

Automatic runoff measurements triggered by water level observations and weather radar information

Fabio Fasel

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Thunderstorm-related floods can cause severe damages to infrastructure close to mountain torrents. Especially small catchments are a threat, since the discharge can rise very quickly from some litres per second to cubic metres per second. Therefore, efficient protection measures are important. The type and size of the protection measures are often chosen according to calculations with empirical equations. These equations can be imprecise if there is a lack of calibration measurements at high discharge. In this thesis, a new automatic discharge measuring method based on the salt dilution method is presented. The first aim of the thesis is to figure out whether or not the method is suitable to create a stage-discharge relationship at a previously ungauged mountain torrent in a useful time. The second aim is to find out if the method can be used to verify and/or extend an existing stage-discharge relationship. The data of two automated salt dilution gauging systems at the Hürlichenbach (canton of Fribourg, Switzerland) and Vogelbach (canton of Schwyz, Switzerland) catchments was used to answer the aims. The systems work with the instant injection of undiluted salt and the discharge is derived from the change in conductivity of the water over time. The results show that the method can be potentially used to create a stage-discharge relationship. The measurements of the salt dilution method from the previously gauged Vogelbach suggest that it is possible, but the lack of important rainfall and therefore discharge measurements at the ungauged Hürlichenbach catchment impede the empirical confirmation of the first aim. The measurement campaign showed that the proposed method could also be used to verify existing stage-discharge relationships. In order to conduct high quality measurements, it is important that the operator is familiar with the new gauging system.

Prof. Dr. Christian Hauck