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High resolution climate change scenarios for sub-Saharan Africa

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Africa encompasses some of the world's regions most vulnerable to climate change, but even though prioritized in the IPCC Third Assessment Report, there is only a small under-resourced scientific community with so far little to draw on beyond raw GCM output and with minimal access to regionalized climate change scenarios. The aims of the recently finished African-designed and -led project AIACC (Assessments of Impacts and Adaptations to Climate Change), funded by the UN and Canadian and US agencies, were to develop new statistical approaches to generating climate change scenarios at appropriate time and space scales and to develop regional climate model-based projections of climate change. We here report on some key results.

Both GCMs and RCMs vary widely in their representation of present-day African climate, in particular south of the Sahara, both in terms of parameterized variables (e.g. rainfall) and regional dynamics. Aspects of the land-surface, especially soil moisture and vegetation, are important to correctly simulate the climate of Africa. They may be important components of future change that are not currently addressed to a large degree. Consistent trends have been observed over southern Africa during the last three decades, for example in dry spell duration and extreme temperatures. Due to the sparse (in certain regions non-existing) observational network over most parts of Africa, it remains difficult to attribute these trends to anthropogenic influence.

Statistical and dynamical downscaling procedures for future climate evolution have been applied for a number of GCMs and RCMs. According to these simulations, strong drying can be expected over the central Sahel, while there is an increase in precipitation along the east African rift valley. This goes along with a tendency for less rain days in regions adjacent to the oceans. Also changes in the diurnal cycle of precipitation are simulated.