

Extended range forecast for diurnal rainfall episodes in Taiwan using the CFS

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The occurrence of diurnal afternoon convection in the subtropical island of Taiwan undergoes substantial modulation from tropical intraseasonal oscillations in the western North Pacific, including the quasi-biweekly (QBW) mode. By analyzing surface station observations and the Climate Forecast System (CFS) Reanalyses (CFSR), as well as the NCEP CFS version 2 (CFSv2) reforecast data over 18 summers from 1993 to 2010, it was found that the QBW mode plays a significant role in the formation of episodic diurnal convection. When the cyclonic circulation of the QBW mode is located west of Taiwan, followed by an anticyclonic circulation to the east, Taiwan's diurnal convection activity tends to intensify and persists for about 4-7 days. Synoptically, this situation reflects the enhanced subtropical anticyclone leading to fair weather conditions and increased monsoon southwesterly winds moistening the lower troposphere, all of which are conducive to thermally induced diurnal convection in Taiwan. The opposite situation tends to suppress the diurnal convection activity for a sustained period of time. Based upon this synoptic linkage, we derived an empirical relationship between the precipitation diurnal amplitude and low-level circulation fields of the CFSv2. It was found that the CFSv2 forecast exhibits an effective lead time ranging from 16-24 days for the QBW mode and, subsequently, diurnal convection episodes in Taiwan.