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Precipitation is one of the major landslide triggers and its patterns control temporal behaviour of landslides and their displacement dynamics. Local hydrological regimes are complicated because of the dynamic behaviour of the sliding material which affects the fissure characteristics and distribution. The fissures can be conceptualised as extension cracks or preferred flow paths consisting of loosely packed material with higher permeability then the more densely packed original sediments. This creates dual permeability that influence infiltration rates, storage capacity and drainage characteristics, but also pore pressure distribution within the landslide body. Although the importance of preferred infiltration is recognized in literature, its quantification remains difficult.

This work presents the results obtained during small scale infiltration experiments carried out in highly heterogeneous mudslide of Super-Sauze, in Southern French Alps. The main objective of this research was to study the hydrological system in different morphological units of the landslide with a focus on the identification of preferential flow characteristics of each area. Three rainfall infiltration experiments were carried out in the black marls mudslide of Super-Sauze between 20 and 25 July 2008. Representative plots of 1m2 were selected. In each plot two periods of 8 hours artificial rain was applied. Manual and automatic measurement of groundwater level in 5 piezometers was performed to monitor local hydrological response. Moreover, chemical tracers (Br- and Cl-) were applied to the rain to follow the rainfall water during the infiltration process.

The chemical analysis combined with the hydrological observations showed distinct different hydrological behaviour of the three test locations including variable infiltration capacity, drainage characteristic and ratio of preferential and matrix flows. The upper part of the landslide can be characterised by very high infiltration capacity (>40mm/h) and very fast drainage (i.e. fast matrix flow + fast preferential flow). Another area, morphologically denoted as the stable part with low displacement rates, shows reduced infiltration capacity (<15mm/h) and matrix-like flow behaviour. Lastly, high infiltration capacity and long time of drainage was recorded in the most active part of the landslide (i.e. matrix flow + 80% preferential flow). Furthermore, an attempt has been made to relate preferential flow occurrence with mapped surface fissure information.

Based on the analysis of the field data the conceptual models of hydrological behaviour of particular units within landslide were created. This knowledge was valuable insight into further hydrological modelling of the landslide (see abstract of Krzeminska et al., in HS13.13/NH3.16 session).