

気象変動の影響による雪氷環境の変化に関する研究

Changes in Snow and Ice Environments Associated with Climate Change

地球規模の温暖化の影響により、日本国内の降積雪や気温の変動が予測されています。積雪寒冷地では、暖冬による少雪傾向、降雪の少ないとされてきた地域への大雪、局地的な豪雪など、今までとは異なった姿が想定されます。本研究では、近年の雪氷環境の変化傾向について調査を行っています。

Global warming is forecasted to drastically alter snowfall and temperature trends in Japan. The cold, snowy regions of this country are expected to have winters with unprecedented changes, such as warm winters with little snowfall, heavy snowfall in areas that have typically had little snowfall, and localized intense snowfall. This study surveys the trends in the snow and ice environments for recent years.



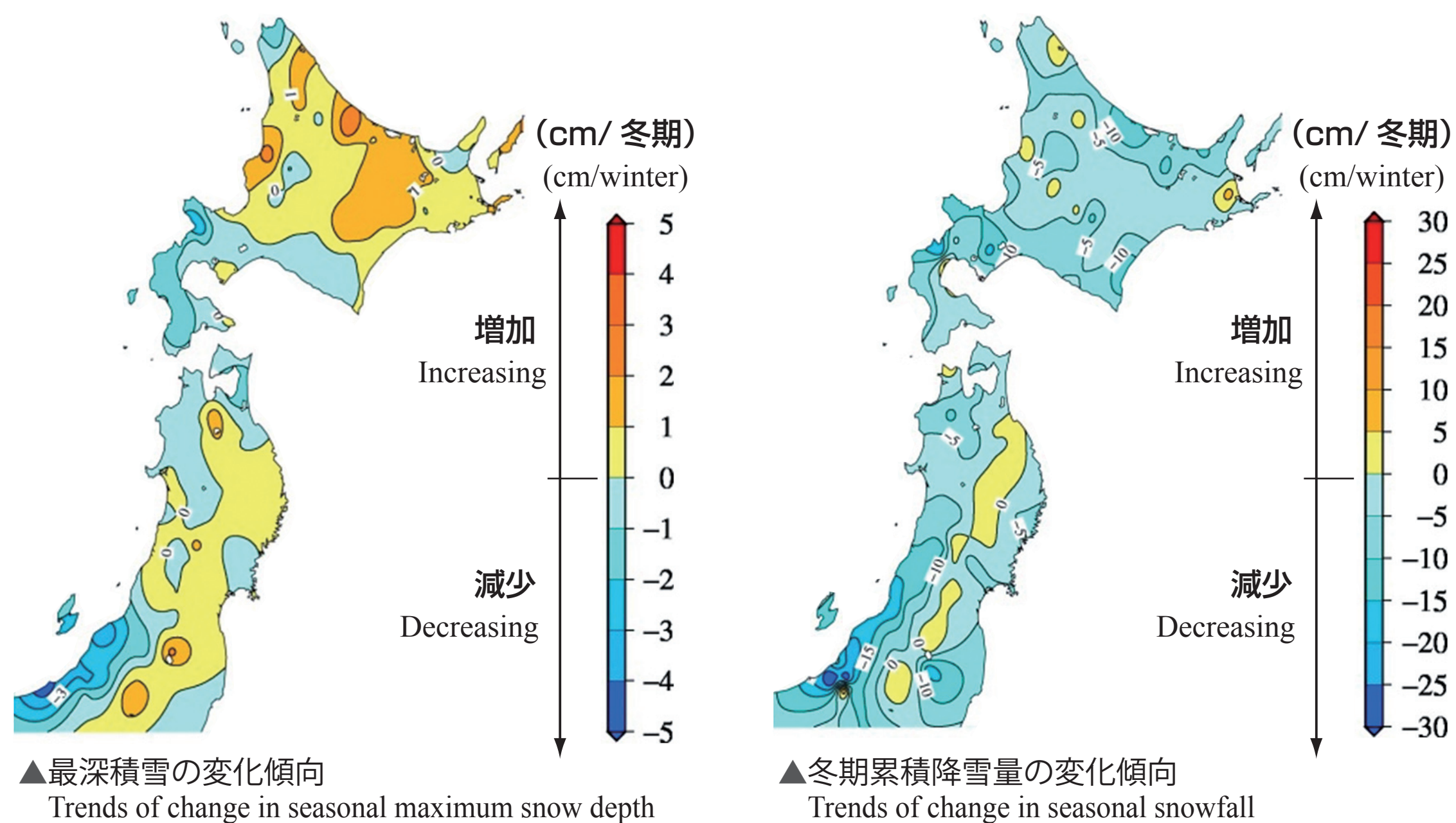
2008年4月1～2日に発生した北海道東部での災害
Snow disaster in Eastern Hokkaido on April 1 and 2, 2008

近年の降雪・積雪の変動傾向

Changes in snowfall and snow cover in recent years

新潟県以北のアメダス141箇所を対象に、調査期間(1983～2008年度、11月～4月)における各冬期の最深積雪や累積降雪量の変化傾向を調べました。冬期の最深積雪は、北海道では日本海側の小樽以北、内陸部、オホーツク海側および太平洋側東部で、本州では北部太平洋側で増加傾向にあります。冬期累積降雪量は、対象地域の大部分で減少傾向にあります。

The trends of change in the seasonal maximum snow depth and the seasonal snowfall from November to April in the years 1983 to 2008 were surveyed using the data from 141 AMeDAS stations in Northern Japan, including stations in Niigata Prefecture. Areas with increasing seasonal maximum snow depth are found in Hokkaido and Honshu: Those in Hokkaido include the northern part of the Japan Sea coast, including Otaru; the inland areas; areas on the Okhotsk coast; and the Pacific east coast areas. The areas in Honshu are on the Pacific northern coast. The seasonal snowfall has tended to decrease in most of the surveyed areas.



近年の大雪や暴風雪時の低気圧の位置と移動経路について

The locations and routes of low-pressure systems at the time of heavy snowfall events and snowstorms in recent years

1984～2010年において、北海道で発生した大雪および暴風雪時の地上天気図に着目し、低気圧や前線の移動経路、気圧配置について特長を調べました。その結果、下の表に示すA～Dの4パターンが、全事例の約3分の2を占める事が分かりました。(右図)

A～Dそれぞれのパターンについて9冬期ごとの出現頻度を求め、表にしました。数字は出現頻度を示しています。なお、括弧内の数字は北海道付近で急速に発達した低気圧によるものを意味しています。

近年の特長として、二つの低気圧が北海道付近で一つになり、急激に発達するパターン(パターンD)が増加する傾向がある事が分かりました。(下表)

The characteristics of the locations and routes of low-pressure areas and their fronts, and pressure patterns were investigated by referring to surface weather charts at the time of heavy snowfall and snowstorms in Hokkaido from 1984 to 2010.

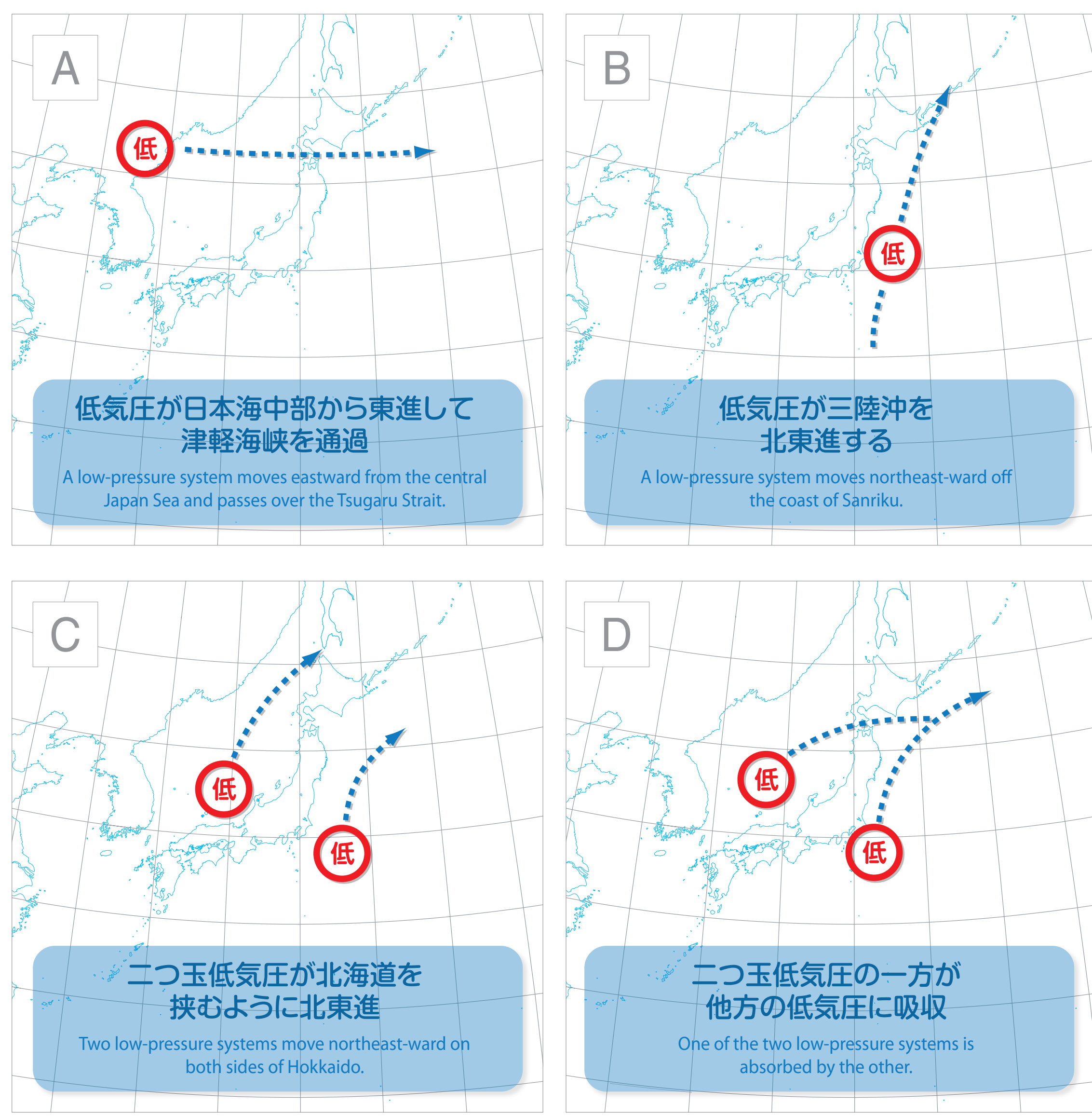
It was found that about two thirds (2/3) of the cases fall under the patterns of A to D shown below. (Figure at right)

The occurrence frequency for each pattern (A to D) for 9 winters was obtained and is shown in the table. The numbers show the occurrence frequencies. Parentheses indicate the occurrence of a low-pressure system that rapidly developed near Hokkaido. It was found that one characteristic pattern, Pattern D, has tended to increase in recent years. In Pattern D, two low-pressure systems combine near Hokkaido and rapidly develop. (Table below)

天気図パターン Weather chart pattern		期間 Period	1984 1992	1993 2001	2002 2010	計 Total
低気圧 Low-pressure system	A 津軽海峡を通過 Passes over the Tsugaru Strait.		2(1)	4(2)	3(1)	9(4)
	B 三陸沖を北東進 Moves northeast-ward off the coast of Sanriku.		4(1)	3(1)	4(1)	11(3)
	C 二つ玉各々通過 Two low-pressure areas pass.		3(3)	5(4)	2(1)	10(8)
	D 二つ玉併合 Two low-pressure areas combine.		3(2)	5(2)	11(9)	19(13)
計 Total			12(7)	17(9)	20(12)	49(28)

▲近年の低気圧パターンとその頻度

The patterns and frequencies of low-pressure system in recent years



▲大雪や暴風雪をもたらしやすい低気圧のパターン

Patterns of low-pressure systems that tend to result in heavy snowfall or snowstorms