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# Future snow avalanche regime under climate scenarios in the Italian Alps

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Influence of snow avalanche on morphology and ecology of mountain area is paramount. Snow avalanches redistribute snow mass deposited during winter, reducing accumulations on steep slopes and impacting the mass balance of the snow covered and glacierized areas. The snow depth in the avalanche release zone is often assumed to coincide with the snow depth precipitation in the three days before the event H72. Statistical analysis of H72 is therefore used to evaluate snow depth (and volume) at avalanche start. Transient climate change conditions as observed nowadays are expected to substantially modify the future distribution of precipitation and temperature, which in turn will drive changes of avalanche regime. Therefore, long term simulation of avalanche regime under pending climate change scenarios henceforth is warranted. Here, based upon an already developed and well assessed method for long term synthetic simulation of snow avalanches, we investigate future avalanche regime for a case study site in Alta Valtellina, in northern Italy. A probabilistic framework, conditioned upon precipitation and temperature, is used to assess future H72 patterns, and to trigger avalanche events therein. The geometry of the avalanches, including release depth, width and length is devised using regional statistical distributions evaluated from the observed data. Then, the avalanche runout and volume at deposition are evaluated. We use downscaled precipitation and temperature regime from reference GCMs to force avalanche dynamics in the considered area for the period 2010-2060. The statistics of the resulting avalanches geometry, volumes and track length are then compared against their historical statistics within the considered site, as well as against long term simulation for steady climatic conditions, and preliminary conclusions about the expected future regime of avalanches in the area are drawn.

Keywords: avalanche models, climate change, GCMs