

Excitation of slow MJO-like Kelvin waves in the equatorial atmosphere by Yanai wave-group via WISHE-induced convection

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The intraseasonal Madden-Julian oscillation (MJO) involves a slow eastward-propagating signal in the tropical atmosphere which significantly influences climate yet is not well understood despite significant theoretical and observational progress. We study the atmosphere's response to nonlinear "Wind Induced Surface Heat Exchange" (WISHE) forcing in the tropics using a simple shallow water atmospheric model. The model produces an interestingly rich interannual behavior including a slow, eastward propagating equatorial westerly multiscale signal, not consistent with any free linear waves, and with MJO-like characteristics. It is shown that the slow signal is due to a Kelvin wave forced by WISHE due to the meridional wind induced by a Yanai wave group. The forced Kelvin wave has a velocity similar to the group velocity of the Yanai waves, allowing the two to interact nonlinearly via the WISHE term while slowly propagating eastward. These results may have implications for observed tropical WISHE-related atmospheric intraseasonal phenomena.