



## **Future change of North Pacific blocking in CMIP5 models – frequency and intensity**

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Future change in frequency and intensity of wintertime North Pacific blocking are investigated with phase 5 of the Coupled Model Intercomparison Project (CMIP5) participating models. The current status and future changes in climatological blocking activity over the North Pacific region are investigated using historical and two Representative Concentration Pathway (RCP4.5 and 8.5) simulations for boreal winters (December-February) over a 30-year period. The future change in the Pacific blocking frequency and intensity are examined in terms of the projected meridional thickness gradient, Hadley circulation changes, and changes in the probability distribution of categorized blocking strength. With historical simulations, five CMIP5 models show better performance in reproducing climatological blocking events over the Pacific region. These models are selected for the analyses of the projected blocking activities. Projected blocking activity shows that the climatological winter Pacific blocking frequencies and mean values have tendency to decrease under global warming conditions. This trend is closely linked with the strong upper level westerly wind, resulting in less meandering air flow, consistent with the enhanced meridional temperature gradients at mid-latitude in the future climate. The decreased frequency in climatological atmospheric blocking over the Pacific under warming may also be influenced by the strengthening of the north–south temperature gradients due to the poleward extension of Hadley circulation in the subtropics. The climatology of the Pacific blocking intensity in boreal winter also tends to decrease slightly due to a future reduction in the number of strong blocking events.

Acknowledgement : This work was funded by the Korea Meteorological Administration Research and Development Program under grant KMIPA 2015-2081