

Meso-scale Weather Analysis and Forecasting during the Plum-rain Season in the Taiwan Area

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ABSTRACT

During the transit season from spring to summer the polar front moves back and forth over South China with frequent rainshowers or thunderstorms in the Taiwan area. Intense thundery rainshowers with a 24-hour rainfall over 100mm are at times associated with minor waves forming along the quasi-stationary front or within a strong southwest flow. In this season and summer pressure gradients are flat over Taiwan. The method of surface streamline analysis is highly recommended to replace the pressure analysis. The former one can indicate certain peculiarities not easily discernible from pressure patterns. Based on charts of surface streamline analysis the following phenomena are discussed:

1. Meso-scale anticyclone and cyclone

In the southwest flow, due to the blocking effect of the Central Mountain Range, a mesocyclone is normally observed over the area off-shore of Taitung, along the eastern coast of Taiwan; while a meso-anticyclone is located over the Central Taiwan. The intensity of the "Taiwan Meso-anticyclone" is highly important to thunderstorm activities over Taiwan.

2. Locations of the CB formation are separated into 3 categories:

(1) Along the windward side of the Central Mountain Range,

(2) Along the quasi-stationary polar front, and

(3) In the area of convergence of the southwest flow. The life of this type of CBs is much longer than any other types.

3. In the southwest flow the circulation within and without a CB is different from Newton's model (1963), which is applicable to CBs forming in the area of strong westerly winds aloft (over 25,000ft). The CB model in the southwest flow is presented herein.

4. Westerly trough at 500mb is the triggering mechanism that provides sufficient ventilation for CBs to prolong the life of a sufficiently large and vigorous system.

5. Finally a 850mb height-time continuity chart is recommended for weather forecasting. In this chart the pressure wave is clearly shown by daily 850mb heights. Whenever the current height is below the climatological mean value, both the frontal activity and weather within the southwesterly flow are much active than any other times except at Taipei, where heavy afternoon (thermal) thunderstorms frequently occur at the stage of pressure increase from low to high and the current 850mb height is higher than the corresponding climatological mean value.