



道路構造による吹きだまり対策効果の定量化に関する研究

Study on Quantifying the Effectiveness of Road-structure-based Snowdrift Countermeasures

近年、暴風雪により道路上に大規模な吹きだまりが生じ、交通障害を引き起こすケースがしばしば発生しています。これまで、道路構造による吹雪対策として防雪盛土等が用いられていますが、既往研究が少ないためその防雪効果が定量的に明らかにされていませんでした。

このため、道路構造ごとの吹きだまりの発生状況と積雪深や気象条件との関係について、現地観測や吹雪シミュレーションによる調査を通じて防雪効果の定量化に向けた研究を行っています。

In recent years there have been many cases in which large-scale snowdrifts from severe snowstorms have hindered traffic. Drift-control fills have been used to control blowing snow by taking advantage of the road structure. However, the effectiveness of this measure against blowing snow has not been quantitatively clarified, because few studies have addressed this subject.

To quantitatively clarify the effectiveness of road structures used as blowing-snow countermeasures, the institute has been conducting studies on the relationship between the conditions of snowdrift formation and the snow depth and weather conditions for each road structure. The studies are done using surveys based on field observations and snowstorm simulations.

道路構造による吹きだまり対策について

Snowdrift countermeasures that rely on the road structure



防雪盛土
Drift-control fills

盛土の高さを高くすることで、冬期間を通じて路面の吹きだまり抑制効果を確保する道路構造で、一般に平地積雪深の1.3倍以上の高さで造成されます。

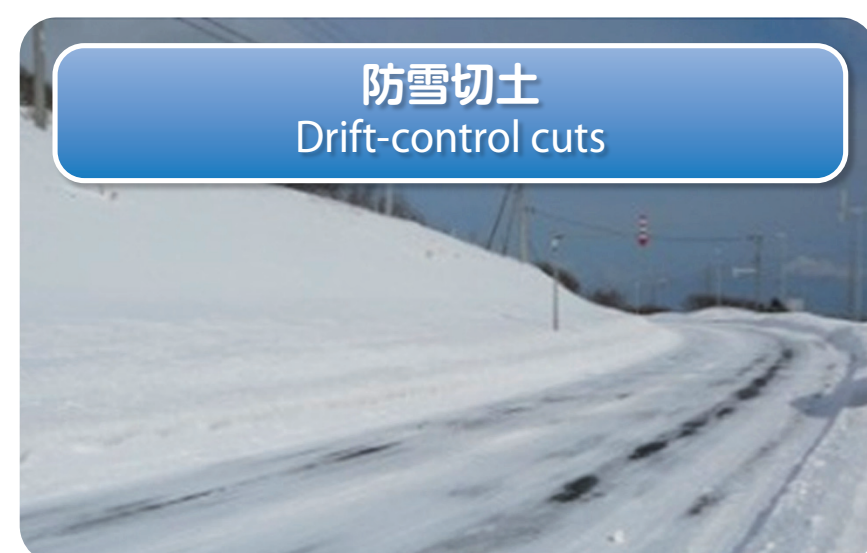
Drift-control fills, which are higher than ordinary road fills, control snowdrift formation on the road throughout the winter period. Generally, a drift-control fill is constructed at least 1.3 times as high as the snow depth on flat land.



緩勾配盛土
Gently sloped embankments

盛土斜面の勾配を1:4程度と緩やかにすることで、ガードレールの設置を不要とし、斜面上端の風の流れを滑らかにして、道路上の吹きだまりを防ぎます。

Gently sloped embankments control the formation of snowdrifts on the road by using a slope with a gentle gradient of about 1:4, which makes the installation of guardrails unnecessary and which smooths the wind flow at the top of the slope.



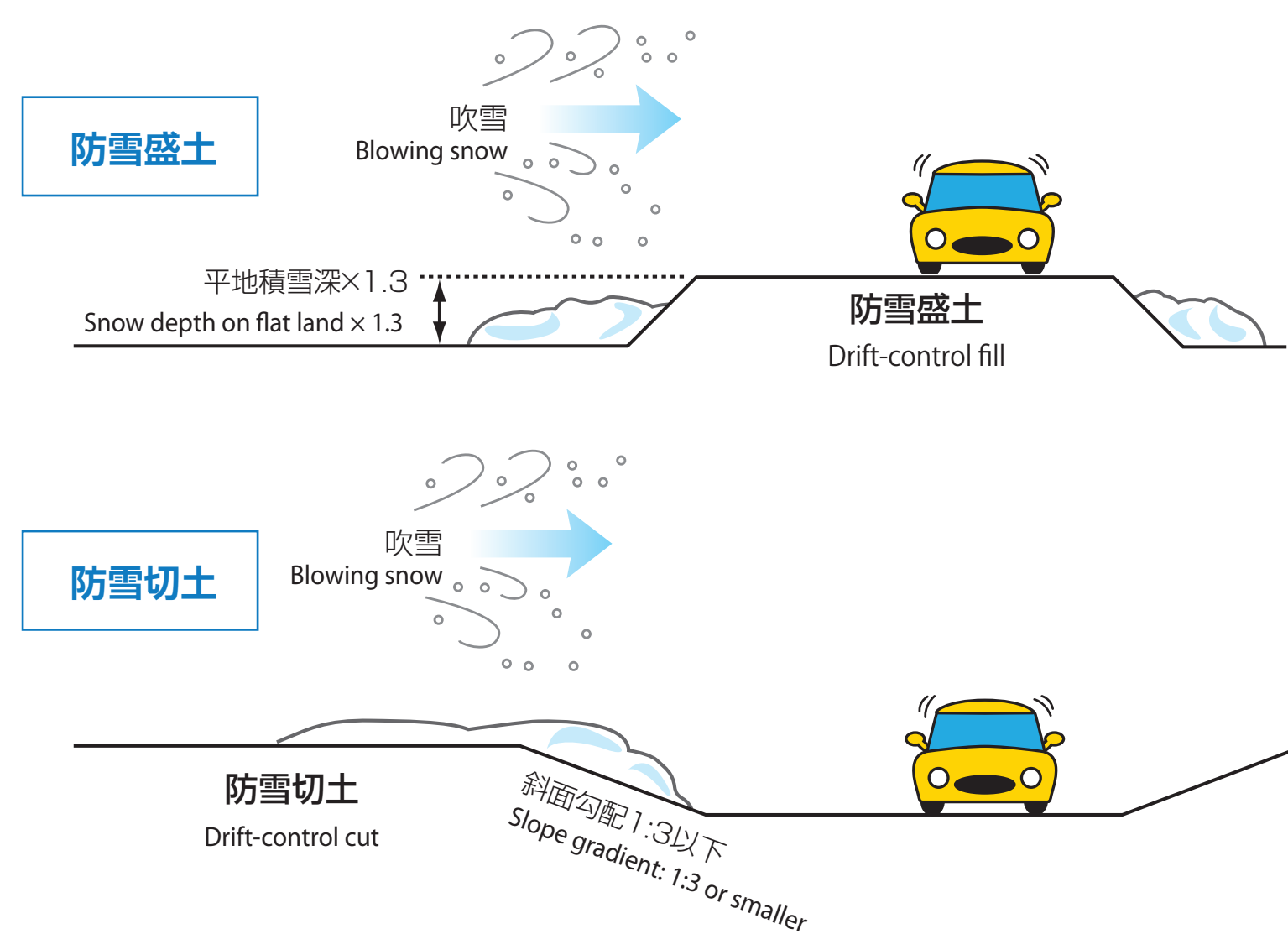
防雪切土
Drift-control cuts

風上側の切土斜面の勾配を1:3以下に緩やかにし、風上側の斜面上に雪をためることで、道路上の吹きだまりを防ぎます。

The formation of snowdrifts on the road is controlled by making the gradient of the cut slope on the windward side of the road 1:3 or smaller. The snow accumulates on the cut slope with a gentle gradient.

道路構造による吹きだまり対策には、防雪盛土、緩勾配盛土、防雪切土の3種類があります。

Three road structures have been used as snowdrift countermeasures: drift-control fills, gently sloped embankments and drift-control cuts.



▲防雪盛土と防雪切土の機能イメージ
Effects of the drift-control fill and cut

吹きだまりの現地観測

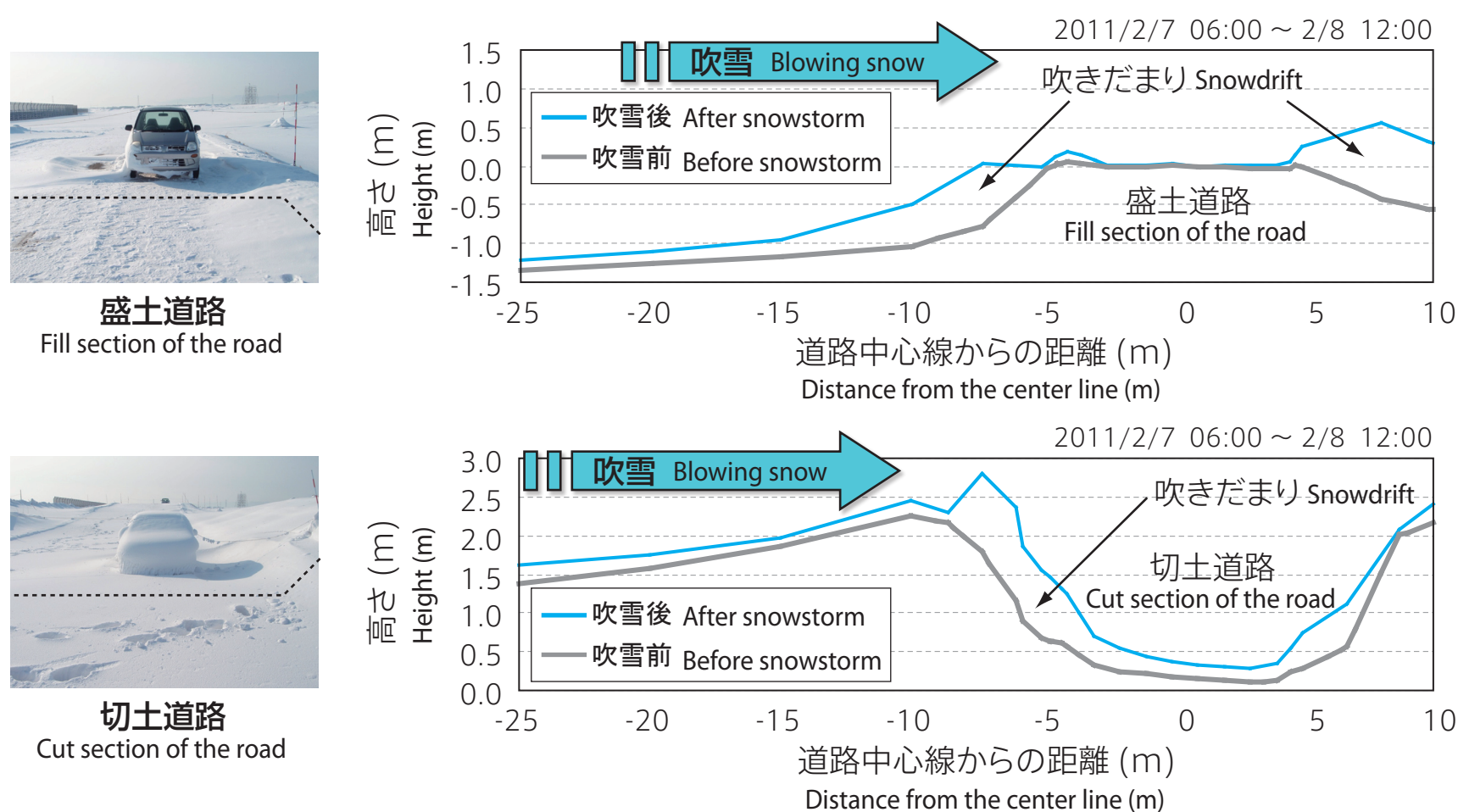
Field observation of snowdrifts

道路構造と吹きだまりとの関係を解明するため道路や実験場で、気象観測や吹きだまりの発生状況の調査を行っています。

盛土道路と比べ、切土道路で道路上の吹きだまりが生じやすいこと等、道路構造ごとの吹きだまりの特徴について整理しています。

The institute has been conducting field observations of snowdrifts and weather conditions at roads in service and at test fields to clarify the relationship between road structures and snowdrift formation.

The characteristics of snowdrift formation for each road structure have been studied and gradually clarified. One such findings is that snowdrift formation tends to occur more often at cut sections than at fill sections of the road.



▲実験場内の切土・盛土道路で観測した吹きだまりの状況
Snowdrifts observed at the fill and cut sections of the road at the test field

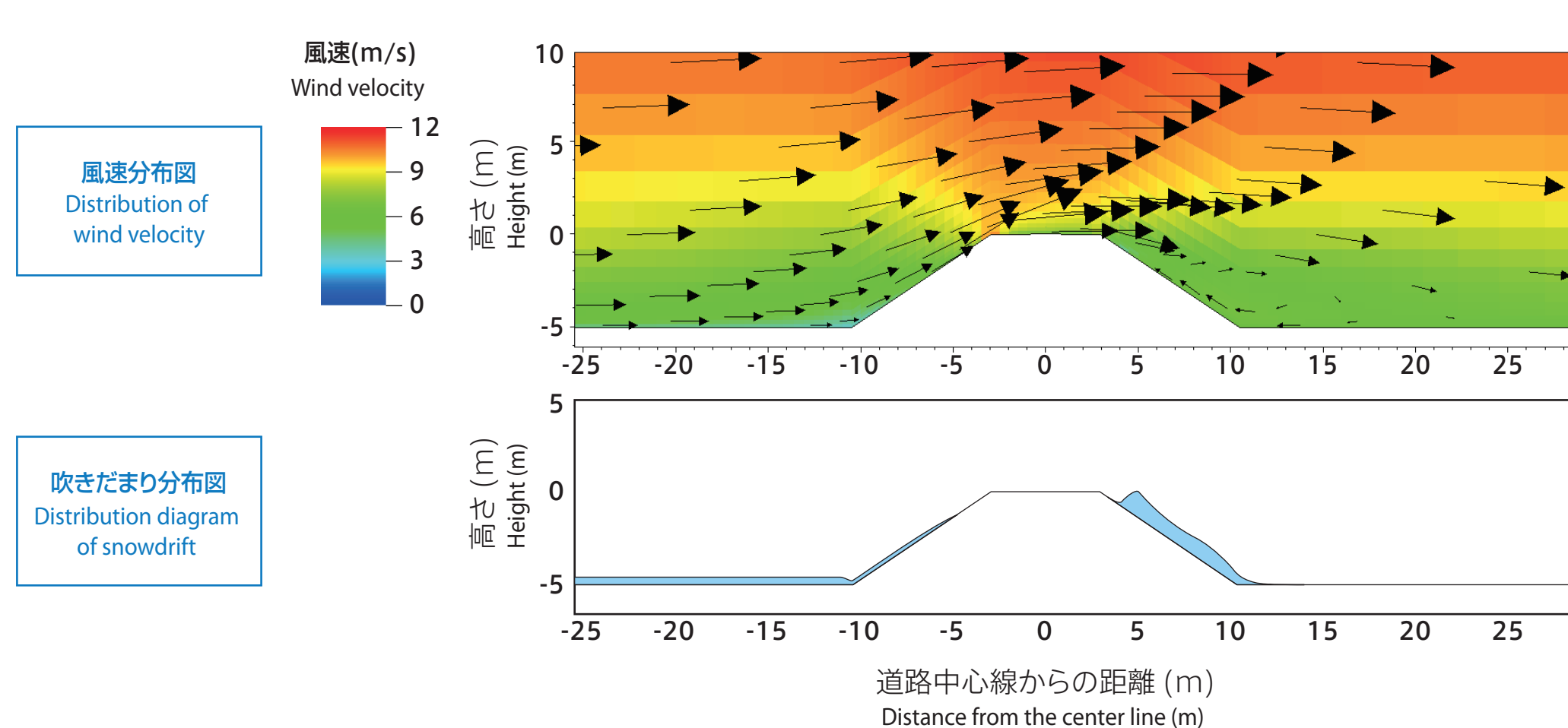
吹雪シミュレーション

Snowstorm simulation

吹きだまりの現地観測では、観測の機会や対象とする道路条件が限られるため、多くのデータを取得することが難しい状況にあります。そこで本研究では吹雪シミュレーションプログラムを開発し、現地観測結果との整合を確保しつつ、吹雪の規模や地形を変化させて計算を行い、様々な吹雪の規模に対して必要となる盛土の高さを検討しています。

It is difficult to obtain sufficient field data on snowdrifts, because the weather and road conditions for intended observation are limited.

The study group developed a snowstorm simulation program and has been conducting computations using snowstorms of various scales and various types of topography, while maintaining consistency with field observation results. Using the simulation program, examinations have been done to identify the optimal embankment height for snowstorms of every possible scale.



▲吹雪シミュレーション結果のイメージ
An example of snowstorm simulation