



Closing the water balance in a regional coupled system model over the North and the Baltic Sea

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In many regional ocean models river flows are obtained from climatological data, which are often monthly data, thus, high peaks due to heavy precipitation are not taken into account. This is often even the case in a coupled setup where the regional ocean model is coupled to a regional atmosphere model. Recently, a few regional atmosphere-ocean coupled system models have been introduced where the river runoff is calculated interactively by a hydrology model or routing model. In this study, we consider a subset of the regional coupled system model GCOAST, which comprises the regional atmospheric model COSMO-CLM vs. 5.0 and the ocean model NEMO vs. 3.6 that are communicating with each other via the coupler OASIS. We have equipped this GCOAST-subset with the hydrological discharge (HD) model for the calculation of river runoff. The latter has already been used for many years in the global Earth System Model (ESM) MPI-ESM and the regional climate model REMO-MPIOM, but was also recently implemented into the regional ESMs ROM and RegCM-ES. The HD model is designed to run on a fixed global regular grid of 0.5° horizontal resolution, and it uses a pre-computed river channel network to simulate the horizontal transport of water within model watersheds. To do so, different flow processes are considered, such as overland flow, base flow, and river flow. In our presentation, we will show various problems encountered with setting up the coupled system and how we solved them. We will especially address water conservation that is an important issue while passing the runoff amounts from an atmospheric model through a river runoff scheme to an ocean model, because usually, the atmosphere, ocean and river runoff models use different spatial resolutions.