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Simulation of mesoscale convective systems with the Conformal Cubic Atmospheric Model on the CHPC

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Mesoscale convective systems (MCSs) are defined as cloud bands that produce flanking precipitation within a scale of 100 km or more and comprise an ensemble of thunderstorms. MCSs may also be associated with severe weather such as tornadoes, hail, straight-line winds, squall lines, mesoscale convective complexes and flash flooding. MCSs are a major contributor towards the total observed global rainfall and to the hydrological cycle at large. Numerical Weather Prediction (NWP) models play a critical role in skilfully and timeously predicting such events to help prevent or mitigate associated hazards. High resolution NWP models are equipped with the ability to explicitly represent some physical processes within convective systems by means of parameterization schemes. Convection parameterization schemes play a more critical role in representing the pattern, characteristics, processes and temporal variation of convective precipitation in NWP models. This study aims to investigate the capability of the Conformal Cubic Atmospheric Model (CCAM) in simulating cases of severe MSCs over South Africa. The CCAM comprises a convection parameterization scheme, CSIRO9, which has different versions. The CCAM was setup to run with four versions of the CSIRO9 on the CHPC. The results will show the CCAM performance in simulating these MCSs, the benefits and shortcomings of each version of the CCAM convection scheme and the effectiveness of the CHPC in running NWP models.

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