Geophysical Research Abstracts
Vol. 17, EGU2015-5703, 2015
EGU General Assembly 2015

Present and future precipitation variability over the East African region using CORDEX simulations (COSMO-CLM) and its relation with circulation patterns

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The East African region is highly dependent on precipitation due to its water-fed agricultural system. On the other hand the region experiences a high interannual variability regarding precipitation amounts during several months. Consequently, there is a strong need to predict how precipitation variability will evolve under climate change in this region. This requires a good understanding of the processes that influence this variability.

This study tackles this issue via the use of circulation patterns, shown to strongly influence precipitation over the East African region. Changes in (the frequency of) circulation patterns towards the future are therefore the main drivers of changes in precipitation variability. To investigate this issue a classification of the different circulation patterns over the region was executed for a reference period (1981-2010) on ERA Interim data using the COST733class software. Different algorithms are tested and their performance over the study area is evaluated. This results in a weather atlas concerning the circulation patterns and their corresponding precipitation amounts that are currently present over the region.

Furthermore, the classification will be executed on the COSMO-CLM CORDEX-Africa evaluation simulation for the same reference period. The model results are evaluated by comparing them with the classification results of the ERA Interim data and observational datasets. To predict how precipitation variability changes towards the future, a classification is also applied on the whole CORDEX-Africa ensemble for a present (1981-2010) and future period (2071-2100) under RCP 8.5. Comparing both classifications makes it possible to detect differences in the frequencies of circulation patterns and in the circulation patterns themselves. Particular attention is paid to the months that show a high interannual variability in precipitation amounts, since changes here are of most importance for the region. Finally, the different drivers of interannual circulation and precipitation variability will be considered. In particular, the influence of ENSO on precipitation amounts will be investigated and it will be tested how changes of this oscillation may influence precipitation variability.