

# 短時間の多量降雪による雪崩危険度評価に関する研究

## Hazard Assessment for Avalanches Caused by Intense Heavy Snowfall

平成 18 年豪雪以降、北海道や東北、北陸、中国地方と各地で豪雪が続いています。特に、平成 26 年 2 月は雪の少ない関東甲信などの広い地域で、短時間の多量降雪により記録的な大雪となりました。短時間の多量降雪は、雪崩の多発につながり、豪雪地帯はもとより豪雪地帯以外の地域でも突発的に雪崩が発生する可能性が高くなります。

土木研究所では、短時間多量降雪による雪崩発生危険度評価技術に関する研究に取り組んでいます。

Since the Heavy Snowfall of 2006, there have been heavy snowfall events in many areas of Japan, including Hokkaido, Tohoku, Hokuriku, and Chugoku. In February 2014, a record intense heavy snowfall occurred in large parts of the Kanto and Koshin areas, which ordinarily have little snow. Intense heavy snowfalls lead to many avalanches. In such cases, unpredictable snow avalanches become highly likely in areas within and beyond the areas of heavy snowfall. The Civil Engineering Research Institute for Cold Region has been pursuing research on ways to assess the risk of avalanche occurrence from intense heavy snowfall.



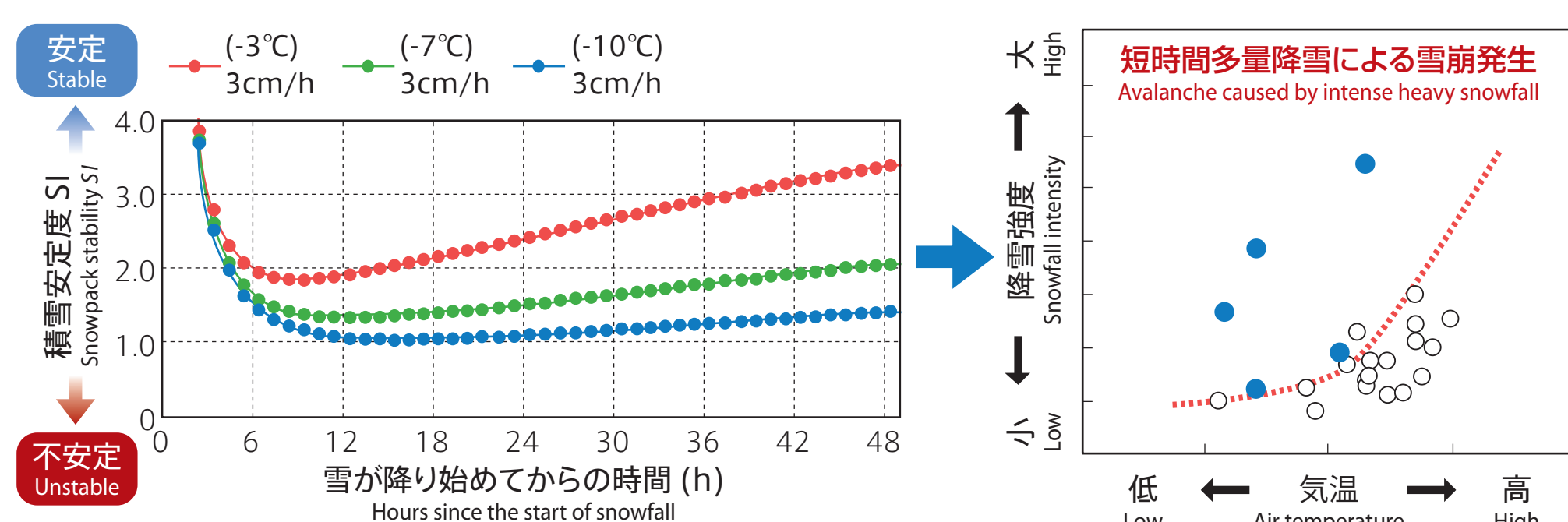
短時間多量降雪による雪崩事例  
An avalanche caused by intense snowfall

### 雪崩発生の気象・積雪条件の検討

#### Examination of weather and snow cover conditions for avalanche occurrence

短時間に多量に雪が積もる場合、雪の強度が十分大きくなる前に斜面積雪が不安定となり、明確な弱層がない状況でも表層雪崩が発生します。現地調査結果に基づく理論的な解析によって、降雪強度や気温などを指標にした雪崩発生条件を検討しています。

When thick snow cover develops in a short period of time, the snow cover on a slope becomes unstable before the snow cover develops strength. A surface avalanche occurs even when there is no clearly identifiable weak layer in the snow cover. Based on theoretical analyses using the results of onsite surveys, the occurrence conditions for avalanches have been examined by using snowfall intensity and temperature as indexes.



▲斜面積雪の安定性に関する検討例  
Example of examination on the stability of the snowpack on the slope

▲降雪強度と気温を指標にした雪崩発生条件(イメージ)  
Avalanche occurrence conditions when the snowfall intensity and temperature are used as indexes (conceptual diagram)

### 雪崩発生の地形・植生条件の検討

#### Examination of topographic and vegetation conditions for avalanche occurrence

短時間に多量に雪が積もる場合、一般には雪崩発生の可能性が低い積雪深が小さい場合や樹林内でも、雪崩が発生する傾向にあります。この研究では、短時間多量降雪による雪崩発生場における植生や地形等の特徴を調査しています。

When snow cover develops in a short period of time, avalanches tend to occur even at locations with a relatively shallow snow depth and in forest, where avalanches tend not to occur. In this study, the vegetation and topographic characteristics of locations where avalanches have occurred from intense heavy snowfall have been investigated.



▲樹林内の雪崩発生箇所の例  
An avalanche location in a forest



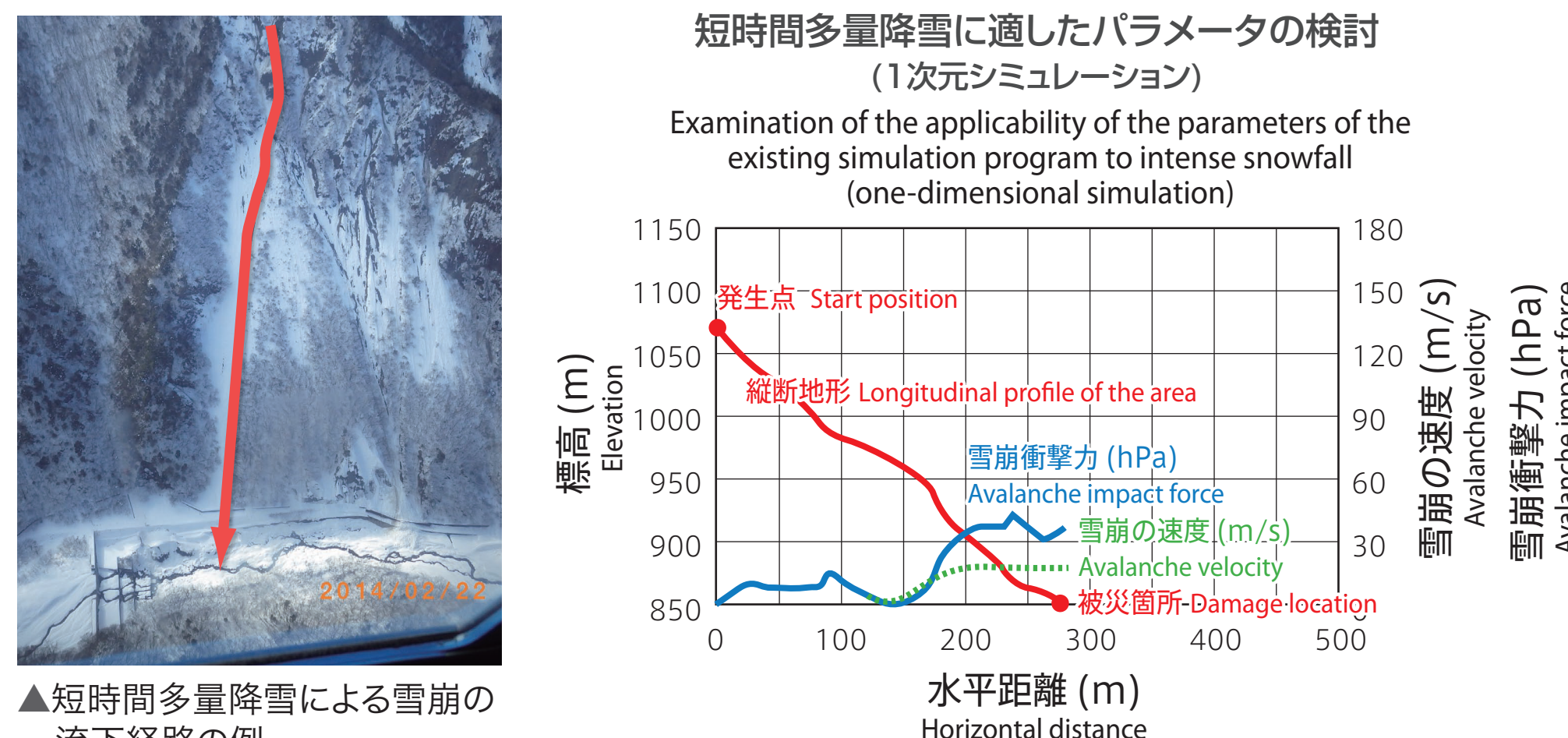
▲雪崩発生箇所の植生調査例  
A vegetation survey at an avalanche starting zone

### 雪崩の到達範囲と衝撃力の検討

#### Examination of runout distance and impact force of avalanches

現地調査や雪崩発生条件の調査結果に基づいて、短時間多量降雪時の雪崩に対する既存シミュレーションのパラメータ等の適用性を調査し、雪崩の到達範囲や衝撃力の算出手法を検討しています。

Based on the results of onsite theoretical analyses and surveys on avalanche occurrence conditions, the applicability of existing avalanche simulation parameters has been investigated with regard to their application to avalanches that occur after intense heavy snowfalls. Based on the results of this investigation, we have been conducting examinations towards the establishment of a method for calculating the runout distance and impact force of such avalanches.



▲短時間多量降雪による雪崩の流下経路の例  
A track for an avalanche that occurred from intense heavy snowfall

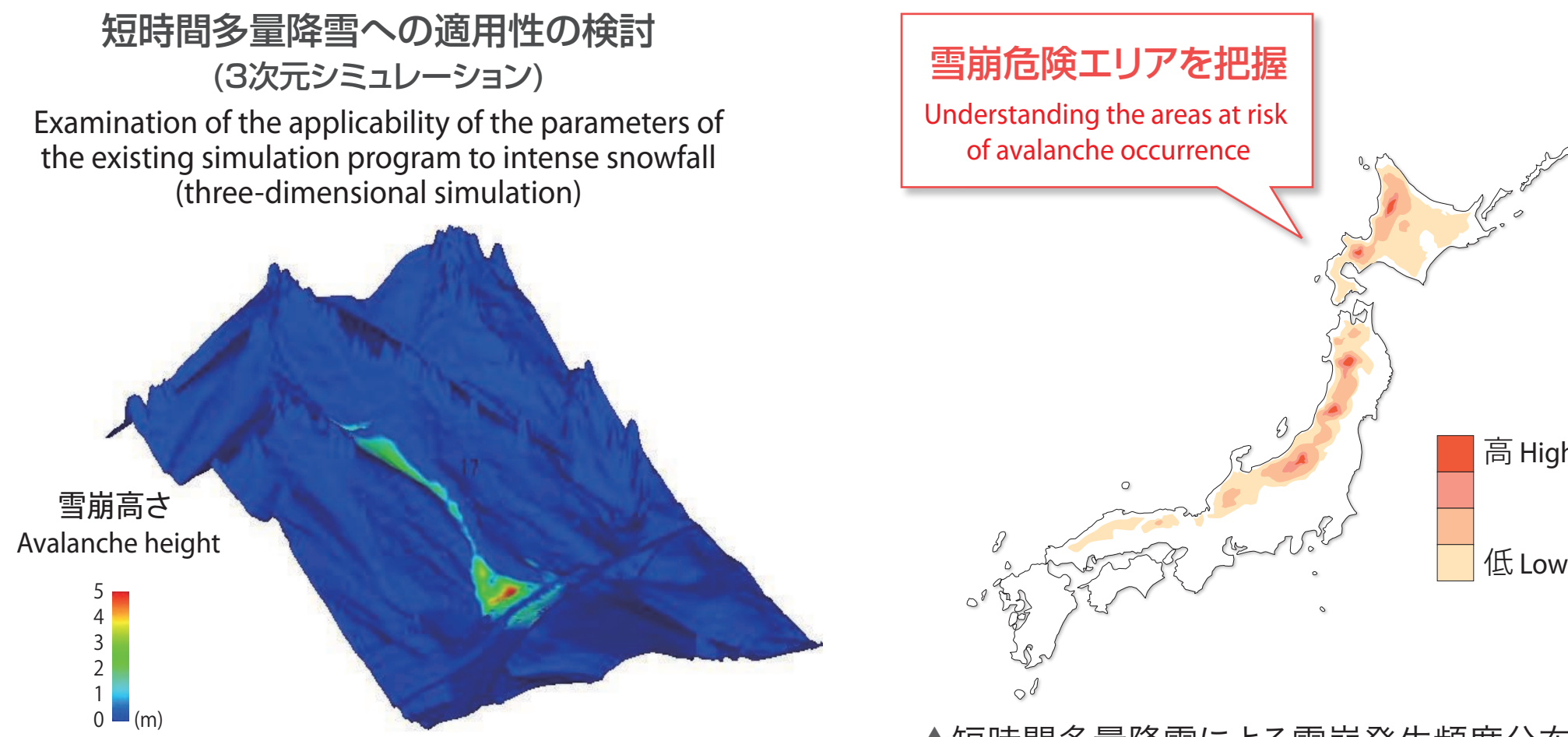
▲既存シミュレーションによる雪崩の解析例  
An avalanche analyzed by the conventional simulation program

### 雪崩危険度評価手法の検討

#### Examination of hazard assessment for avalanches

雪崩発生条件の調査結果に基づいて、短時間多量降雪時の雪崩発生に関わる頻度分布などを作成します。さらに、雪崩の発生条件と衝撃力の算出手法の検討結果をとりまとめ、短時間多量降雪による雪崩危険度評価手法を提案する予定です。

Based on the results of surveys on the conditions under which avalanches occur, a frequency distribution map will be created that shows avalanche risk from intense heavy snowfall. The examination on methods for calculating the conditions under which avalanches occur and impact forces will be completed, and an evaluation method for the risk of avalanche from intense heavy snowfall will be proposed.



▲既存シミュレーションによる雪崩の解析例  
An avalanche analyzed by the three-dimensional simulation program

▲短時間多量降雪による雪崩発生頻度分布(イメージ)  
Distribution of avalanches caused by intense snowfall (conceptual diagram)