路線を通した連続的な吹雪の危険度評価技術に関する研究

Study Related to Snowstorm Risk Assessment Technologies That Target Entire Routes

寒地土木研究所では、吹雪障害への危険要因やその影響度を定量的に解明することで、路線全体を通しての連続的な吹雪危険度評価技術の開発に取り組んでいます。

The Civil Engineering Research Institute for Cold Region has been developing snowstorm risk assessment technologies that are able to be used linearly on an entire route by clarifying the risk factors of blowing-snow-induced hindrances and quantifying their relative influence.


地吹雪による視程障害
Poor visibility caused by blowing

吹雪危険度評価技術に関する研究背景

Background of the study related to snowstorm risk assessment technologies

積雪寒冷地の冬期道路では、吹雪によって多重事故や通行止めが多く発生しています。一方、公共事業費縮減に伴い、より効率的な吹雪対策が求められることから、吹雪危険度の評価に基づく吹雪対策の重点箇所抽出が必要となってきています。

そこで、路線を通した連続的な吹雪危険度の定量的評価技術の開発により、より効果的な吹雪対策の整備を可能として、吹雪災害の軽減を目指します。

On winter roads in snowy cold regions, many multi-vehicle collisions and road closures caused by blowing snow have occurred. Gradual reductions in public works budgets have made it urgent to develop blowing-snow countermeasures that are more efficient than the conventional ones. In developing such facilities, it has become necessary to extract important sites for installation of such facilities based on snowstorm risk assessment.
The goal of the study is the mitigation of snowstorm-related disasters through the development of snowstorm countermeasures that are more effective than conventional ones and the development of technologies for quantitative assessment of the risks of snowstorm throughout a subject route.


▲吹雪による交通障害
Traffic accident caused by blowing snow


▲吹雪災害対策の効率的な整備
Effective installation of snowstorm countermeasures

視程障害移動観測車による吹雪視程障害状況の計測事例

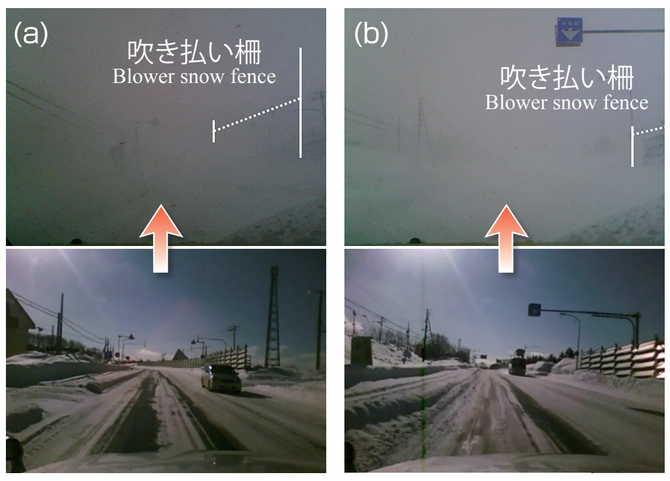
Example of blowing-snow-induced poor visibility measured by a visibility observation vehicle

視程障害移動観測車を用い、吹雪時の視程、風向風速、気温、走行速度やブレーキ踏力、アクセル踏量、ハンドル操舵角を計測しました。また、助手席の調査員により運転危険度を表に示す5ランクで記録しました。その結果、防雪柵の端部や開口部では、視程が50m未満に大きく低下し、ブレーキ操作による速度低下やハンドル操作のふらつきが発生するなど、運転の危険性が高くなることが分かりました。

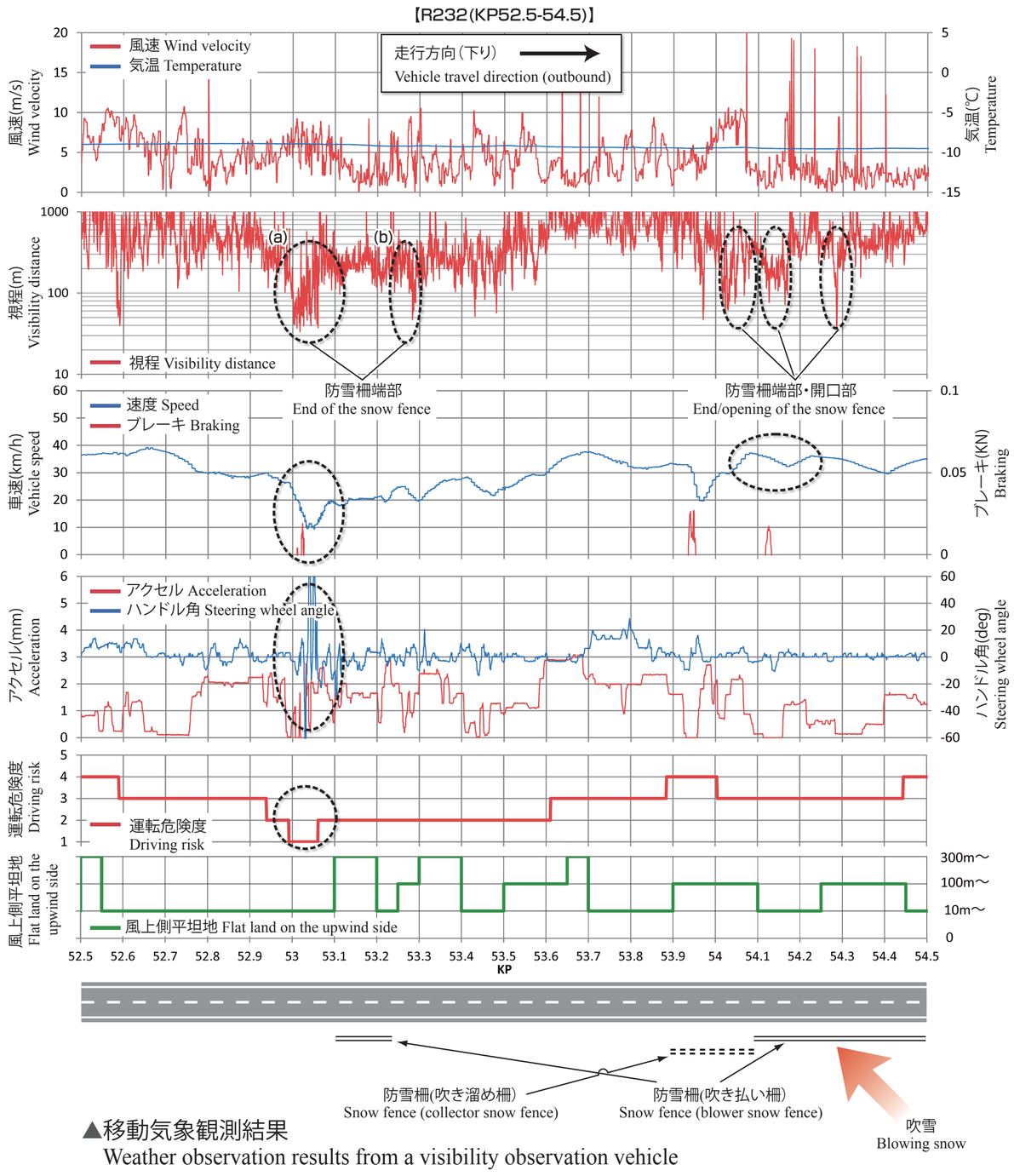

▲視程障害移動観測車による観測状況
The visibility observation vehicle making observations

The visibility distance during blowing snow and the wind direction and velocity, temperature, traveling speed, force applied on the brake pedal, accelerator position, and the steering wheel angle were measured by using a visibility observation vehicle. A researcher in the front passenger seat recorded the level of driving risk in the five ranks shown in the table below. The survey using the vehicle found that the driving risk tends to increase at the ends and openings of snow fences. The visibility distance decreased to less than 50 m, the travel speed was reduced because of brake application, and unsteady handling of the steering wheel occurred at such sites.


▲視程観測装置
Visibility observation equipment



▲吹き払い柵端部の視程障害状況
Poor visibility at the end of a snow fence



▲移動気象観測結果
Weather observation results from a visibility observation vehicle

吹雪危険度のランク区分 / Category of driving risk

ランク Rank	運転危険度 Driving risk
1	運転することができず、停止 Could not continue driving, and stopped
2	運転が困難で本当は停止したいが、やむを得ず走行 Wanted to stop because of difficult driving, but continued driving
3	かろうじて走行可能だが、コンビニやGSなどの駐車スペースがあれば停車 Found driving hard but possible; would stop if parking were available
4	視界が悪いため、ゆっくりと走行を継続 Continued driving slowly because of poor visibility
5	視界が比較的良いため、通常の走行を継続 Continued driving as usual because of relatively good visibility