

Tropical cyclone signals on rainfall distribution during strong vs. weak Changma/Baiu years

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The spatiotemporal distribution of summer rainfall is diverse in origin, namely tropical cyclones (TCs) and quasi-stationary monsoon frontal systems. Here, the contribution of TCs to summer rainfall is singled out for the years of strong vs. weak Changma/Baiu, which is represented by the leading mode of the variability in total rainfall over East Asia (20° – 45° N, 105° – 150° E) during the summers (July and August) of 1979–2014. Analyzing rain gauge based rainfall and TC best track data indicates that the difference in TC-induced rainfall between strong and weak Changma/Baiu years exhibits distinctive subseasonal evolution from that in non-TC-induced rainfall. A deficit in TC-induced rainfall is mainly observed over eastern China and Taiwan, where a surplus in non-TC-induced rainfall exists. This opposite relationship between the difference in TC-induced and non-TC-induced rainfalls, which is associated with westward extensions of the subtropical high and associated westerlies over the East China Sea, implies that the variations of TC-induced rainfall and non-TC-induced rainfall partly offset each other in certain regions of East Asia. For heavy rainfall (> 50 mm day $^{-1}$), similar features are observed in the whole East Asia region. The variability of total heavy rainfall is dominated by non-TC-induced rainfall, except for the Yangtze River Valley where the variability of TC-induced rainfall cancels out that of non-TC-induced rainfall.