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The impact of ENSO and the Atlantic Multidecadal Variability (AMV) on the upper tropospheric large scale flow in the PRIMAVERA models.

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Rossby waves play a fundamental role for both climate and weather. They are in fact associated with heat, momentum and moisture transport across large distances and with different types of weather at the surface. Assessing how they are represented in climate models is thus of primary importance to understand both predictability and the present and future climate. In this study we investigate how ENSO and the AMV affect the large scale flow pattern in the upper troposphere of the Northern Hemisphere, using reanalysis data and data from the PRIMAVERA simulations.

The upper tropospheric large scale flow is investigated in terms of the Rossby wave activity associated with persistent and recurrent patterns over the Pacific-North American and Euro-Atlantic regions during winter, the so called weather regimes. In order to quantify the vigour of Rossby wave activity associated with each weather regime we make use of a recently developed diagnostic based on Finite Amplitude Local Wave Activity in isentropic coordinates, partitioning the total wave activity into the stationary and transient components. The former is associated with quasi-stationary, planetary Rossby waves, whereas the latter is associated with synoptic scale Rossby wave packets. This allows one to quantify the contribution from stationary versus transient eddies in the total Rossby wave activity linked to each weather regime.

In this study we explore how ENSO and the AMV affect both the weather regimes frequencies and the upper tropospheric waviness in the Pacific and Atlantic storm tracks, respectively. Furthermore we analyse how both the stationary and transient wave activity component modulate the onset and transition between different regimes.