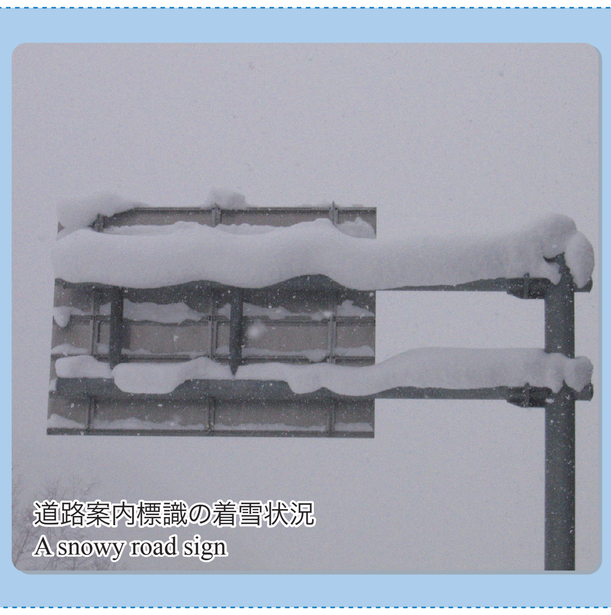
道路案内標識の着氷雪対策に関する研究

Measures for Controlling Snow and Ice Accretion on Road Signs

冬期間、道路案内標識に付着した雪や氷が落下して、通行車両に被害を及ぼす事例が起きています。この対策として、人力による着雪処理を主に行っていますが、作業に手間がかかり通行車両との接触などの危険が伴います。このため、寒地土木研究所では、道路施設の着氷雪対策に関する研究に取り組んでいます。

There have been several cases of winter-specific damage to vehicles caused by snow or ice that has accreted to road signs and then fallen.
However, such removal is time and labor intensive, and potentially dangerous to road maintenance personnel from possible contact with passing vehicles. The Civil Engineering Research Institute for Cold Region has been investigating measures against snow and ice accretion on road accessories.


道路案内標識の着雪状況
A snowy road sign

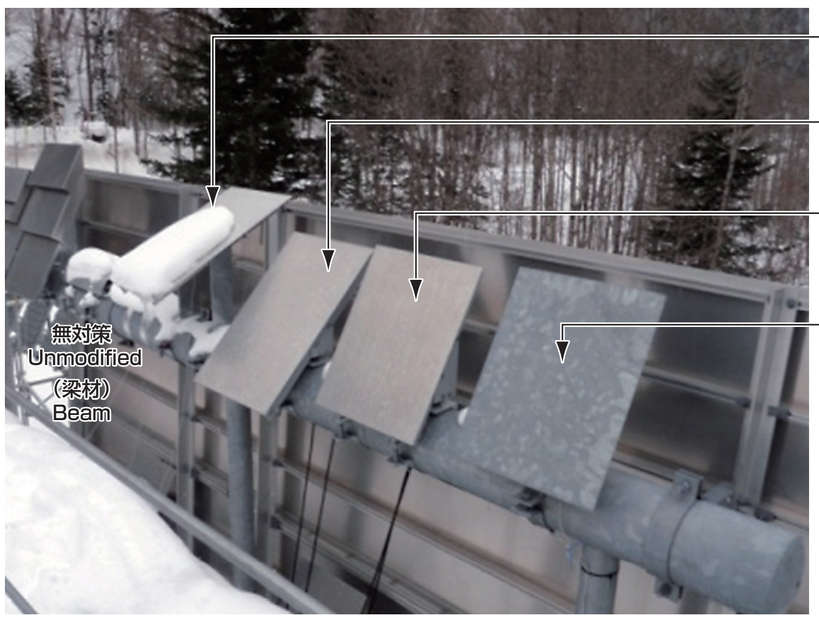

人力による着雪処理作業
Manual snow removal

道路案内標識の対策工の調査

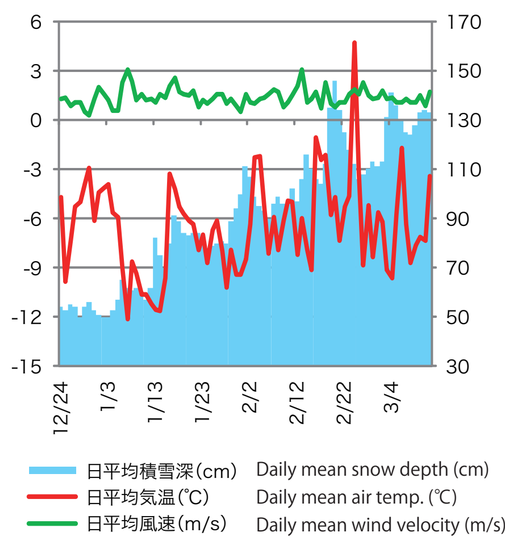
Investigation of Road Sign Designs

簡易な着雪の対策として、形状、材質および角度を変えた板（傾斜板）を、試験用の道路案内標識に設置し、着雪と落雪状況の調査を行っています。対策を行った箇所では、対策を行っていない箇所より、観測期間中において着雪している時間が２５～４２％短くなりました。また、勾配６０°の傾斜板が最も着雪している時間が短く、鋼製よりもアルミ製の方が着雪量を減らす傾向が見られました。勾配が３０°と４５°では、効果にあまり違いは見られませんでした。

We have been conducting field experiments toward developing a simple and efficient way to control snow accretion on road signs by equipping the signs with protective plates. The plates differ in materials, shapes and installation angles. Our observations have shown that road signs equipped with the test plates show accretion for 25% to 42% less time than for conventional road signs. The least time with snow accretion was for signs with plates tilted at 60°. Aluminum plates were found to be more effective than steel ones at reducing snow accretion. The plates tilted at 30° and those tilted at 45° did not differ in their effectiveness in reducing snow accretion.

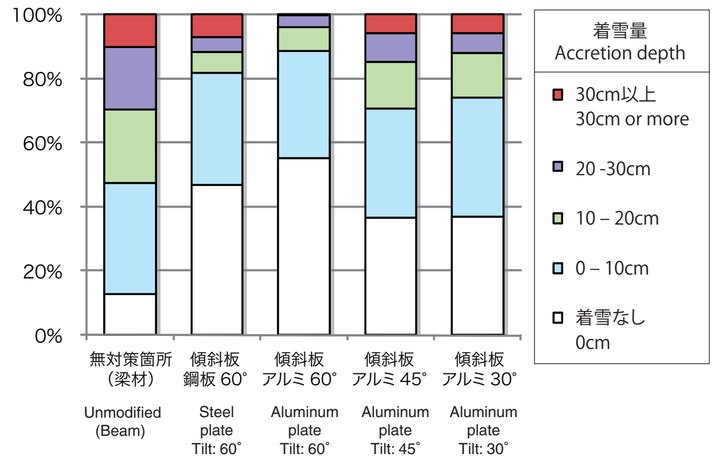


▲難着雪対策工の試験状況
Test installation of devices to prevent snow accretion



▲観測期間中の気象状況（定山渓）
Weather conditions during the observation period (Jozankei Site)

観測期間（2010/12/24～2011/3/18）
Observation period (Dec. 24, 2010 to Mar. 18, 2011)



▲各着雪対策工の着雪量と観測期間中の着雪時間の割合（定山渓の例）
Snow accretion on each specimen: Accretion depth and cumulative duration during the observation period (Jozankei Site)

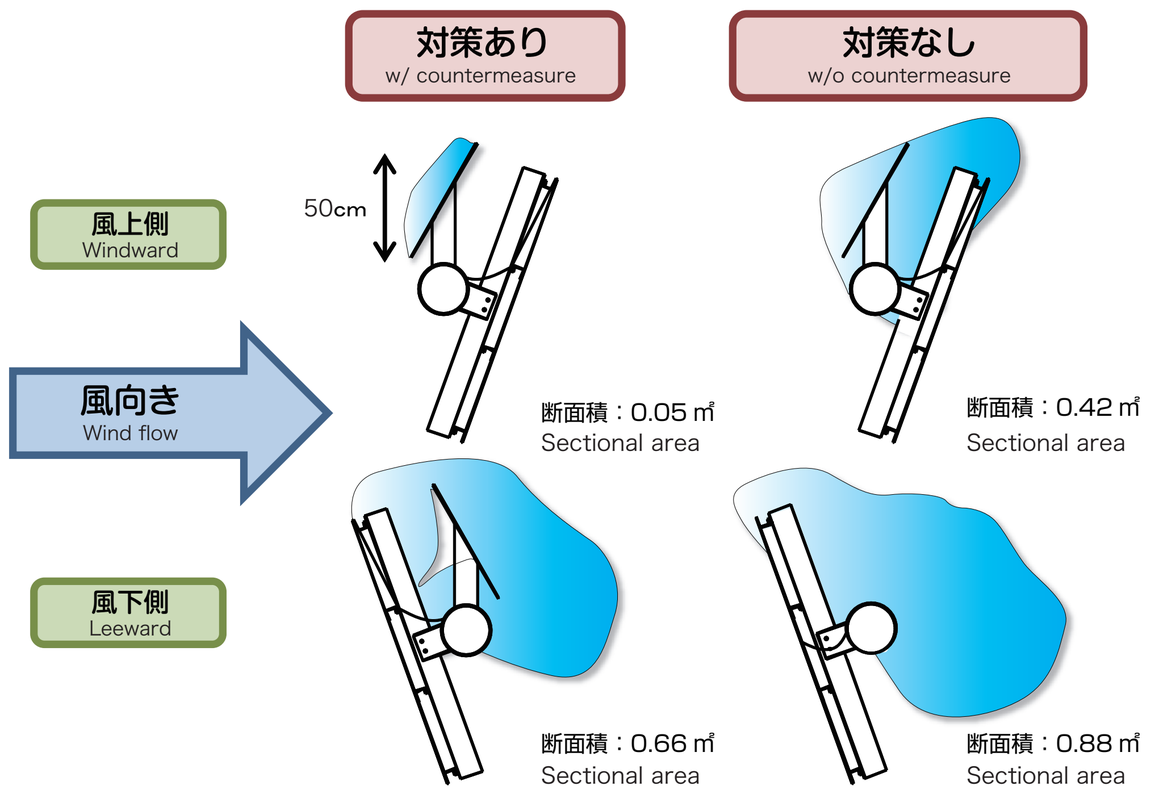
観測期間（2010/12/24～2011/3/18）
Observation period (Dec. 24, 2010 to Mar. 18, 2011)

設置条件による着雪の発達状況の解明

Investigation of Orientation-related Differences in Snow Accretion to Roadsigns

道路案内標識を主風向に対して、直交するように設置し、風上側と風下側の着雪の発達状況について観測を行いました。着雪は風上側より風下側で大きく発達する傾向が見られ、無対策箇所では 2.1 倍、対策箇所では 13.2 倍大きく成長しました。また、対策箇所の着雪は無対策箇所の着雪より小さく、風上側では断面積が８０％程度、風下側では２５％程度小さくなりました。この結果より、風上および風下側でも、対策工による着雪量の低減効果が期待されます。

Road signs equipped with experimental plates oriented perpendicular to the prevailing wind direction were used to investigate the difference in snow accretion between the windward and leeward sides. The volume of accreted snow was greater when the backside of the road sign was facing leeward. Without any countermeasures, the accretion volume on the leeward side was 2.1 times that on the windward side. With countermeasures, the accretion volume on the leeward side was 13.2 times that on the windward side. On both windward and leeward sides of the road sign, less snow accreted with countermeasures than without countermeasures: The cross-sectional area of the accreted snow on the windward side was about 80% smaller and that on the leeward side was about 25% smaller than those on the parts without countermeasures. The experiment results reveal that the snow accretion countermeasure is effective on the windward and leeward sides of the road sign.



▲着雪してから３１日間経過した着雪の断面（中山峠の例）（着雪期間：2010/1/11～2010/2/11）
Cross-section of accreted snow 31 days after the start of accretion (Nakayama Pass Site)
(Snow accretion period: Jan. 11, 2010 – Feb. 11, 2010)