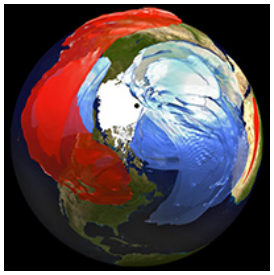

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Subseasonal-to-seasonal predictability of the Southern Hemisphere eddy-driven jet during austral spring and early summer

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Several recent studies have suggested that the stratosphere can be a source of subseasonal-to-seasonal predictability of Southern Hemisphere circulation during the austral spring and early summer seasons, through its influence on the eddy-driven jet. We exploit the large sample size afforded by the hindcasts from the European Centre for Medium-Range Weather Forecasts Integrated Forecast System to address a number of unanswered questions. It is shown that the picture of coherent seasonal variability of the coupled stratosphere-troposphere system apparent from the reanalysis record during the spring/early summer period is robust to sampling uncertainty, and that there is evidence of nonlinearity in the case of the most extreme variations. The effect of El Niño-Southern Oscillation on the eddy-driven jet during this time of year is found to occur via the stratosphere, with no evidence of a direct tropospheric pathway. A simple two-state statistical model of the stratospheric vortex is introduced to estimate the subseasonal-to-seasonal predictability associated with shifts of the seasonal cycle in the SH extratropical atmosphere. This simple model, along with a more general model, are subsequently used to interpret skill scores associated with hindcasts made using the full seasonal forecast model. Together the results provide evidence of tropospheric predictability on subseasonal-to-seasonal timescales from at least as early as August 1, and show no evidence of a 'signal-to-noise paradox' between the full seasonal forecast model and the reanalysis.

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