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Interactive comment on "MOMBA 1.1 – a high-resolution Baltic Sea configuration of GFDL's modular ocean model" *by* H. Dietze et al.

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General

This paper gives an overview of the new configuration for the coupled North Sea - Baltic Sea configuration with high resolution in the Baltic Sea based on GFDL's Modular Ocean Model (MOM) with an intention to couple this set up with biogeochemical model in the future.

In general the quality of the paper is good - the description of forcing and set-up (topography, initial conditions for the temperature and salinity) is very good, the given overview of the test runs performed is satisfactory and general validation of model against measurements and literature (in case of missing observations, for example current persistency) has been made. The topicality of paper is high as the growing computing capability makes it possible to use improved model set ups for the Baltic

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and North Sea region. Coupled North Sea-Baltic Sea with high resolution is definitely a good example of state-of-the-art.

Nevertheless, the paper needs major revision regarding the simulation of salt water inflows. The current set up of the model is not able to reproduce the salt water inflow to the main Baltic Sea at all as seen from the paper. The salt water (and oxygen rich water) transport to the Baltic proper should be among the highest priority in order to have proper multi-year model for the Baltic. At the moment, the bottom layer of the Baltic Sea (BY15) is loosing salt and it is questionable if the volume transports between different basins are thereof estimated correctly by the model. Although, the authors have explained the reason for the strong decrease in bottom salinity at BY15 through enhanced vertical mixing between the Arkona and Bornholm Basin, the assumption that z-model with high horizontal resolution mix the incoming salt water due to spurious horizontal currents is not enough. Comparison of the same model experiment with horizontal resolution of 2 nautical miles could show the actual impact of horizontal resolution to the currents and vertical mixing in the Arkona basin. In addition, several set ups of z-models with horizontal resolution higher than 2 nautical miles, which are able to reproduce the salt water inflows to the Baltic Sea, have been reported in the past (Meier 2007, Lehmann et. al. 2004, Leibniz Institute for Baltic Sea Research set up of MOM 3.1 as used in Eilola et. 2009). The community would expect at least same performance from any new set up for the Baltic Sea.

Specific comments and questions

Additional comparison of modelled transports between different basins against literature values should be made as this could indicate the impact of underestimation of salt water inflows to the general circulation. Is the the tidal forcing in the North Sea used in the model if the model is closed at western boundaries?

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