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Projecting the future levels of Lake Victoria

Inne Vanderkelen (1), Nicole van Lipzig (1), Wim Thiery (2,3)

(1) KU Leuven, Department of Earth and Environmental Sciences, Leuven, Belgium, (2) ETH Zurich, Institute for Atmospheric and Climate Science, Zurich, Switzerland, (3) Vrije Universiteit Brussel, Department of Hydrology and Hydraulic Engineering, Brussels, Belgium (wim.thiery@env.ethz.ch)

Lake Victoria directly sustains 30 million people living in its basin and 200 000 fishermen operating from its shores. As the one of the two sources of the Nile River, it also supports natural resources that impact the livelihood of over 300 million people living in the Nile basin. The outlet to the Nile is controlled by two hydropower dams. The water balance of Lake Victoria is controlled both by climatic conditions (precipitation and evaporation) and human management (dam outflow).

Future climate simulations with a high resolution coupled lake-land-atmosphere model project decreasing mean precipitation and increasing evaporation over Lake Victoria. As these two are important factors in the water balance of Lake Victoria, these projected changes may induce a drop in future levels of Lake Victoria. Moreover, as Lake Victoria is also a relatively shallow lake, lake surface area may decrease as well.

Here we present a water balance model for Lake Victoria that provides lake level and extent as output. We first force our model with observational input (new satellite products providing high quality precipitation and evaporation data) and evaluate it using measured lake levels. The skill of the model is subsequently assessed by forcing it with present-day regional climate simulations (CORDEX evaluation simulations). In a third step the future lake levels and surface area changes of Lake Victoria are simulated by forcing the model with CORDEX projections under RCP4.5 and 8.5. Finally, the role of human decisions regarding future dam outflow are investigated.