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Effect of East Asia summer blocking on the atmospheric circulation over the region

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The influence of the boreal summer blocking on atmospheric circulation in East Asia was examined. The summer blocking occurred mostly in North Europe, Ural region, Sea of Okhotsk (OK), and northeastern Pacific. The summer blocking was the major mode in these four regions according to principal component analysis using 500 hPa geopotential heights. Among the four blocking regions, OK blocking frequencies (OK BFs) showed negative and positive correlations with summer temperature and precipitation of Northeast Asia centered around the East Sea/Sea of Japan, respectively. In particular, the OK BF had a statistically significant correlation coefficient of -0.54 with summer temperatures in the Korean Peninsula. This indicates that the summer temperature and precipitation in this region were closely related to the OK blocking. According to the composite analysis for the years of higher-than-average BF (positive BF years), the OK High became stronger and expanded, while the North Pacific High was weakened over the Korean Peninsula and Japan and an anomalously deep trough was developed in the upper layer (200 hPa). As the cool OK High expanded, the temperature decreased over Northeast Asia centered around the East Sea/Sea of Japan and the lower level (850 hPa) air converged cyclonically, resulting in the increased precipitation, which induced the divergence in the upper layer and thereby strengthened the jet stream. Thus, the boreal summer OK blocking systematically influencing the area as the most dominant mode.

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