



## **Atmospheric variability and its relationship with winter precipitation over Mexico and Southern USA in the 21st Century from CORDEX RegCM4 simulations**

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We study the relationship between atmospheric variability modes (MAVs) obtained from empirical orthogonal functions of 500 hPa geopotential height anomalies and winter precipitation over Mexico and Southern USA. The annual cycle and interannual variability of precipitation from four RegCM4 present-period simulations using different configurations are evaluated as prior step to analyse future projections for the 21st century. The model ability to reproduce the MAVs is also assessed by comparing with ERA-Interim reanalysis. The dominant MAV in the projections is an inhomogeneous atmospheric expansion which induces a future change in the atmospheric circulation by favoring inland advection of oceanic humidity, and therefore increasing precipitation over the Northwest of Mexico and Southwest USA. The second AVM represents a dipole of zonal expansion-compression which apparently modulates interannual precipitation variability in our region of study. This second mode is actually accountable for the occurrence of very wet and very dry winters in this region; and therefore the increase of the interannual variability of this MAV is responsible for the projected increase in interannual variability of winter precipitation.