

Barrier Effect of the Indo-Pacific Maritime Continent on the MJO: Perspectives from Tracking MJO Precipitation

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Explanations for the barrier effect of the Indo-Pacific Maritime Continent (MC) on the MJO should satisfy two criteria. First, they should include specific features of the MC, namely, its intricate land-sea distributions and elevated terrains. Second, they should include mechanisms for both the barrier effect and its overcoming by some MJO events. Guided by these two criteria, we applied a precipitation-tracking method to identify MJO events that propagate across the MC (MJO-C) and those that are blocked by the MC (MJO-B). About a half of MJO events that form over the Indian Ocean propagate through the MC. Most of them (> 75%) become weakened over the MC. The barrier effect cannot be explained in terms of the strength, horizontal scale, or spatial distribution of MJO convection when it approaches the MC from the west. A distinction between MJO-B and MJO-C is their precipitation over the sea vs. land in the MC region. MJO-C events rain more over the sea than over land, whereas land rainfall dominates for MJO-B. This suggests that inhibiting convective development over the sea could be a possible mechanism for the barrier effect of the MC. Preceding conditions for MJO-C include stronger low-level zonal moisture flux convergence and higher SST in the MC region. Possible connections between these large-scale conditions and the land vs. sea distributions of MJO rainfall through the diurnal cycle are discussed.

Keywords: MJO tracking, Maritime Continent, barrier effect