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Equatorial waves in the lower stratosphere

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Following the general concensus that equatorial waves in the stratosphere are forced by convection, we use the LMDz atmospheric model to compare two simulations having distinct convection schemes. As expected, the wavenumber-frequency spectrum of precipitations is different between the simulations, but they both underestimate the high frequencies and the high wavenumbers when compared to observations. However, the equatorial stratospheric Kelvin waves in the model at 50hPa is quite realistic and do not present significant differences between the two simulations. The same applies to the Rossby gravity waves, which are nevertheless too weak in the model stratosphere. In LMDz, the direct effect of convectionis in part hidden by the existence of other sources of waves. An Eliassen and Palm flux diagnostics show that the Kelvin waves in the model come from the subtropics and mid-latitudes whereas the sources are more equatorial in the reanalysis. To show nevertheless that in reality equatorial waves are not uniquely related to the convection in the tropical regions, we take the case of Rossby gravity waves in a dynamical configuration where the stratosphere is dynamically separated from the troposphere. We can found in this case substantial Rossby gravity waves signal, a process we refer to as a « stratospheric reloading ». This study shows that convection is definitely not the unique source of large scale equatorial waves in the stratosphere, and that model with too weak convection can still have substantial equatorial waves.