



Monitoring soil moisture dynamics at a hillslope prone to slide

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In the framework of the TRAMM project (Triggering of Rapid Mass Movements in steep terrain) a process study has been carried out at the Rufiberg test site in the Northern prealps of central Switzerland. The aim of this study was to better understand the hillslope system and the involved hydrological processes of the test site, and thus allowing better predictions for similar settings in the long term. The Rufiberg – ‘Rufi’ means shallow landslide in Swiss dialect – has a long history of shallow landslides and all dispositions for the occurrence of such mass movements are met at this steep test site (30° average inclination). The hydrological conditions are assumed to be crucial for triggering potential landslides. Therefore, we are monitoring the spatial and temporal soil moisture distribution with TDR probes, the groundwater table with groundwater wells and subsurface storm flow in a trench. These measurements were complemented with an electric resistivity tomography profile to obtain information about soil thickness, bedrock lithology and the saturation pattern of the soil. Finally, we evaluated the influence of precipitation and groundwater table increase on the occurrence and amount of subsurface storm flow. Four major precipitation events during summer 2010 were analyzed in detail to characterize the soil moisture responses at different depths, to determine the soils maximum precipitation uptake and to estimate the influence of precipitation on the saturation behavior of the soil. We identified variances in soil properties and microtopography as key factors for the spatial soil moisture distribution. We conclude that the pre-event soil moisture, precipitation intensity and its duration determine the saturation behavior of the soil.