広域的な吹雪視程障害予測技術の開発に関する研究

Research on Technologies for Assessing Snowstorm-induced Poor Visibility in a Wide Area

近年、急激に発達した低気圧の影響により、北海道に限らず本州などの吹雪の発生頻度が低かった地域でも、吹雪による交通障害が発生しています。これまで、防雪林や防雪柵のハード対策によって吹雪災害の軽減に効果を上げていますが、多くの時間と費用が必要です。

このような暴風雪に対して早急な対策を行うには、吹雪視程の現況及び予測情報を提供して、ドライバーの行動判断を支援することが重要と考えられます。そこで本研究では、北海道に加え全国の積雪寒冷地で適用可能な吹雪視程予測技術を開発し、吹雪時に道路管理者や道路利用者の行動判断を支援することで、吹雪災害を軽減することを目的としています。

In recent years, winter low-pressure systems, which develop quickly, have been bringing snowstorms and resulting traffic hindrances more frequently than ever to areas not only in Hokkaido but also in Honshu, where snowstorms had only rarely occurred. Snowstorm disasters have been successfully mitigated through the use of snowbreak woods, snow fences and other tangible countermeasures. However, the installation of these countermeasures is time- and cost-intensive.
So that rapid measures can be taken against these snowstorms, the provision of snowstorm visibility information in real time and of visibility predictions is thought to be important to support drivers in their decision-making on driving behaviors. This study aims to mitigate snowstorm disasters through the development of a technology for forecasting visibility during snowstorms. We will develop a technology for forecasting visibility in snowstorms that is applicable in Hokkaido and in all the other cold and snowy regions of Japan. This technology will contribute to the mitigation of snowstorm disasters by supporting road users and road administrators in their decision-making behaviors at times of snowstorms.

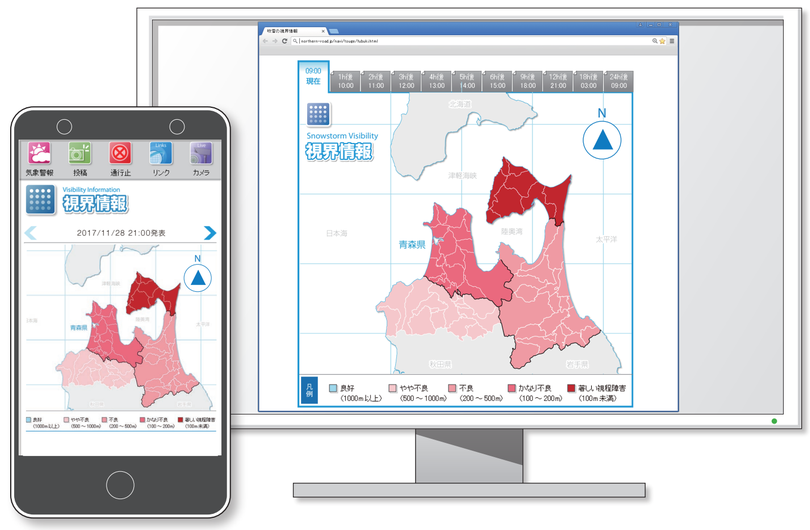
全国の積雪寒冷地で利用可能な吹雪視程予測技術開発

Development of a technology for forecasting visibility in snowstorms that is usable in any cold and snowy region in Japan

ドライバーの交通行動判断を支援するため、全国の積雪寒冷地で適用可能な吹雪視程予測技術を開発し、提供実験を行っていきます。

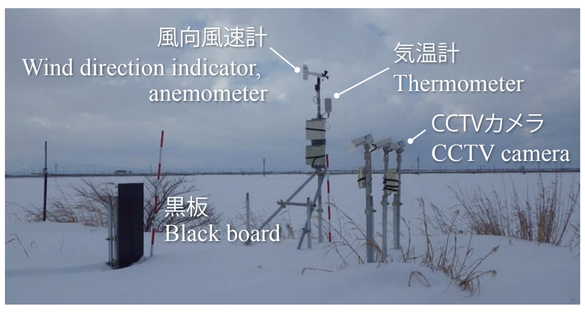
To support drivers in their decision-making on traffic behaviors, we will develop a technology for forecasting visibility in snowstorms that is applicable in any cold and snowy region in Japan. We will continue to conduct demonstration experiments in which forecast information is provided.

広域的な吹雪視界予測（イメージ）
Screens showing visibility forecasts in wide regions (conceptual images)



多様な気象環境下における吹雪発生条件の解明

Clarification of blowing snow occurrence conditions

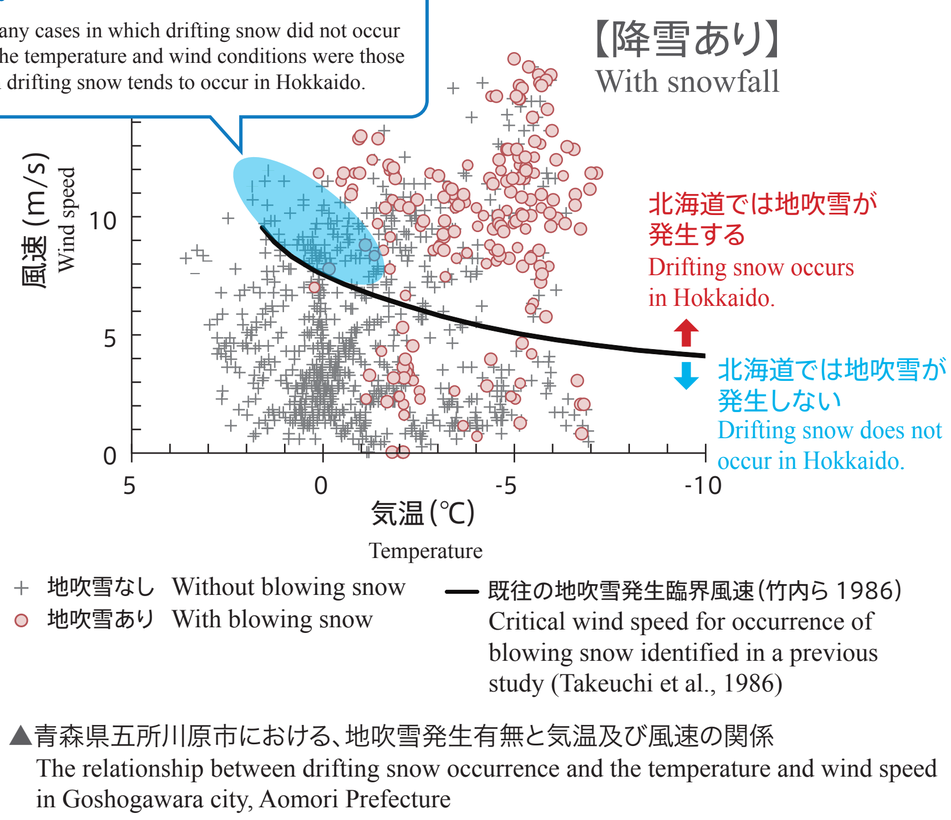


▲気象観測機器設置状況
Installed weather observation equipment

多様な気象環境下における吹雪発生条件を明らかにするために、青森県五所川原市において、降雪時の地吹雪発生の有無と風向風速、気温との関係について分析を行いました。その結果、北海道では地吹雪が発生する気温と風速であっても、青森県では地吹雪が発生しない事例が見られました。これは、気温や風速の条件が一緒であっても、北海道よりも温暖な地域では、降雪粒子の特性や雪面の雪質などの違いによって地吹雪の発生する条件が変化しやすいことが原因として考えられます。今後、さらに地吹雪発生状況に関する気象データを取得し分析を進めて行く予定です。

To clarify the conditions under which drifting snow occurs, an analysis was done on the relationship between the occurrence of drifting snow and the wind directions and speeds and the temperature during snowfall in Goshogawara city, Aomori Prefecture. The analysis found some cases in which drifting snow did not occur, even when the temperature and wind speed were those under which drifting snow tends to occur in Hokkaido. The reason for this is thought to be that, in Aomori, an area that has a milder climate than Hokkaido does, the characteristics of snow particles and the quality of the snowcover surface differ from those in Hokkaido. It is thought that the conditions under which drifting snow occurs differ from area to area, even when conditions such as temperature and wind speed do not differ. We will further collect weather data that relate to the occurrence of drifting snow and will continue to analyze the collected data.

北海道で地吹雪が発生する気温と風速条件下でも地吹雪が発生しない事例が多く見られました。
There are many cases in which drifting snow did not occur even when the temperature and wind conditions were those under which drifting snow tends to occur in Hokkaido.



▲青森県五所川原市における、地吹雪発生有無と気温及び風速の関係
The relationship between drifting snow occurrence and the temperature and wind speed in Goshogawara city, Aomori Prefecture

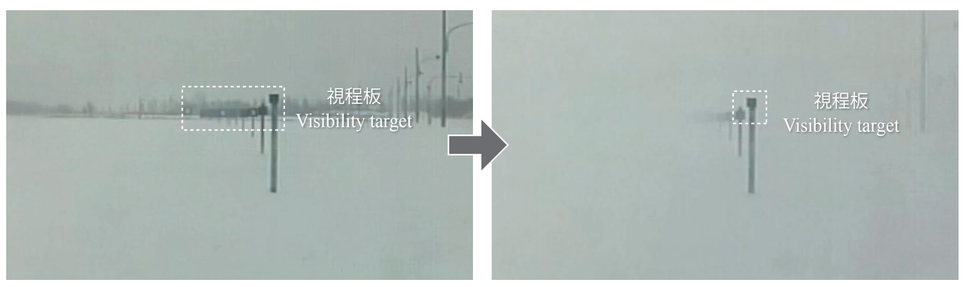
降雪形態による視程低下の違いの解明

Clarification of differences in visibility reduction by type of snowfall

降雪形態による視程低下の違いを明らかにするために、北海道石狩市、青森県青森市、新潟県長岡市において視程観測を行っています。現地に、視程観測のための目標物を設定し、降雪時に目視やカメラでの画像撮影による視程観測と、降水量などの気象観測を行っています。今後、降雪時における視程と降水量などの気象データとの関係について分析を進めて、視程低下の違いを明らかにしていきます。

To clarify the differences in visibility reduction by type of snowfall, we have been conducting visibility observations in Ishikari city in Hokkaido, Aomori city in Aomori Prefecture, and Nagaoka city Niigata Prefecture. Visibility distances are observed by measuring the visibility of a target object installed at the observation location. Measurements are done by eye or by using images taken by camera. We will clarify the differences in visibility reduction between various weather conditions by continuously conducting analyses on the relationship between the visibility distance during snowfall and weather data, including precipitation.

北海道石狩市での撮影画像
Images taken in Ishikari city, Hokkaido



新潟県長岡市での撮影画像
Images taken in Nagaoka city, Niigata Prefecture