

Impacts of cyclogenesis and moisture transport by the marine boundary layer jet on heavy rainfall over southern Taiwan during the 2018 Mei-Yu season

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Abstract

During the 19–20 June 2018, heavy precipitation (> 600 mm) occurred over southwestern Taiwan. This heavy rainfall event occurred immediately after an abrupt shift in the Mei-Yu frontal zone from south of Taiwan to the southern China plain. Prior to this heavy rainfall event, a series of mesoscale cyclones formed along the NE-SW orientated Mei-Yu front south of Taiwan between the strong (> 15 m s⁻¹) cold northeasterlies coming from the Taiwan Strait and the warm, moist prefrontal southwesterly flow. On 15 June, heavy rainfall (> 300 mm) occurred over southern Taiwan with maximum rainfall in the Pintung County due to the passage of a mesocyclone. The last mesocyclone made landfall over the southern China coast around 0600 UTC 18 June, bringing SSW monsoon flow over the Taiwan area.

During 19–20 June, the horizontal moisture fluxes associated with the strong (> 15 m s⁻¹) SSW monsoon flow occurred primarily within the marine boundary layer (MBL) with maximum TPW > 65 mm. The heavy rainfall over southwestern Taiwan is mainly caused by the warm, moist marine boundary jet (MBLJ) impinging on southwestern Taiwan under favorable large scale settings. On 19 June, the maximum rainfall axis (> 300 mm) occurred on the windward slopes of the Central Mountain Range due to orographic blocking and lifting. On 20 June, with the development of cold pool ($\sim 25^{\circ}\text{C}$) over southwestern Taiwan, due to rain evaporative cooling, the rainfall maximum (> 300 mm) occurred along the southwestern coast. This heavy rainfall event ended in the late afternoon of 20 June after the weakening of the MBLJ due to the westward extension of the West Pacific Subtropical High.

Key word: MBLJ, Mei-Yu Frontal cyclones, Heavy Rainfall