

## Meteorological features observed during the period of heavy snowfalls over the Japan Sea coastal area

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In the Japan Sea coastal area, very intense snowfall winters occur with time interval of 10-20 years. Present report will discuss the large- and meso-scale meteorological features associated with very intense snowfall events.

Climatologically, the snowfalls over the Japan Sea coastal area occur under the influence of the Asian winter monsoon (polar-air out break) and the rapid air-mass transformation over the relatively warm Japan Sea.

However, the time-series data of snowfalls at surface stations indicate a few synoptic and meso-scale strong snowfall events during the intense snowfall winter.

In many cases, the heavy snowfalls occurred in the very cold spell over the East Asia. During such winter, the 1-month averaged 500 hPa height field was characterized by a predominant three-wave pattern over the northern hemisphere. A large-scale very deep and wide cold trough was located over the East Asia in the vicinity of the Japan Islands.

Several synoptic- and/or meso-scale cold vortex aloft were formed and propagated within the large-scale cold trough. The eminent peaks of intense snowfalls occurred in association with the passage of these cold vortexes.

While the temperature in the middle troposphere decreased significantly over the coastal area when the cold vortex approach, the equivalent potential temperature in the lower troposphere did not decrease owing to the airmass transformation. Thus the vertical stability decrease significantly under the cold vortex.