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The Asymmetric Seasonal March of the Southeast Asian Monsoon

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This work uses station and satellite data to study the local variations of the annual cycle over the Maritime Continent. The annual cycle is dominated largely by interactions between the complex terrain and a simple annual reversal of the surface monsoonal winds. The semiannual cycle is comparable in magnitude over parts of the equatorial landmasses, but only a very small region reflects the twice-yearly crossing of the sun. The boreal summer and winter monsoon rainfall regimes intertwine across the equator, with the winter regime extends far northward along the eastern flanks of the major island groups and landmasses.

A hypothesis is presented to explain the asymmetric seasonal march in which the maximum convection follows a gradual southeastward progression path from the Asian summer monsoon to the Asian winter monsoon but a sudden transition in the reverse. The hypothesis is based on the redistribution of mass between land and ocean areas during spring and fall that results from different land-ocean thermal memories. This mass redistribution between the two transition seasons produces sea-level patterns leading to asymmetric wind-terrain interactions throughout the region, and a low- level divergence asymmetry in the region that promote the southward march of maximum convection during boreal fall but opposes the northward march during boreal spring.