



Variability of debris flow properties at the Illgraben catchment

B.W. McArdell and C. Graf

WSL Swiss Federal Institute for Forest, Snow and Landscape Research

Debris flows exhibit a wide range of flow morphologies in nature, ranging from events that have distinct dry granular flow fronts to events that more closely resemble flash floods, and transitional events that contain elements of both end-members. The apparent variability in nature has implications for both research (e.g. evaluating constitutive models for debris flow) and practice (e.g. selection of friction coefficients for modeling debris flows related to the evaluation of mitigation structures or for generating hazard maps). Using eight years of event data from the Illgraben debris flow observation station (southwestern Swiss Alps), one of the most active debris flow catchments in the Alps, we illustrate the natural variability of flow properties such as flow depth, front velocity, and total event volume for more than 30 events. Measurements of normal and shear forces are available for the last four years, allowing an assessment of the correlation between the physical dimensions of the flow and parameters such as the bulk density of the flowing debris, or the water content. For example, there is a positive correlation between front velocity and water content. Additionally, within an individual debris flow there may be strong variation of the water content along the length of an individual surge.