Project title: **KIT-ELVIC – Climate Extremes in the Lake Victoria Basin**

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Project overview:

The Institute of Meteorology and Climate Research at the Karlsruhe Institute of Technology (KIT) aims to make a considerable contribution to the CORDEX (embedded in the World Climate Research Programme (WCRP)) endorsed Flagship Pilot Study (FPS) ELVIC – Climate Extremes in the Lake Victoria Basin. Since the computational cost of the planned high-resolution runs is currently so high that individual groups can only afford one realization of a possible future climate. Ensemble climate projections at the convection resolving scale are only possible in internationally coordinated programmes such as CORDEX. Therefore, the CORDEX Flagship Pilot Study (FPS) "ELVIC – climate Extremes in the Lake VICtoria basin" was initiated in 2018 with the overall objective to provide robust climate information on extremes to the impact community.

In East Africa, particularly in the Lake Victoria Basin (LVB), extreme weather events, like heavy precipitation, heat waves, droughts and wind storms have a detrimental impact on societies. As the frequency and intensity of climate extremes is projected to further increase substantially with climate change, so do the risks, with potentially major consequences for livelihoods of people in the LVB. Future climate projections for the LVB are challenged by the complexity of the region. The mesoscale circulation induced by the lake and by the complex orography surrounding the basin, strongly modulate the climate change signal. Moreover, current state-of-the-art climate simulations over the region parameterize convection, while Convection Permitting Models (CPMs) have shown a strong added value in representing convection in other regions of the world. Altogether this urges for reducing model resolution to grid sizes of less than 5 km.

Within the scope of the FPS, KIT will contribute to the project by (1) dynamical downscaling of reanalysis data (EAR-Interim, ERA5) to validate model performance of a state-of-the-art regional climate model (WRF) for present day conditions at convection resolving resolution of ~2.8 km. These simulations will be compared with other regional climate simulation performed by other institutions using different regional climate models (e.g. COMSO-CLM at KU Leuven, AROME at the Swedish Meteorological and Hydrological Institute (SMHI)). Furthermore (2), a statistic dynamic downscaling approach will be applied by simulating individual episodes with COSMO-CLM based on recurring weather types (clusters) for comparison with the dynamical downscaling results from KU Leuven. Finally, (3) projections of climate change for the end of the 21st century will be computed by dynamical (WRF) and statistic dynamical downscaling (COSMO-CLM) based on available GCM data.