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**Plain Language Summary:** On 14 June 2015, a severe afternoon thunderstorm event developed within the Taipei basin, producing intense rainfall (with rainfall rate of 131 mm $h^{-1}$) and urban-scale flooding. This study uses high-resolution simulations (with the finest horizontal grid size of 500 m) to successfully reproduce this thunderstorm event, and performs numerical experiments to examine the interactions between sea breeze, cold-air outflow, and local coastal terrain of Mount Datun.

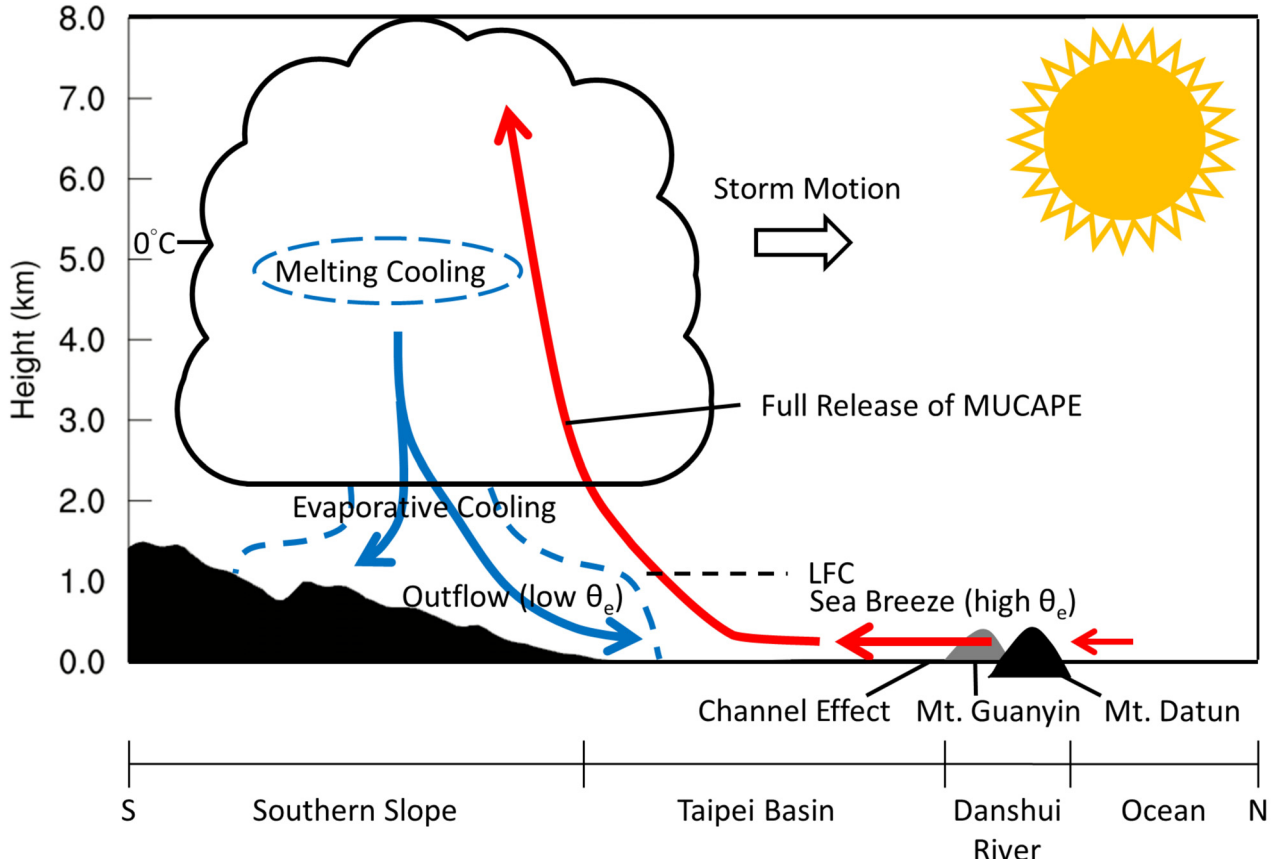


Figure 1: Schematic diagram of the interactions between sea breeze, cold pool and coastal terrain for the development of afternoon thunderstorm over Taipei basin.

- Convective available potential energy (CAPE) was increased from 800 to 3200 J $kg^{-1}$ with abundant moisture transport by the sea breeze from 08 to 12 LST.
- Evaporative cooling played a major role in the propagation of cold-air outflow and the production of heavy rainfall within Taipei basin, while melting cooling played a relatively minor role.
- Mount Datun at coastal region produced the channel effect through Danshui River Valley, intensified sea-breeze circulation and transported more moisture, made the thermodynamic characteristics more favorable for convection development, resulting in heavy rainfall.