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How strong ist the impact of changing topography of the East African Rift System on regional climate?

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The evolution of the East African Rift System (EARS) leads to a topography change at the surface and the impact of this change on climate in this region can easily be analysed with climate models. In the present study both global and regional climate models are applied. The global climate model is the coupled atmosphere ocean general circulation model ECHO-G and the regional climate model is the non-hydrostatic CLM, which is the climate version of the numerical weather prediction model of the German Meterorological Service. At the lateral boundaries the regional model is driven by the simulations performed with the global model. Different topographical situations representing possible conditions in the past, are simulated with the global and the regional climate model. One assumption affects only the highest peaks of the EARS south of the Turkana Channel by reducing them to 1200 m. The other assumptions affect a much larger area covering the whole of Southern and Eastern Africa. Over this region topography is reduced by 25%, 50%, 75% and 95%. These different topography reductions have an impact on circulation and therefore also on moisture transport. This leads to changes in the precipitation patterns over Africa. One strong effect is the decrease in orographic precipitation windward of the mountains. Wetter conditions can be found over the east coast of Africa, where moisture is transported from the Indian Ocean farther into the continent due to the lower barrier. Both global and regional models show similar results on the continental scale, however the results of the regional model are much more detailed due to the higher horizontal resolution (50 km) compared to the global model (∼350 km).