

Characteristics of Rainfall Distributions and Surface Wind Fields over the Taiwan Area during the 1996 and 1997 Mei-Yu Season

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In this study, data from denser surface networks over Taiwan were used to study the characteristics of rainfall distributions and surface airflow during the Mei-Yu (May-June) season of 1996 and 1997. The data used include 21 routine stations from the Central Weather Bureau, 176 automatic raingauge stations and 65 automatic surface stations.

Overall, May 1996 is relatively wet with frequent Mei-Yu fronts over the Taiwan area. In June 1996, the Pacific high extended farther westward than its climatological position with rainfalls over the Taiwan area well below normal. Rainfalls during June 1996 are primarily from local afternoon showers. For 1997, Mei-Yu fronts are very active in June. The total rainfalls in June 1997 are well above normal. Nevertheless, the total rainfall distributions for these four months are remarkably similar to that presented by Yeh and Chen (1998, JAM) during TAMEX 1987 with maximum rainfalls along the western slopes of A-Li Shan, the southern slopes of Hsin-Lun Shan and the southwestern slopes of the Central Mountain ranges. These regions are on the windward slopes of the southwesterly monsoon flow. Furthermore, with a stronger southwesterly monsoon flow later in the season, the maximum rainfall axis along the windward slopes shifts southward. These results suggest that orographic lifting plays an important role in determining the rainfall distributions over the Taiwan area during the Mei-Yu season.

In addition to orographic lifting, both the rainfall occurrences and surface wind fields are strongly modulated by the diurnal heating cycle with a profound rainfall peak in the late afternoon hours for most stations especially for stations along the windward slopes. Similar to the evolution of the diurnal cycle presented by Chen and Nash (1994, MWR) for the island of Hawaii, the turning from land (sea) breezes to sea (land) breezes in the early morning (evening) on the windward side first occurs on the foothill. Nevertheless, the early morning rainfall maximum along the windward coast found over the island of Hawaii is not observed along the southwestern coast of Taiwan. Possible factors accounting for this difference will be discussed.

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