Geophysical Research Abstracts,
Vol. 11, EGU2009-5337, 2009
EGU General Assembly 2009

Simulation of dynamical wetland extent in a global hydrological model

T. Stacke and S. Hagemann

Max Planck Institute for Meteorology, Bundesstr. 53, 20146 Hamburg, tobias.stacke@zmaw.de

Wetlands interact very strongly with the global water cycle. They increase evaporation, store water and regulate river discharge. In spite of this, most of the global earth system models deal with wetlands as static shapes with fixed boundaries or do not include them at all. However, with changing climate the number and extension of wetlands may change and therefore their influence on the water cycle. In order to assess this influence it is necessary to develop a dynamical extent scheme for wetlands in earth system models.

The dynamical wetland extent module balances the vertical and lateral water fluxes within a gridcell and calculates the amount of water which belongs to lakes and wetlands. It also derives a relation between this available water volume and the corresponding water surface area based on high resolution subgrid topography. Thus it is able to assess the change in the lake and wetland fraction of a gridcell caused by the change in water fluxes. Additionally it regards feedbacks from lakes and wetlands to the water fluxes. These feedbacks comprise an alteration in evaporation, drainage and riverflow.

Currently the module is developed using the global hydrological model of the Max Planck Institute for Meteorology (MPI-HM) as a testbed. The MPI-HM consists of the Simplified Landsurface scheme and the Hydrological Discharge model. The two sub-models calculate the vertical and lateral water fluxes, respectively. While still being under development first test simulations were conducted to judge the performance of the module. Considering only the vertical water balance the generated lake and wetland fraction for the earth's land surface adds up to 11 %. This value seems too high compared to the *Global Lake and Wetland Database* (Lehner & Döll, 2004). However, the spatial distribution of water areas, especially in North America and Siberia, shows already some agreement with observations. With the next step, the implementation of the lateral water balance, a stronger drainage of wetlands due to riverflow is expected. This would lead to an improved distribution of the simulated lake and wetland fraction.

Later on the dynamical wetland extent module will be transferred into the land part of the MPI Earth system model (JSBach). Then also feedbacks in the energy balance can be considered.