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Offshore propagation of coastal precipitation

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This work focuses on the seaward propagation of coastal precipitation with or without mountainous terrain nearby. Offshore of India, diurnal propagation of precipitation is observed in the Bay of Bengal. On the eastern side of the Bay a diurnal but non-propagating signal is observed near the west coast of Burma. This asymmetry suggests that the propagating mechanism is inertio-gravity waves. Perturbations generated by the diurnal heating over the coastal mountains of India propagate offshore, amplify in the upwind direction and dissipate in the downwind direction owing to critical level consideration.

A linear model is applied to study these gravity waves. Analytical analysis is performed for various heating depths, mountain widths, stability, Coriolis effect, background mean wind, and friction. We assess how these affect the amplitude, dissipation, initiation phase, and propagation speed of the diurnal disturbance. The propagation of precipitation triggered by land/sea breeze, are distinguishable from a mountain-plain circulation. For mountain breeze, convection from mountain heating starts earlier; propagates slower; and damps faster than that of the land breeze. For mountains near the coast, the slower propagation and stronger earlier convection are due to the combination of two dynamical mechanisms. The propagation of precipitation is initially triggered by mountain breeze near the coastal mountain. Over the open ocean, the dominant signal propagates as that of the land breeze but with stronger convection.