

Snowpack properties of unstable wet snow slopes: observations from the Swiss Alps

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Next to meteorological parameters, snowpack properties play a major role in the formation of wet snow avalanches. We investigated profiles observed at wet snow avalanche fracture lines (winter 1992-2009, 20 profiles) and in slopes where signs of instability like cracking or collapsing were noted at the time of observation (2006-2010, 16 profiles). Furthermore, we investigated snowpack properties in southerly aspect start zones before, during and after wet snow avalanche cycles at the regional scale (2002-2010, 156 profiles). Investigated parameters include grain shape and size, hand hardness and wet-ness of the failure plane, the slab layer and the bed surface. The failure plane of wet snow avalanches was generally at the interface or within a moist, very soft layer consisting of a mix of melt-freeze, faceted or depth hoar grains. The slab tended to be fully moist, soft and was already transformed to melt-freeze grains for the most part. Typically, in unstable slopes the Rutschblock (RB) score was very low (median score 2) and failed within or at the interface to a soft or very soft layer consisting of moist, coarse facet or depth hoar grains. The comparison of snowpack properties before and during wet snow avalanche cycles showed that significant differences exist in snow temperature, the proportion of the snowpack which is wet and in the wetness of the snowpack. To assess the potential of avalanche failure deep in the snowpack, it is important to determine if soft layers containing coarse, facet or depth hoar grains are present.