

**Diurnal Variation of Regional Circulation and Precipitation  
During Mei-Yu Season over Taiwan and Surrounding Area**

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**Abstract**

During Mei-Yu season of Taiwan (May-June), fronts often pass through Taiwan region and interact with the large-scale circulation and land-sea breezes which would also affect the diurnal cycle of wind field and precipitation. This study divides the Mei-Yu season of 2008-2012 into pre-Mei-Yu (5/15-5/31), mid-Mei-Yu (6/1-6/15), post-Mei-Yu (6/16-6/30) in order to discuss the seasonal changes of the circulation and precipitation. The large-scale circulation, stability, moisture, front position and the synoptic weather systems are different during each period. Therefore, the wind field, cloud amount and precipitation distribution are different during each period of the Mei-Yu season. The land-sea breeze circulation and the forcing effects of the topography during the three periods also exhibit differences under different large-scale circulation (e.g. prevailing wind speed and direction are different from mid-May to June). From the pre-Mei-Yu season to the mid-Mei-Yu season, the average position of the fronts moves from southwest of Taiwan to northwest of Taiwan. During the post-Mei-Yu period, the Mei-Yu front moves away from Taiwan to southeastern China. Thus, during the pre-Mei-Yu season, the precipitation associated with fronts occurs over ocean southwest of Taiwan. The precipitation primarily occurs over ocean northwest and southwest of Taiwan during the mid-Mei-Yu season, and over ocean southwest of Taiwan during the post-Mei-Yu season.

Under the seasonal change condition, the wind field, precipitation, cloud amount of Taiwan and southeastern China have significant diurnal change. Taiwan Strait area is under the effect of the land-sea breezes on both Taiwan and southeastern China sides. At night, the land breezes from both sides are significant III so the low-level convergence is evident, causing a higher chance of precipitation within the Taiwan Strait than during daytime. In the afternoon, due to the impacts of sea breezes-upslope flow and orographic lifting, the rainfall occurs inland or in the mountain areas, whereas, occurs at shore at night over Taiwan. During the midMei-Yu season, the southwesterly flow strengthens. The orographically induced barrier jet usually occurs on the northwest coast of Taiwan, and it would converge with the prevailing winds producing precipitation in some cases. If the southwesterly flow strengthens, more prevailing airflow can pass across over the mountains, causing significant thermal effects at lee-side of the east of Taiwan. In the afternoon, prevailing flows over southwestern Taiwan is prone to passing through the Central Mountain Range (CMR) when the terrain is heated. Thus, leeside low and subsidence effects are more significant. The rainfall distribution over Taiwan will be different with the transformation of large-scale circulation. The rainfall occurs mainly at the windward side of northeastern Taiwan during the preMei-Yu season under northeasterly flow at lowest level. During the mid-Mei-Yu season, the rainfall mainly occurs at the windward of southwestern Taiwan in the afternoon under low-level southwesterly flow. During the post-Mei-Yu season, the rainfall is mainly caused by thermal convection. To sum up, during Mei-Yu season, the interaction among fronts, orographic effect, prevailing winds and land-sea breezes are complicate which also affect the diurnal cycle of circulation and precipitation over Taiwan and the surrounding area.