Assessment of the 2019 Chamoson debris flow event (Swiss Alps)

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Debris flows triggered by heavy rain are common and can cause huge damages in Alpine valleys. In this case we documented the changes occurred in the Losentsé valley after the 11 August 2019 event, which caused two death and several damages to the village of Chamoson. The Chamoson basin is located in the Alps on the right side of the Rhône valley. Three main rivers drain the Chamoson basin, the Losentsé, the Cry and the Tsené. The main debris flow event occurred in the Losentsé sub-basin. The Losentsé River is 9 km long from the sources at 3000 m until the alluvial cone apex at 600 m. In the upper part of the Chamoson basin thick loose debris cones and glacial deposits lie on steep slopes, the geology of the middle basin is formed by unstable clayey shales with several active landslides on both lateral valley slopes.

The village of Chamoson is located on the huge alluvial cone built with torrential events from the three main rivers. Since the XIX century, several big debris flow events (1898, 1923, 2003, 2018) were recorded in this area and mitigation measures were built in the principal rivers. Unfortunately, the 2019 debris flows overflowed the channels limit when the flows reached the alluvial cone apex, reaching the road and took a car with 2 persons inside. Upstream in the middle basin 2 wood bridges were destroyed and many concrete or stone walls (mitigation measures) along the river were damaged.

After the event we acquired pictures with a drone from the sources area and the Losentsé river valley in order to have a post event image. With this image we could analyse and map the source areas and the inundated areas in the Losentsé channel. We did also field observation along the river.

After comparing the pre- and post-event images we mapped the middle and upper basin inundated areas by the 2019 event and the described the deposits and eroded sections along the river. We calculated the peak discharge of 1000 m$^3$/s for this event using the inundated transversal profile area near the cone apex and the flow velocity obtained from a movie. The peak discharge corresponds to 4 in the size classification for debris flows (Jacob et al., 2005).

Reference: