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How do forests influence the stability of the snowpack?

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Snow avalanches may seriously endanger both the local infrastructure and human lives. In order to mitigate the danger a number of different methods are used, starting from the active methods, such as controlled avalanche triggering with explosives, to the passive methods, such as steel levies, snow nets or by planting specific vegetation. In the recent years in particular nature-based solutions are getting more popular. Nature-based solutions are sustainable, economically viable and environmentally friendly protections against natural hazards, that enhance the resilience of the local ecosystems. One such solution is forestation, as forest are known to usually reduce avalanche formation in the source regions due to their physical anchoring effect and their influence on the snowpack layering, e.g. by influencing snow temperature, albedo, wind speed and direction. However, the exact effect of the different kinds of forests on different terrains is a very complex topic, still not fully understood today.

In the current presentation we will summarize the results of field measurements conducted at different sites in south-western Iceland in order to determine the effect of the type and condition of forest cover on snowpack stability for avalanche risk mitigation purposes. By using different kinds of stability measurements (CT, ECT, PST, hardness, snow temperature profiles, crystal structure in the layers, etc.), under different kinds of forest cover in a variety of stages (e.g. native birch, newly planted evergreens, different ages), at different locations within and close to the plantation (e.g. near the trunk of the trees, on clearings, in open areas with similar characteristics to the plantation) and at different slope angles we can get a better understanding on the effect of forests on the snowpack stability in general. Furthermore our results may serve as a support for local decision makers in Iceland when choosing the exact tree species to be planted for avalanche risk mitigation purposes.