

## Impacts of climate change on heavy wet snowfall in Japan: differences among weather patterns

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Wet snow is a primary cause of atmospheric icing, which can lead to severe damage to power towers and lines, resulting in electrical breakdowns and blackouts. This study investigated the influence of climate change on heavy wet snowfall events during the winter season in Japan. Self-organizing maps (SOMs) were used to explore the weather patterns (WPs) associated with changes in heavy wet snowfall. This study used climate projections obtained from the database for Policy Decision-making for Future climate change (d4PDF) to investigate the impacts of climate change on wet snowfall in Japan. The SOM technique was applied using the surface atmospheric circulation to determine the dominant heavy wet snowfall WP. The SOMs showed that some WPs had a significant effect on the magnitude, frequency, and location of heavy wet snowfall in Japan. The projected changes in the amount of heavy wet snowfall showed a nonuniform spatial distribution. Additionally, the impact of climate forcing on WPs associated with heavy wet snowfall was evaluated to understand the spatially heterogeneous changes in wet snowfall. The SOM analysis results suggest that the future changes in spatially heterogeneous extreme wet snowfall can be attributed to differences in WP responses to climate change. These differences can be attributed to the future variations in the region of the atmospheric layer at temperatures near 0 °C (rain-snow transition layer) among WPs, which can alter the spatial distribution and frequency of heavy wet snowfall. The findings can help inform structural design requirements to withstand regional climate change.

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