



Geomorphological and dendrochronological data comparison to assess the frequency and magnitude of snow-avalanches fluxes in a subpolar maritime environment

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Snow avalanches pose a serious hazard for several Icelandic coastal urban nuclei in the north-western, northern and eastern parts of the country. Most of these communities developed during the first part of the 20th century and have encountered dramatic situations due to the occurrence of lethal snow-avalanche events between 1974 and 1995. In those areas, historical data regarding snow avalanches are scarce and not reliable enough. Furthermore, land-planning irreversibly destroyed geomorphological evidence of snow avalanches past occurrence. As in Iceland snow avalanches occur most often by cycles every 10-15 years, that affect several areas in a few days span time, investigating remote areas with limited human influence seems the key to gather relevant information on the recent and sub-recent snow-avalanche activity (occurrence and magnitude, runout distance and lateral dispersion) and changes.

Thus, geomorphological evidence such as slope gradient distribution on colluvial cones and snow-avalanche transported and deposited boulders mapping in the distal parts of the cones are used to define topographic models of the runout distance of snow avalanches. Furthermore, relative dating of the snow-avalanche boulders, carried out with vegetation cover and rock hardness measurements, discriminates several generations of snow-avalanche magnitudes, clearly underlining a shift during the last decades, with events reaching shorter distances.

Dendrogeomorphological and dendrochronological methods are also applied in prone areas, enabling the mapping of the preferential snow-avalanche paths and surveying the snow-avalanche occurrence during the tree life time, i.e. during the last 100 years in Northern Iceland. The results underline the occurrence of snow-avalanche "cycles", with several areas responding the same ways to the repeating snow-avalanche stress. Thus, results individualize several avalanche winters from 1950 to 1970, and since the year 2000.