

Full-depth avalanches and soil erosion: an experimental site in Aosta Valley (NW Italian Alps)

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Snow gliding and full-depth avalanches are often associated with soil erosion in the starting and track areas, with the release of significant amount of solid material in the runout zone. In this study, we want to investigate the snow movements related to soil erosion, with particular attention to the processes at the snow/soil interface and to the weather conditions, which might contribute to avalanche release. The study area (Aosta Valley Region-NW Italy) is located on a SW slope frequently interested by snow gliding and glide cracks, often followed by full-depth avalanches and soil erosion. In the release area two plots at the same elevation, slope angle and aspect, but with different soil water content have been equipped with sensors for the continuous measurements of snow gliding, soil water content and temperature. Soil profiles were described in the avalanche release area. The field pedological investigations showed that the soil erosion phenomena, due to full-depth avalanches, involve the whole topsoil (A horizon), gliding on the underlying AC horizons, characterized by clear discontinuities in soil physical properties, e.g. lower liquid and plastic limits in the deeper horizons. Preliminary results from the winter season 2008-2009 and 2009-2010 showed that the intensity of the gliding process in the avalanche release area is very high (daily mean of 4.3 cm). The release of wet snow avalanches (01/03/2009 and 15/03/2010) caused a solid transport equal to 2.44 kg m⁻², revealing a strong interaction between soil and snow avalanches.

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