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First results on characteristics of wet snow avalanche activity in a high alpine valley

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The occurrence of wet snow avalanches is in general poorly understood. This is particularly true for mountain areas with a non-maritime type of climate where wet snow avalanches mainly occur in spring with the onset of melt water percolation through the snowpack. However, since melt water percolation is notoriously complex and hence hardly predictable, wet snow avalanche prediction is still in its infancy. For 20 years (winters of 1975-1976 to 1994-1995) the avalanche activity has been observed on an almost daily basis in the Dischma valley near Davos (Eastern Swiss Alps). The study area comprises a large starting zone of north-easterly aspect (2200 m a.s.l.) with several avalanche paths. We have analysed the occurrence data in combination with meteorological and snowpack data collected at an elevation of 2000 m a.s.l. Snowpack data were only available on a bi-monthly basis and included snow temperature, estimated liquid water content (wetness) and existence of capillary barriers. During the 20 year observation period almost 800 avalanches were observed. The proportion of loose snow to slab avalanches was 4.5, whereas considering the avalanche size, the proportion was 0.68. Most avalanches occurred in May, whereas the highest activity (considering size) was recorded in March. Considering both types of avalanches jointly, snow depth, precipitation and air temperature showed the highest correlation with avalanche activity. Most loose snow avalanches occurred when air temperature was high and/or after a precipitation period. Slab avalanches also occurred more frequently after precipitation events, in particular rain, but also the existence of capillary barriers was a significant discriminator between avalanche and non-avalanche days. Interestingly, radiation did not show up as a significant variable. The results suggest that even in transitional snow climates most wet snow avalanche are, as dry snow avalanches, related to precipitation events rather than due to a loss of stability due to

the ripening of the snowpack in spring. Also, as for dry snow avalanches, the snow stratification is essential for wet snow slab avalanches (capillary barriers). However, the study does not provide deeper insight into the mechanics of wet snow avalanches. It is also too site specific to reveal general rules for wet snow avalanche forecasting. As the first significant study on wet snow avalanche occurrence, it will nevertheless pave the way to a more quantitative, data-based forecasting of wet snow avalanches.