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Radiative effects of ozone waves on the polar vortex seasonal cycle and extratropical QBO signal

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Studies have shown that the radiative effects induced by ozone zonal asymmetries can significantly change the temperature of the winter polar cap, and correspondingly the strength of the polar vortex. Given the dominance of dynamics relative to radiative processes in driving variations in the stratosphere, it is clear that the influence of ozone zonal asymmetries involves a significant change in the drag exerted by the planetary waves. However, it is not clear how this change is brought about from the direct radiative influence. Using temperature tendencies from MERRA reanalysis, as well as is a set of 100 year runs with the Whole Atmosphere Community Climate Model (WACCM) we quantify the direct radiative effect of ozone waves on planetary temperature wave amplitudes, and examine how this influence is amplified and evolves in time and space through wave-mean flow feedbacks from an early winter subtropical influence on the waves to an anomaly in the polar vortex in mid winter, with a QBO phase dependence.