrostatic z-coordinate model - Major Baltic Inflow 1993 as a test case

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The ventilation of Baltic Sea deep waters is eminently dependent on intermittent inflows of saline North Sea waters through Danish Straits. This highly saline, dense water spreads along the bottom and propagates to different sub-basins of the Baltic Sea. In three-dimensional hydrodynamic z-coordinate models a sloping bottom is described as chain of steps and with hydrostatic approximation the flow along bottom, often called as gravity current, is poorly described without a specific parameterization. Such parameterizations of flow along bottom slope are mainly developed for world oceans where the horizontal and vertical scales are much larger than in the Baltic Sea. In this study we apply for downslope transport of tracers a parameterization technique comparable to convective adjustment. The major Baltic Inflow (MBI) 1993 is chosen as a test case. Sensitivity tests and comparison with observations are carried out. The parameterization evidently improves results and bottom salinity simulated by the model looks quite realistic in the Arkona Basin. Sensitivity tests show that spreading rate of the salinity front depends on the choice of parameters and it will be discussed in detail in this study.