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Hydrological cycle in the Earth Modelling System

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Earth Modeling System (EMS) is the integrated geophysical system consisting of numerical models for the atmosphere, ocean, land surface and hydrological cycle over land. With an improvement of the computer resources, integration of the first three components became common, but a numerical simulation of the hydrological processes is still not well developed. The idea is to make dynamical hydrological model that will simulate water flow in the environment starting with precipitation, flowing into the rivers and ending in the oceans or lakes. The model should be made to work over any region with no calibration, as do other components of the EMS. One of the dynamical hydrological models is HYPROM (HYdrology PROgnostic Model). In this paper we will present its coupling with the last generation atmospheric model NCEP/NMMB (Non-hydrostatic Multiscale Model on the B grid), the main driver for the ESM that is being developed in the SEEVCCC/RHMSS (South East European Climate Change Center, Republic Hydrometeorological Service of Serbia). Dynamics of the water cycle from precipitation, its infiltration in the ground, runoff and river discharge are very well numerically resolved, while there is still a lot of uncertainties that are related to base flow and underground water. We will show progress in this area of research and problems that are yet to be resolved.