Contrasting atmospheric circulation in the high-southern latitudes during central- versus eastern-Pacific El Niño events

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Antarctica and the high-southern latitudes are inherently connected to rest of the world through global teleconnections, such as the El Niño-Southern Oscillation (ENSO) and its linkages to atmospheric circulation and climate. ENSO not only describes the oscillation between warm (El Niño) and cool (La Niña) sea surface temperatures (SSTs) in the tropical Pacific, but El Niño events are often defined based on whether the warm SST anomalies are located in the central (CP) or eastern (EP) tropical Pacific. This study characterizes the impacts on atmospheric circulation in the high latitudes of the Southern Hemisphere that are associated with each type of El Niño. Simulating these events using the National Center for Atmospheric Research Community Atmosphere Model reveals evidence consistent with observations showing intense blocking over Australia and a southward shift in the sub-tropical jet stream across the eastern Pacific basin during CP events compared to the EP type. More importantly for the high-southern latitudes, CP El Niños shift the upper-level divergence in the tropical Pacific westward, causing the Pacific-South American stationary wave pattern to shift toward the west across the entire South Pacific. These changes to the Rossby wave source region weaken high-latitude blocking that is typically present in the Amundsen-Bellingshausen Seas during EP events, as anticyclonic flow becomes established farther west in the South Central Pacific. This modifies the high-latitude heat and momentum fluxes across the South Pacific and South Atlantic that are associated with the ENSO-Antarctic Dipole.