

Can easterly winds in Southern Hemisphere mid-latitudes cause extreme daily precipitation over Patagonia?

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Patagonia is a vast region in South America's mid-latitudes, which encompasses two regions with highly distinct precipitation features. They include wet Western Patagonia extending from the Pacific coast to the Andean highs, and dry Eastern Patagonia situated leeward of the Andes in the Argentine steppe plains. The prevailing westerly winds throughout the year are responsible for the spatial distribution of mean precipitation. The climate of the Argentinean Eastern Patagonia is characterized by the extremely dryness of the air, because of low rainfalls and high evaporation as a consequence of strong westerly winds. At climatic scale, enhanced (reduced) monthly mean precipitation is associated with weakened (intensified) westerly flow in the region. For such a reason, westerlies have been considered the unique driver of climate both in Western and Eastern Patagonia.

Extreme daily precipitation events are examined in detail to identify their typical synoptic tropospheric circulation flows. Intense daily precipitation is related partly to strong local westward moisture transport, as a consequence of slow-moving weather systems crossing over eastern Patagonia. It could be interpreted as due to enhanced synoptic easterly moisture flux from the Atlantic. Thus, the westerlies rule was broken at least under blocking-like flows, which induces moist easterlies. The influence of the Peruvian coastal manifestation of the El Niño-Southern Oscillation (ENSO) phenomenon is discussed too.