



A multi-scale model for equatorial non-linear interactions

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In the present work we use multi-scale asymptotic methods for the development of simplified models for the non-linear resonant interactions in the equatorial region. Non-linear interactions are a possible way by which the atmosphere and ocean can lead to the generation of low frequency variability. The minimum non-linear system with three different elements is a triad. If a system is reduced to a triad, it can be solved analytically. However, not all the interactions can be resonant because there exist resonant conditions that must be satisfied. The multi-scale character of the development of the model allows us to discuss implications for the interactions between multiple scales with possible implications for El Niño and the Madden-Julian in connections with other scales of variability.