

**Cause of Pre-Summer Diurnal Rainfall in Taiwan: Viewed from the Interaction of
Land-Sea Breezes at Different Scales**

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Abstract

The formation mechanism of diurnal rainfall in Taiwan is commonly recognized as a result of local forcings involving solar thermal heating and island-scale land-sea breeze (LSB) interacting with orography. Focusing on the May-June season and by using the MERRA reanalysis and TRMM precipitation data, this study found that the diurnal variation of the large-scale circulation over the East Asia-Western North Pacific (EAWNP) plays an important role in modulating diurnal rainfall in Taiwan. The interaction between the two LSB systems —the island-scale LSB and the large-scale LSB over EAWNP — facilitates the formation of the early morning rainfall in western Taiwan, afternoon rainfall in central Taiwan, and nighttime rainfall in eastern Taiwan. The recent intensification of diurnal rainfall activity in Taiwan after 1998 occurred in association with the observed strengthening of a shallow, low-level southerly wind belt along the coast of Southeast China. These findings shed light on the importance of the large-scale LSB and its long-term variation in modulating the diurnal rainfall in Taiwan.