



Does antecedent precipitation play a role for floods in (small) Swiss catchments?

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River flooding is one of the most devastating natural hazards worldwide. In Switzerland, like in many other regions, the building of flood protection infrastructures is complicated by difficulties in assessing flood risk due to:

- The large year-to-year variability in flood losses. The variations amount to several orders of magnitude (see for ex. Hilker et al., 2009).

- The non-stationarity of the flood risk at longer time scales. A pronounced decadal variability in flood risk has been observed by Schmocker-Fackel and Naef (2010) and Köplin et al. (2013) show that climate change will induce diverse and complex regional changes in flood risk.

A better understanding of flood processes is therefore required in order to better predict changes in flood frequency. It has been hypothesized that flood frequency variations are linked to changes in the atmospheric circulation. Consequently, the whole mechanism chain starting from atmospheric circulation patterns triggering severe precipitation weather and ending with extreme river discharge must be considered. In a step in that direction we characterize precipitation events that triggered observed annual maximum discharges at 120 discharge stations during the last 53 years in Switzerland. The precipitation dataset is a temporally-homogeneous complex interpolation of daily rain gauge data on a 1 by 1 km grid covering the Swiss territory (MeteoSwiss, 2011).

We test the relationship between different catchment-averaged precipitation indices and flood occurrence. We explicitly separate antecedent and event-associated precipitation. The preliminary results show that antecedent precipitation (weekly to monthly sums ending 3 days before the event) are no significant flood predictors for most of the catchments. On the other hand, a very strong signal is found for the 1-3 days precipitation sums.

Lessons for flood modeling in Swiss catchments is that a strong effort is required in order to represent the flood-associated weather events correctly over a 1-3 day period -particularly the precipitation amounts- whereas antecedent precipitation is not a necessary precondition for flood building. In that sense, flood processes in Switzerland might contrast with extreme drought processes for which longer term precipitation statistics are expected to be important.

Hilker, N., A. Badoux, and C. Hegg. 2009. The swiss flood and landslide damage database 1972-2007. *Natural Hazards and Earth System Sciences* 9, 913–925.

Schmocker-Fackel, P., and F. Naef. 2010. More frequent flooding? changes in flood frequency in switzerland since 1850. *Journal of hydrology* 381, 1–8. 1,3

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MeteoSwiss. 2011. Documentation of meteoswiss grid-data products. daily precipitation (final analysis): Rhiresd. available online at

<http://www.meteosuisse.admin.ch/web/de/services/datenportal/gitterdaten/precip.html>.