

Forecast of summer precipitation in the Yangtze River Valley based on South China Sea springtime sea surface salinity

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As a major moisture source, the South China Sea (SCS) has a significant impact on the summer precipitation over China. The ocean-to-land moisture transport generates sea surface salinity (SSS) anomalies that can be used to predict summer precipitation on land. This study illustrates a high correlation between springtime SSS in the central SCS and summer precipitation over the middle and lower Yangtze River Valley (the YRV region). The linkage between spring SSS in the central SCS and summer YRV precipitation is established by ocean-to-land moisture transport by atmospheric processes and land-atmosphere soil moisture feedback. In spring, oceanic moisture evaporated from the sea surface generates high SSS in the central SCS and directly feeds the precipitation over southern China and the YRV region. The resulting soil moisture anomalies last for about 3 months triggering land-atmosphere soil moisture feedback and modulating the tropospheric moisture content and circulation in the subsequent summer. Evaluation of the atmospheric moisture balance suggests both a dynamic contribution (stronger northward meridional winds) and a local thermodynamic contribution (higher tropospheric moisture content) enhance the summer moisture supply over the YRV, generating excessive summer precipitation. Thus, spring SSS in the SCS can be utilized as an indicator of subsequent summer precipitation over the YRV region, providing value for operational climate prediction and disaster early warning systems in China.

Keywords: Yangtze River Valley, South China Sea, sea surface salinity, summer precipitation

