Stochastic models for tropical convection and climate

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Abstract

We present prototype coarse-grained stochastic models for the interaction of the large scale circulation with unresolved features of tropical convection. These coarse-grained stochastic parametrizations involve systematically derived birth/death processes which allow for direct interaction of the dynamical variables with the small scale unresolved fluctuations. It is established, for an idealized climate scenario, mimicking the Walker circulation associated with the Western Pacific/Indian Ocean warm pool, that in suitable regimes, these coarse grained stochastic models can significantly impact the climatology and strongly increase the wave fluctuations.