EGU2020-21834
https://doi.org/10.5194/egusphere-egu2020-21834
EGU General Assembly 2020

Assessment of the effect of including information on the water level of surface water bodies into large scale hydrological modelling – Case study Amazon basin

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State of the art global hydrological models (GHMs) are able to assess continental water storages and fluxes. Different current GHMs provide conflicting estimates of e.g. evapotranspiration or discharge, resulting in differing water availability or climate change impact estimates. The Global Calibration and Data Assimiliation project (GlobalCDA) aims at enhancing our understanding of global freshwater resources by combining state-of-the-art hydrological modelling with new data assimilition and calibration methods using multiple geodetic and remote sensing data.

This study is part of the hydrological model development efforts within GlobalCDA and analyzes the effect of the adaptation and implementation of an existing dynamic floodplain model (Adam, 2017) into WaterGAP2.2d, a state-of-the-art GHM. The implemented floodplain model approach combines the modeling of a two-way river-floodplain interaction, downstream water transport within river and floodplain and flood-plain-groundwater interactions.

The effect of information on the water level of surface water bodies on the model results is assessed using the Amazon basin as study area. Observed river discharge is used to assess the changes in model efficiency as floodplains and other wetlands have a strong impact on river discharge dynamics. This study shows the value of the modeling of large floodplains and wetlands for an improved estimation of terrestrial water cycle components.