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The Dynamics and Propagation of Westerly Wind Bursts

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Westerly wind bursts (WWBs), a westerly anomaly in equatorial winds in the Pacific, occur before every major El Niño event, yet major aspects of their mechanism are still not fully understood. Proposed mechanisms include cyclones approaching the equator, eastern-propagating convective heating, and wind-induced surface heat exchange, which amplifies WWBs near their peaks (Fu and Tziperman, 2019). To better understand WWB dynamics, we study their composite momentum budget using reanalysis and examine the role of convective heating and other factors. We find that many WWBs are not directly explained by nearby tropical cyclones or convective precipitation. We study their momentum budget before, during, and after the peak of the event, finding different balances at each stage. A comparison of the deduced balance to that in atmospheric general circulation climate models should add confidence in their ability to simulate this important factor in El Niño's development.