



Integrated Impacts of Large-Scale Circulations on Rainy Season Precipitation in the Source Region of Yangtze River

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In this paper, integrated impacts of large-scale circulations on rainy season precipitation (RP) in the source region of Yangtze River (SRYR) was investigated under the consideration that the relationship between a single large-scale circulation and precipitation is not stationary and can be modulated by another circulation. Principle Component Analysis (PCA) was performed on rainy season (June–September) precipitation to identify the leading modes of variability during the period 1961–2016. The correlation between the principle components (PCs) of each mode with Sea Surface Temperature (SST) anomalies was evaluated. The analysis shows that the first mode of RP is associated with Southern Oscillation Index (SOI) and Pacific Decadal Oscillation (PDO), which explains 64% of the spatial and temporal variance in RP in this region. Additionally, the coupled effects of two oceanic–atmospheric oscillations on RP were evaluated by investigating the composites of RP under different SOI and PDO phases. Results indicate that the effect of PDO on precipitation varies with the SOI phase. When in phase with the SOI, PDO-induced precipitation anomalies are magnified with respect to the canonical pattern. When out of phase, these variations weaken or even disappear. In upcoming decades, the PDO will continue being negative with higher La Niña (positive SOI) frequency, implying more precipitation in the rainy season, which can provide support for water and risk management over SRYR region.

Key Words: PDO, SOI, precipitation, Yangtze River.