



Large-scale collapse events of perennial snow patches in Japan related to torrential rainfall

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Recently, large-scale collapse events of perennial snow patches have been occurring frequently in the mountains area in Japan. Those events arose in connection with torrential rainfall in summer. Since such events and accidents accompanying them have not been studied thus far, we have carried out firsthand investigations shortly after them. In this study, we discuss about effects of extremely heavy rainfall on large-scale collapse events of perennial snow patches with two practical examples.

On 11 and 12 July, 1995, for the first example, owing to 814 mm of rainfall in two days a debris flow occurred and flowed down on the Shirouma-daisekkei snow patch, the Northern Japanese Alps. Consequently the debris flow incised the snow patch, and a large-scale trench, 1.3 km in length, 6-8 m in width, 10-20 m in depth, was formed from the upper part to near the terminus of the snow patch. This snow patch is located within one of the most popular alpine recreation areas in Japan. Although there was fortunately no human damage, a big blow was dealt to the mountain tourism.

For the second example, a collapse accident of a snow patch occurred at Mt. Arasawa, Niigata Prefecture, on August 1, 2004. This accident claimed the lives of 3 amateur photographers who were taking photographs within a large snow tunnel formed by the snow melting underneath the snow patch. A survey of the snow patch indicated that the collapsed snow area was as large as 220 square meters, and the mass of the collapsed snow was estimated to be 150–230 ton. Since the roof of the snow tunnel may have become a cantilever structure immediately before the accident, this large-scale collapse was presumed to be caused by tensile fracture at the fixed end of the roof because of its weight. The large snow tunnel underneath the snow patch has a high possibility of having expanded greatly by a heavy rainfall event (approximately 730 mm of rainfall during 10-21 July, 2004).