



Longitudinal Displacement of the Subtropical High in the Western Pacific in Summer and its Influence

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Using the relative vorticity averaged over a certain area, a new index for measuring the longitudinal position of the subtropical high (SH) in the western Pacific is proposed to avoid the increasing trend of heights in the previous indices based on geopotential height. The years of extreme westward and eastward extension of SH using the new index are in good agreement with those defined by height index. There exists a distinct difference in large-scale circulation between the eastward and westward extension of SH under the new definition, which includes not only the circulation in the middle latitudes but also the flow in the lower latitudes. It seems that when the SH extends far to the east (west), the summer monsoon in the South China Sea is stronger (weaker) and established earlier (later). In addition, there exists a good relationship between the longitudinal position of SH and the summer rainfall in China. A remarkable negative correlation area appears in the Changjiang River valley, indicating that when the SH extends westward (eastward), the precipitation in that region increases (decreases). A positive correlation region is found in South China, showing the decrease of rainfall when the SH extends westward. On the other hand, the rainfall is heavier when the SH retreats eastward. However, the anomalous longitudinal position of SH is not significantly related to the precipitation in North China. The calculation of correlation coefficients between the index of longitudinal position of SH and surface temperature in China shows that a large area of positive values, higher than 0.6 in the center, covers the whole of North China, even extending eastward to the Korean Peninsula and Japan Islands when using NCEP/NCAR reanalysis data to do the correlation calculation. This means that when the longitudinal position of the SH withdraws eastward in summer, the temperature over North China is higher. On the other hand, when it moves westward, the temperature there is lower. This could explain the phenomenon of the seriously high temperatures over North China during recent summers, because the longitudinal position of SH in recent summers was located far away from the Asian continent. Another region with large negative correlation coefficients is found in South China.