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Variable resolution numerical weather modelling on the CHPC

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The South African Weather Service (SAWS) has employed the computing resources of the Centre for High Performance Computing (CHPC) for several research projects. The current project is primarily focused on model development, utilizing the Conformal Cubic Atmospheric Model (CCAM) provided by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The model was successfully installed on the CHPC cluster, and a series of experimental simulations were conducted at various grid resolutions. The primary objective was to gain insights into the model's scale-awareness and identify areas where improvements could enhance its ability to simulate high-impact weather events. The chosen grid resolutions included 25 km, 10 km, 6 km, 3 km, and 1 km. For each case study, the model simulations were run around the area of observed high-impact weather. As a result, the high-resolution simulations spanned a relatively small geographical area. This paper details the procedures employed to execute these diverse CCAM simulations, the computational resources utilized, and the model's performance.

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