Modeling present-day and future extreme events in the Lake Victoria Basin

Nicole van Lipzig\textsuperscript{1}, Jonas Van de Walle\textsuperscript{1}, Matthias Demuzere\textsuperscript{2}, Andreas H. Fink\textsuperscript{3}, Patrick Ludwig\textsuperscript{3}, Grigory Nikulin\textsuperscript{4}, Joaquim Pinto\textsuperscript{3}, Andreas F. Prein\textsuperscript{5}, Dave Rowell\textsuperscript{6}, Minchao Wu\textsuperscript{4}, and Wim Thiery\textsuperscript{7}

\textsuperscript{1}KU Leuven, Leuven, Belgium, nicole.vanlipzig@kuleuven.be
\textsuperscript{2}Ruhr-University Bochum, Bochum, Germany
\textsuperscript{3}Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Karlsruhe, Germany
\textsuperscript{4}Swedish Meteorological and Hydrological Institute, Norrköping, Sweden
\textsuperscript{5}National Center For Atmospheric Research (NCAR), United States
\textsuperscript{6}Met Office Hadley Centre, Exeter, United Kingdom
\textsuperscript{7}Department of Hydrology and Hydraulic Engineering, Vrije Universiteit Brussel, Brussels, Belgium

The population in the Lake Victoria Basin (LVB) is affected by extreme weather both on land, where flooding regularly occurs and on the lake, where nightly storms often catch fishermen by surprise. The CORDEX Flagship Pilot Study ELVIC investigates how extreme weather events will evolve in this region of the world and to provide improved information for the climate impact community. Here we evaluate the performance of five regional climate models at convection-permitting resolution and present projections for the future using COSMO-CLM in a pseudo global warming approach. Most substantial systematic improvements were found in metrics related to deep convection in convection-permitting models compared to their coarser scale counterparts. For the future, extreme precipitation and wind gusts are expected to increase over the lake due to a thermodynamically induced increase in water vapor whereas the impacts of weaker meso-scale circulation over the lake and stronger thunderstorm dynamics compensate each other. More compound events are expected for the future during which both rainfall and wind gusts are intense. Interestingly, the mean precipitation is strongly affected by uncertainties in large-scale dynamics whereas thermodynamics dominate extreme precipitation. This might imply that uncertainties in future projected extremes are smaller than those in mean precipitation.