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Climate modelling and seasonal climate forecasting at CSIR sing the CHPC cluster

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The existence of the CHPC where our group has access to through the Lengau cluster under the project ERTH0859 is providing us with the means to do our modeling activities requiring high-performance computing. These activities are the systematic and seamless dynamical and statistical downscaling tasks ranging from short-range weather forecasting; seasonal climate forecasts; to climate simulations and projections. Over the years, we have been using the Conformal-Cubic Atmospheric Model (CCAM) to generate high-resolution climate outputs or dynamically downscale global climate models across the mentioned time spectrum over Africa, with a closer look over Southern Africa. The climate projections are to inform climate change impact studies, risk and vulnerability analysis, the formulation of adaptation strategies and climate change policy while short-range weather forecasting and seasonal forecast inform timely decision making.

Currently, weather forecasts are being generated at 15km resolution over South Africa while seasonal forecasts and climate projections are generate at 8km resolution over South Africa and 50km over the whole of Africa. Other finer resolution data are being generated for specific places within the country e.g., the high-resolution downscaling of urban climate over Tshwane has been completed. These urban runs are high resolution runs that use the TEB within CCAM to simulate the urban form, in order to simulate the urban heat island in current and future climate. This is important to assist urban areas in understanding the spatial differences in exposure to heat, and impacts on air quality and health. This is a unique capability to the CSIR modelling team, and due to its computational expense, this task among other dynamical modelling tasks would not be possible without the CHPC. In addition, the improvement of the seasonal forecasting system has continuing with the use of the CHPC. We also have other limited area models we have started exploring e.g., the Weather and Forecasting non-hydrostatic model to complement the CCAM model-based runs. These model runs continue to highly support much of the research in the group.

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