Asian Monsoon Years (2007-2012): Interannual variation of the late spring-early summer monsoon rainfall in the northern part of the South China Sea

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Major rainfall (› 60%) in the northern part of the South China Sea (between north Vietnam and Taiwan) during May-June (the meiyu season-the first phase of the Southeast/East Asian monsoon) is produced by rainstorms originating over the northern Vietnam-southwestern China region, and the northern part of the South China Sea. As observed in this study, the occurrence frequency of rainstorms and rainfall contribution by these rainstorms undergo a distinct interannual variation, in-phase with those of monsoon westerlies in northern Indochina and sea surface temperature (SST) anomalies over the NOAA NINO3.4 region, SST (NINO3.4). This in-phase relationship between monsoon westerlies and the SST (NINO3.4) anomalies is a result of the filling (deepening) of the subtropical Asian continental thermal low in response to the SST (NINO3.4) warm (cold) anomalies. Accompanied with this response is a slight southward (northward) shift of the North Pacific Convergence Zone (NPCZ), which extends from southern China to the North Pacific east of Japan. Thus, a favorable environment that meets the Charney-Stern instability criterion in initiating rainstorm genesis is enhanced (suppressed) by the intensification (weakening) of the monsoon shear flow formed by the mid-tropospheric northwesterly flow around the northeast periphery of the Tibetan Plateau and the monsoon westerlies. The meridional shift of the NPCZ established an elongated anomalous convergence (divergence) zone of water vapor flux along rainstorm tracks to increase (reduce) the rain-producing efficiency of rainstorms. Consequently, this interannual rainfall variation between northern Vietnam and Taiwan is primarily caused by rainstorm genesis and rain-producing efficiency.

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