



Atmospheric Circulation Influence on Dry Periods over the Central Andes

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The observed increase in weather and hydroclimatological extremes over this century has brought much needed attention to this subject. It's known that some extremes such as heavy rainfalls, flood events, heatwaves and droughts in particular are not surprising in a warming world. They depend largely on the atmospheric circulation and local features. Bolivia is no exception and while the large scale dynamics over the Amazon has been largely investigated, the local features driven by the Andes Cordillera and the Altiplano is still poorly documented.

This study aims to improve the understanding of the influence of Atmospheric Circulation Patterns (ACPs) on dry periods over the South-American Central Andes in recent decades. Coupling Principal Components Analysis (PCA) and k-means clustering to geopotential height anomalies (at 200 and 500 hPa), we find a set of ACPs that we associate to precipitation, moisture flux and sea surface temperature (SST) in order to identify the main physical mechanisms of droughts during Austral Summer. We explore several reanalysis with special emphasis in those with higher spatial resolution that represent the regional orography better. Results show a link between positive El Niño Southern Oscillation (ENSO) phases and dry periods over this region, occurring mainly with anticyclonic and westerly ACPs.

The ACPs characterised in this study allows to identify recurrent regimes that are common during dry periods. The principal outcome is the extended knowledge on the local circulation and their relationship with droughts. The identification of the physical mechanisms also provides predictive skill over the Central Andes region.