

Sedimentological reconstruction of an outburst flood in response to the Flims Rock Slide into the potential Lake Bonaduz

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The Flims mass movement is the largest one in the Alps. Its deposits reach a volume of about 9–11 km³ (CAPREZ 2008; POLLET & SCHNEIDER 2004) and recent datings show that its failure occurred during a period of warm weather conditions (IVY-OCHS et al. 2009). Next to the Flims mass movement another, slightly older (POSCHINGER 2005), rock slide took place near the village Tamins. The Tamins mass movement deposits were able to dam the Vorderrhein and Hinterrhein and the “Lake Bonaduz” was created. Calculations reveal a volume of 7,88 km³ and a water surface height of 724 masl. According to this assumption, the Flims impact produced a megaflood event with a 214±20 m high wave crest which reached regions up to 900–950 masl.

The consideration of the flood wave was verified and improved by sedimentological and geophysical methods. In total, 20 samples of gravels and pebbles were taken from seven locations along the megaflood pathway. Those samples are seen as flood wave deposits and also contain proved sediments of the Bonaduz-Fm., which probably belongs to the megaflood event. Over 13,000 components were petrographically and morphologically analysed. Additionally, these analyses were compared with those of the riverbed gravels from the Vorderrhein, Hinterrhein valley and versam gorge. Furthermore, the grain size distribution of the assumed flood wave deposits were investigated and interpreted.

The landscape of the northern part of the Tamins landslide deposits reveals morphological structures to capture the megaflood deposits. Because of that, this area was mapped with the focus on gravel and pebble occurrences. Additionally, the sediment fillings of the topological sinks were studied with three ERT (electrical resistivity tomography) transections with a summarized length of 1,7 km.

The results enable the distinction between three deposition facies within the megaflood sedimentation. First of all, the pathway along the Vorderrhein and Rhein valley with the deposition of the Bonaduz-Fm. Secondly, the wave impact into the versam gorge and the sedimentation of the gravels between the limestone boulders of the Flims landslide main deposits. Thirdly, the inundation wave over the Tamins mass movement deposits and the filling of the topological sinks. The mapping and the ERT-survey support the assumption of the megaflood event as reason for the high sedimentation within the sediment sinks. In the area of Tamins, the gravel/pebble distribution and the morphological observations reveal a maximum flood wave impact height of 830 masl. This result supports the calculations of the maximum wave crest height at the beginning of the megaflood progression (SCHWENK 2017).

Literature:

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