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The effect of the South Pacific Convergence Zone on the termination of El Niño events and the meridional asymmetry of ENSO

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The westerly wind response to an El Niño event shifts southward during boreal winter and early spring, such that the maximum zonal wind is centered about 5-7 degrees south of the equator. The resulting meridional asymmetry, along with a related seasonal weakening of wind anomalies on the equator are key elements in the termination of strong El Niño events. Using an intermediate complexity atmosphere model it is demonstrated that these features result from a weakening of the climatological wind speeds south of the equator. The reduced climatological wind speeds, which are associated with the seasonal intensification of the South Pacific Convergence Zone (SPCZ), lead to reduced surface momentum damping of the combined boundary layer/lower troposphere wind response to El Niño allowing the maximum wind speed to shift south of the equator. Therefore, the development of a realistic climatological SPCZ in DJF/MAM is one of the key factors in the seasonal termination of strong El Niño events. Furthermore, this southward wind shift is shown to generate a meridionally asymmetric discharge of heat away from the equator which is qualitatively similar to the observed. This result leads us to question the role of ocean dynamics in the recharge oscillator paradigm. Implications of the meridional asymmetry in El Niño-related wind anomalies for the positioning of the South Pacific Convergence Zone are also discussed.