The impacts of Atmospheric Rivers on Precipitation over the west coast of Southern South America

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Similar to mountainous west coast of North America, the west coast of South America (SA) is strongly affected by heavy orographic precipitation events that result from the landfalling Atmospheric Rivers (AR). When the pre-cold-frontal moisture transport enhances and concentrates over the ocean in the form of a narrow and long corridor heading to the Andes mountains in SA, orographic processes enhance precipitation along the windward side, usually producing floods, landslides, and river overflow, that at worst can cause irrecoverable losses and fatalities. On the other hand, these heavy orographic precipitation events are a major contributor to water resources in the region, especially at the subtropical latitudes where the Andes are higher and melted snow irrigates the desert lands on both flanks of the range. Despite their importance, the SA region has a significant gap in the knowledge of AR phenomena and their impacts compared to North America and western Europa. In this study, we will discuss results from the quantification of how AR storms contribute to the annual total precipitation along the west coast of SA between the southern tip of the continent and 30ºS, and across the Andes from the west coast (Chile) to the foot of the Andes in the leeside (Argentina). By doing so, we estimate the role of AR on the water cycle in the region as well as their inland penetration across the Andes. The Integrated Water Vapor Transport (IVT) strength and shape estimated from Climate Forecast System Reanalysis (CFSR) data over the 2001-2015 period is used for the AR identification, while daily precipitation recorded with rain gauges located in Chile and Argentina are used to quantify the impact of AR on precipitation over the region.