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# Geographical dependence observed in blocking high influence on the stratospheric variability through enhancement and suppression of upward planetary-wave propagation

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Previous studies have suggested the importance of blocking high (BH) development for the occurrence of stratospheric sudden warming (SSW), while there is a recent study that failed to identify their statistical linkage. Through composite analysis applied to high-amplitude anticyclonic anomaly events observed around every grid point over the extratropical Northern Hemisphere, the present study reveals distinct geographical dependence of BH influence on upward propagation of planetary waves (PWs) into the stratosphere. Tropospheric BHs that develop over the Euro-Atlantic sector tend to enhance upward PW propagation, leading to the warming in the polar stratosphere and, in some occasions, to major SSW events. In contrast, the upward PW propagation tends to be suppressed by BHs developing over the western Pacific and the Far East, resulting in the polar stratospheric cooling. This dependence is found to arise mainly from the sensitivity of the interference between the climatological PWs and upward-propagating Rossby wave packets emanating from BHs to their geographical locations. This study also reveals that whether a BH over the eastern Pacific and Alaska can enhance or reduce the upward PW propagation is case-dependent. It is suggested that BHs that induce the stratospheric cooling can weaken statistical relationship between BHs and SSWs.