

## Regional snowfall distributions in a Japan-Sea side of central Japan associated with Eurasian jet variabilities and Siberian blocking

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Regional snowfall distributions in a Japan-Sea coastal area of Japan are found to be controlled by the intraseasonal jet variabilities, especially the atmospheric blocking over the east Asian region and subweekly stationary Rossby waves along the jets over the Eurasian continent. We mainly focus on the Niigata area which is a representative of the heavily snowfall areas in Japan. Three types of dominant snowfall distributions exist; (1) the plain (P) type is characterized by heavy snowfall events dominant in coastal regions of the Niigata area, (2) the mountain (M) type is in the mountain regions, and (3) the PM-type is in the whole Niigata area. Previous studies have clarified that which type of snowfall distributions emerge is mainly controlled by synoptic systems (~1000 km) that accompany convective systems (~10–100 km) causing snowfall in those regions.

In this study, the relationships between snowfall events in each type and intraseasonal circulation variabilities in the larger-scale circulation (~5000–10000 km) were found out, especially for the jet variabilities in the upper troposphere, by conducting composite analyses for past heavily snowed “decades” (one-third of a month) as P-, M-, and PM-type snowfall events using a Japanese global long-term reanalysis dataset. Results indicate that all snowfall types were related to southward shift of the westerly jet over Japan with a large-scale intensified troughs (i.e., cyclonic or cold anomalies) over there. The troughs were found to be identical to blocking cyclones, because frequencies of blocking events significantly increased in the east Siberian region. Mechanisms of the trough intensification were different among the three snowfall types: Different paths of quasistationary Rossby-wave packet propagation along the Eurasian jets and relative positions of the blocks were found in between the three snowfall types. Thus, the local snowfall distributions in Japan were determined by large-scale circulation variabilities which can be evidently distinguished in the global reanalysis.

Keywords: atmospheric blocking, 10-day averaged fields, Plain- and Mountain-type snowfall