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The impact of Lake Victoria on climate extremes in Eastern Africa

Jonas Van de Walle (1), Oscar Brousse (1), Wim Thiery (2,3), Matthias Demuzere (1,4,5), and Nicole P.M. van Lipzig (1)

(1) KU Leuven, Leuven, Belgium (jonas.vandewalle@kuleuven.be), (2) Vrije Universiteit Brussel, Brussels, Belgium, (3) ETHZ, Zürich, Switserland, (4) Universiteit Gent, Ghent, Belgium, (5) Kode, Ghent, Belgium

As one of the stormiest places in the world, the Lake Victoria region (East-Africa) is prone to hazardous climate extremes. More than 5000 fishermen die every year due to heavy and hardly predictable thunderstorms happening over the lake (Semazzi et al., 2011), emphasizing the need to thoroughly study the area. Thiery et al. (2015) were first to model the climate of this region at high resolution (∼7 km) and gain insights on the regional climatology of the African Great Lakes. As a follow-up, this study therefore aims at unraveling the interaction of Lake Victoria on the initiation, development and behavior of mesoscale convective systems.
To assess the influences of Lake Victoria on the mesoscale convective systems, two regional climate simulations are performed with COSMO-CLM and compared over a time period of 8 years (2010-2017). One reference simulation is run with the presence of Lake Victoria while the second excludes the lake. The simulation techniques are identical and consist of a direct dynamical downscaling procedure from ERA-5 reanalysis to a domain at a convection permitting resolution of 2.8 km. The model set-up follows the CORDEX-Africa tropical set-up proposed by Panitz et al. (2014), and supplements the original microphysics scheme by the two-moment scheme. To accurately represent the lake structure in the first simulation, the model is coupled to the Freshwater Lake model (FLake).
Analysis of the model output will improve our understanding of the impact of unstable boundary layer air over Lake Victoria on the development and progress of lake-land interaction induced convective systems. The accurate model output will also serve as boundary conditions for a 1 km resolution domain centered over Kampala (the capital city of Uganda) to study the urbanization impact on the regional climate as proposed by Brousse et al. (2018, 2019).