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\textbf{20–50-day Oscillation of Summer Yangtze Rainfall in Response to Intraseasonal Variations in the Subtropical High over the Western North Pacific and South China Sea}

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The spatio-temporal variability in summer rainfall within eastern China is identified based on empirical orthogonal function (EOF) analysis of daily rain-gauge precipitation data for the period 1979–2003. Spatial coherence of rainfall is found in the Yangtze Basin, and a wavelet transform is applied to the corresponding principal component to capture the intraseasonal oscillation (ISO) of Yangtze rainfall. The ensemble mean wavelet spectrum, representing statistically significant intraseasonal variability, shows a predominant oscillation in summer Yangtze rainfall with a period of 20–50 days; a 10–20-day oscillation is pronounced during June and July. This finding suggests that the 20–50-day oscillation is a major agent in regulating summer Yangtze rainfall.

Composite analyses reveal that the 20–50-day oscillation of summer Yangtze rainfall arises in response to intraseasonal variations in the western North Pacific subtropical high (WNPSH), which in turn is modulated by a Rossby wave-like coupled circulation–convection system that propagates northward and northwestward from the equatorial western Pacific. When an anomalous cyclone associated with this Rossby wave-like system reaches the South China Sea (SCS) and Philippine Sea, the WNPSH retreats northeastward due to a reduction in local pressure. Under these conditions, strong monsoonal southwesterlies blow mainly toward the SCS–Philippine Sea, while dry conditions form in the Yangtze Basin, with a pronounced divergent flow pattern. In contrast, the movement of an anomalous anticyclone over the SCS–Philippine Sea results in the southwestward extension of the WNPSH; consequently, the tropical monsoonal southwesterlies veer to the northeast over the SCS and then converge toward the Yangtze Basin, producing wet conditions. Therefore, the 20–50-day oscillation of Yangtze rainfall is also manifest as a seesaw pattern in convective anomalies between the Yangtze Basin and the SCS–Philippine Sea. A considerable zonal shift in the WNPSH is associated with extreme dry (wet) episodes in the Yangtze Basin, with an abrupt eastward (westward) shift in the WNPSH generally leading the extreme negative (positive) Yangtze rainfall anomaly by a 3/8-period of the 20–50-day oscillation. This finding may have implications for improving extended-range weather forecasting in the Yangtze Basin.