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Convectively coupled Kelvin waves over tropical South America region during austral autumn

Victor Mayta (1,2), Juliana Dias (2,3), George N. Kiladis (2), Pedro L. Silva Dias (1), and Tercio Ambrizzi (1)

(1) Departamento de Cieˆncias Atmosfe´ricas, IAG, Universidade de Sa˜o Paulo, Sa˜o Paulo, SP, Brasil, (2) Physical Sciences Division, NOAA/Earth System Research Laboratory, Boulder, Colorado, (3) Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, Colorado

Rainfall over the Amazon is known to both modulated by and also trigger convectively coupled Kelvin waves. In this work, the origin of South American Kelvin waves is revisited by analyzing empirical orthogonal functions (EOFs) of 4 times daily Kelvin- filtered brightness temperature over different tropical during boreal spring,
Consistent with prior studies, two main types of Kelvin waves over tropical South America are detected: Kelvin waves with a Pacific precursor that propagates into South America and Kelvin waves with a South American precursor. The events with precursors in the eastern Pacific account for about 40% of the total events. The cases with South America precursor are associated with either pressure surges from extratropical wave trains activity ("pressure surges") or "in situ" convection that locally excites Kelvin waves. Kelvin waves associated with pressure surges are responsible for 25% of total events. Interestingly, only 30% of these extratropical disturbances that reach the equatorial region develop into a Kelvin wave.
The wave propagates slightly faster over central and eastern Pacific ($\sim$19.7 m.s-1), slow down over tropical South America ($\sim$12 m.s-1), and then continues their propagation over tropical Atlantic at about $\sim$17 m.s-1. In the upper troposphere and lower stratosphere, above 250-hPa, clearly demonstrate a downward phase propagation and upward group velocity of zonal wind and temperature, consistent with the eastward tilt with height of the Kelvin wave; structure predicted by the theory.
At the lower-level the westerly (easterly) wind anomalies is roughly in phase with the enhanced (suppressed) convection, while in the upper-level zonal wind is clearly in quadrature with the convective signal, and its divergence being in the region of intensified convection.

To advance our understanding of forcing mechanisms related to the various types of Kelvin waves over tropical South America, a comprehensive analysis of their vertical structure, propagation characteristics and potential interactions with the basic state is presented.