Seasonal persistence of circulation anomalies in the Southern Hemisphere stratosphere, and its implications for the troposphere

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Previous studies have highlighted an important organising influence of the seasonal Southern Hemisphere stratospheric vortex breakdown on the large-scale stratospheric and tropospheric circulation, which should provide a source of seasonal predictability for the troposphere. In this study we show, using reanalysis data, that perturbations to the winter SH stratospheric vortex persist into austral spring, and lead to a shift in the statistics of the breakdown event during austral summer. There is dynamical coupling to the troposphere throughout this period. The statistical relationships associated with the anomaly persistence provide illuminating diagnostics for model evaluation, and are used to understand the performance of the recent and latest ECMWF seasonal forecast systems in their prediction of the Southern Annular Mode during this time of year.

Key words: Southern Hemisphere, polar vortex, stratosphere-troposphere coupling, Southern Annular Mode