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A Study of the dynamics of tropical-extratropical atmospheric connection using the vorticity equation

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The different terms of the vorticity equation are analysed in this work in order to interpretate not only the propagation but also the sources of the Rossby waves that are the responsible of the atmospheric teleconnections originated in the high troposphere. The perturbations in the atmospheric circulation have been studied for different ENSO events using the NCEP-NCAR reanalysis data. The aim of the study is to analyse the impact of the surface thermal anomalies applying the barotropic theory, stablished as a wave equation. The results show, first, an asymmetry between the different phases of ENSO, El Niño and La Niña and, also, notable differences between some events of the same phase. The stationary wave number helps to understand which conditions are required to allow the existence of wave guides (preferencial patterns) and reflexion areas that inhibit the wave train propagation. This work shows that, in some cases, there is an strangled area in this critical regions which allow the interhemispheric connections; whilst in other cases the spatial distribution is more compact, with the corresponding inhibition of this kind of trayectories. The monthly evolution of the Rossby wave sources and, simultaneously, their propagation to extratropical regions will be also shown in this work.