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Impact of El Niño Modoki signal from the stratosphere to the troposphere

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Recent studies have shown a significant warming in the Southern Hemisphere polar stratosphere in both reanalysis data and chemistry climate models when the sea surface temperature anomalies typical of ENSO events maximize in the Central Pacific Ocean (El Niño Modoki) instead of the Eastern part (Canonical El Niño). This signal, absent during the Canonical warm ENSO events, peaks in austral spring/summer. It is related to anomalous convection located in the western part of the tropical Pacific Ocean (instead of in the central-eastern part as during Canonical ENSO events) which generates a wave train in the Southern Hemisphere that operates constructively with the climatology, intensifying upward planetary wave propagation. The anomalous warming obtained over the polar stratosphere propagates downwards into the lower stratosphere-upper troposphere region. In our study, we investigate whether the downward propagation of El Niño Modoki signal has an impact on the surface, similar to the effect of Canonical warm ENSO stratospheric signals on tropospheric climate in the Northern Hemisphere. In order to do that, a high top and low top general circulation models, with and without a well resolved stratosphere, are analyzed here.