

Combined Impact of ENSO and Antarctic Oscillation on Austral Spring Precipitation in Southeastern South America (SESA)

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Abstract

Southeastern South America (SESA)'s precipitation is supposed to be influenced by both El Niño Southern Oscillation (ENSO) and Antarctic Oscillation (AAO), especially in austral spring. Previous studies conclude that AAO can modulate ENSO's impact on precipitation over the SESA region, without differentiating between El Niño and La Niña events. In the present study, we use composite analysis to further explore the combined impact of AAO and ENSO on austral spring precipitation over Southeastern South America (SESA) to answer this question as well as explain the dynamic mechanisms behind. We found that different AAO phases can influence La Niña's impact on SESA austral spring precipitation considerably, while this does not apply for El Niño events. From our analysis, we found that AAO exerts more impacts on austral spring precipitation over SESA compared to ENSO during La Niña years by influencing northerly wind and southward water vapor flux, which contributes most of moisture into the SESA region, due to the strengthening of South Atlantic subtropical anticyclone and stronger meridional gradient in low level pressure. Besides, there is an upper-level trough (ridge) over subtropical South America indicating advection of cyclonic (anticyclonic) vorticity inducing anomalous increase (decrease) of precipitation over that region during La Niña/AAO- (La Niña/AAO+). We do not see this opposite difference within El Niño groups combined with different phases of AAO.