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Intraseasonal Variability of Western North Pacific Subtropical High Based on the El Nino Influence and Its Relationship with East Asian Summer Monsoon

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Abstract

The boreal summer season could be divided into two periods in terms of the variability of western North Pacific subtropical high (WNPSH) based on the El Niño influence. The correlation analysis indicates that the WNPSH in the period of pentad 32-37 (first period) is not affected by El Niño of the previous winter, while that in the period of pentad 40-45 (second period) is strongly influenced by the sea surface temperature of the equatorial eastern Pacific in the previous winter. The different response of low-level circulation over the western North Pacific (WNP) to the El Niño forcing between two periods seems to be due to the difference of mean climatological fields over the WNP and the East Asian regions. The WNPSH in the first period is located between the East Asian frontal zone and the tropical convection zone. The extent of dry zone between these two convective zones is associated with the variation of WNPSH. However, the East Asian frontal zone disappears in the second period and the WNPSH is entirely affected by the El Niño forcing. The composite analysis on the relationship between the WNPSH and the East Asian summer monsoon exhibits distinct contrasts between two periods. In the first period, the East Asian stationary front exists all the time regardless of the strength of the WNPSH. On the other hand, in the second period, the East Asian stationary front appears only when the WNPSH is strong, while there is no obvious East Asian frontal zone when it is weak.