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## Intraseasonal Variability of Cloud Cover in Midlatitudes during Boreal Winter

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We investigated the spatial structure of the intraseasonal variation (15-30 day) in cloud cover in the mid-latitudes during winter. We attempted to interpret the spatial pattern of clouds in the context of Rossby waves.

We used the total cloud cover in H-series dataset (1984-2016) by the International Satellite Cloud Climatology Project (ISCCP) based on the satellite observations, and ERA-Interim re-analysis data (1980-2016) including high, medium, and low cloud covers defined by  $\sigma$  coordinate.

We calculated correlation coefficients between the geopotential height at 300hPa (Z300) at a certain position and the cloud covers, meridional wind, and vertical velocity in the surrounding area. The positions of the maximum of high ( $0.45\sigma$ ) and medium cloud cover ( $0.8\sigma$ ) relative to Z300 are longitudinally constant for all longitudes except the region from east Asia to western part of the Pacific. The position of the maximum of the high cloud cover is located just west of the ridge and just east of the maximum positions of the upward motions of re-analysis vertical velocity and its adiabatic component. These results suggest that the adiabatic upward motion in the southerly wind region west of the ridge contributes to the generation of high cloud cover. In contrast, the position of the maximum of medium cloud cover is located just east of the trough. The position of the maximum of diabatic upward motion, which is considered to be due to condensation process is located near the maximum of medium cloud cover. These results suggest that Rossby waves modulate activity of short-period disturbances with precipitation. Apart from high and medium cloud covers, the position of the maximum of low cloud cover ( $\sigma < 0.8$ ) has large longitudinal dependency. While the position of the maximum is located at almost the same as that of medium cloud cover mainly over the continent, the position of the maximum is located just east of the ridge mainly over the ocean.

The correlation coefficients between ISCCP total cloud cover and Z300 are statistically significant

only over the continent, where the positions of the maximum of high, medium, and low cloud covers are all located east of the trough and west of the ridge.