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Impacts of the convection parameterization scheme on the Stratospheric Equatorial waves simulated by the GCM LMDz.

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Equatorial waves play an important role in the stratosphere and are a fundamental components of the interaction between physics and dynamics in the tropical atmosphere. Equatorial Kelvin waves and Rossby-Gravity waves are partly responsible for the quasi-biennal oscillation (QBO) and the semi-annual oscillation. These waves also contribute to the dehydration of the air when it crosses the Tropopause Tropical Layer. It is therefore important that they are well represented in General Circulation Models (GCMs).
Stratospheric equatorial waves are often considered to be forced by convection but other sources are plausibles like the interaction between the midlatitudes and the tropics. In model the direct effect of convection can also be hidden by the fact that the vertical resolution can become a strong dynamical filter for the slow and long equatorial waves that eventually enters in the stratosphere.

To adress these issues we compare two simulations with the LMDz GCM where two distinct convection schemes are used: the parameterization of Tiedke (1989) and the parameterization of Emanuel (1990). A wavenumber-frequency spectrum analysis of precipitations is then performed and compared with observations. The spectral characteristics of precipitations depend clearly on convective scheme with clearly underestimating the high frequences and the high wavenumbers of the precipitation. To evaluate the impact of these changes on equatorial waves, we performe an other wavenumber-frequency spectrum analysis of the zonal wind, the meridionnal wind, the temperature and the geopotential. We first note an important Kelvin waves activity in the model lower stratosphere despite the weak eastward activity in the precipitations. Moreover, the westward Rossby-Gravity waves seem even more affected by the convection scheme than the Kelvin waves. Very surprisingly, we find that with different convection schemes, the waves are not much different, despite the fact that the precipitation variability in both simulation is very different.