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Simulation of the fine scale features and their implications for climate change from a double nested regional climate model: the Southern African domain

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Southern Africa is mostly covered by semi-arid regions, which are known for their unreliable rainfall patterns and consequential impact on water resources and food security. The region is characterized by highly complex topographical features due to the presence of mountain chains. These features are variable in spatial extension and are subject to rapid changes in the climate. Southern Africa is bounded by the southern Atlantic and Indian oceans, whose circulations have great influence on the region's climate. By virtue of its position, variations experienced by region are complicated making it more vulnerable to the effects of climate change. In view of these, climatic variables needed for vulnerability assessment must be studied at regional or local scales and this requires a deep understanding of potential present day climate and future changes over the region. Although there have been regional climate studies over southern Africa, most of them employed low resolution (~50 km). It is known that such low resolution cannot convincingly capture the spatial variability of variables needed to provide the regional and local climate change information. Based on these considerations, this study aims at using the International Center for Theoretical Physics (ICTP) Regional Climate Model (RegCM3) in a double nested configuration to represent the fine scale features and investigate their role on future climate of southern Africa. The results based on preliminary analysis showed that when used in a double nested configuration, RegCM3 is capable of providing some small scale features in the spatial distribution of temperature and rainfall over southern Africa. However, the latter results need to be validated by station data. Apart from the validation of rainfall and temperature, evaluation will be conducted on features in the wind fields and geopotential height (such as cut-off lows, deep tropical lows, TTTs and temperate lows) and their role on climate change investigated.
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