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Extreme rainfall events over southern Africa: individual and combined influence of Atlantic sea surface temperatures on rainfall variability

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It is increasingly accepted that any possible climate change will not only have an influence on mean climate but may also significantly alter climatic variability. A change in the distribution and magnitude of extreme rainfall events (associated with changing variability), such as droughts or flooding, may have a far greater impact on human and natural systems than a changing mean. This issue is of particular importance for environmentally vulnerable regions such as southern Africa. The subcontinent is considered especially vulnerable to and ill-equipped (in terms of adaptation) for extreme events, due to a number of factors including extensive poverty, famine, disease and political instability.

Rainfall variability and the identification of rainfall extremes is a function of scale, so high spatial and temporal resolution data are preferred to identify extreme events and accurately predict future variability. In this research, high resolution satellite derived rainfall data from the Microwave Infra-Red Algorithm (MIRA) are used as a basis for undertaking idealised model experiments using a state-of-the-art regional climate model. The MIRA dataset covers the period from 1993-2002 and the whole of southern Africa at a spatial resolution of 0.1 degree longitude/latitude. Once the model's ability to reproduce extremes has been assessed, idealised regions of sea surface temperature (SST) anomalies (associated with the identified extreme days) are

used to force the model, with the overall aim of investigating the ways in which SST anomalies influence rainfall extremes over southern Africa.

In this paper, results from sensitivity testing of the UK Meteorological Office Hadley Centre's regional climate model's domain size are firstly presented. Secondly, simulations of current climate and rainfall extremes from the model are compared to the MIRA dataset at daily timescales. Finally, the results from the idealised SST experiments are presented, suggesting associations between rainfall extremes and both local and remote SST anomalies.