

Analyzing and mitigating the impact of avalanche protection structures on their local wind climate

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ABSTRACT

The wind field during severe winter storms was analyzed in Bolungarvík municipality on the Westfjords peninsula, northwest Iceland, using computational fluid dynamics. The simulations allowed for investigation on reported adverse changes in wind forcing on residential houses near a large avalanche protection structure following its construction.

The simulations show that under certain circumstances an accelerated wind field develops along the steep mountain hills in the outskirts of Bolungarvík. The strong wind along the hill side is diverted by the large-scale avalanche structure towards the buildings in its closest proximity, resulting in elevated wind forcing and thus negative impact to the residential area.

The characterization and mapping of the wind climate following the completed avalanche protection in Bolungarvík municipality will be discussed along with an analysis forming the basis of potential mitigation measures. Furthermore, the benefits of detailed wind field analysis using computational fluid dynamics for examining potential adverse effects of protection structures on their local wind climate will be outlined. Emphasis will be given to how this methodology may assist during the planning and design phases of avalanche structures in severe wind climates.