The spatial variability of snow resistance on potential avalanche slopes

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ABSTRACT. Since snow avalanches are believed to release from zones of localized weakness, knowledge of snow-strength patterns is important for determining slope stability and for applying effective avalanche-control measures. In this study, the spatial variability of snow resistance (an index of snow strength) and depth were measured and compared with terrain features on two inclined slopes. A refined instrument allowed the strength of an entire snow slab to be characterized in a short time. The spatial pattern of trees appeared to affect the pattern of snow depth at one site, where a significant linear relationship was found between snow depth and average snow resistance. These results suggest that localized snow-depth variations may be important in snow-strength genesis. Although a linear relationship existed at that site, additional factors may be critically relevant. A second site with more complex terrain features and less localized wind drifting did not show a linear relationship between depth and average resistance. Instead, complex patterns of resistance demonstrated that many factors contribute to snow resistance. In particular, the snow overlying rocks was found to have significantly weaker resistance than that in adjacent areas not over rocks.