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FlooDSuM - a decision support methodology for assisting local authorities in flood situations

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Decision making in flood situations is a difficult task, especially in small to medium-sized mountain catchments (30 – 500 km^2) which are usually characterized by complex topography, high drainage density and quick runoff response to rainfall events. Operating hydrological models driven by numerical weather prediction systems, which have a lead-time of several hours up to few even days, would be beneficial in this case as time for prevention could be gained. However, the spatial and quantitative accuracy of such meteorological forecasts usually decrease with increasing lead-time. In addition, the sensitivity of rainfall-runoff models to inaccuracies in estimations of areal rainfall increases with decreasing catchment size. Accordingly, decisions on flood alerts should ideally be based on areal rainfall from high resolution and short-term numerical weather prediction, nowcasts or even real-time measurements, which is transformed into runoff by a hydrological model. In order to benefit from the best possible rainfall data while retaining enough time for alerting and for prevention, the hydrological model should be fast and easily applicable by decision makers within local authorities themselves.

The proposed decision support methodology FlooDSuM (Flood Decision Support Methodology) aims to meet those requirements. Applying FlooDSuM, a few successive binary decisions of increasing complexity have to be processed following a flow-chart-like structure. Prepared data and straightforwardly applicable tools are provided for each of these decisions. Maps showing the current flood disposition are used for the first step. While danger of flooding cannot be excluded more and more complex and time consuming methods will be applied. For the final decision, a set of scatter-plots relating areal precipitation to peak flow is provided. These plots take also further decisive parameters into account such as storm duration, distribution of rainfall intensity in time as well as the catchment's antecedent moisture conditions.

The proposed approach is currently tested in two catchments in the Swiss Pre-Alps and Alps. We will show the general setup and selected results. The findings of those case studies will lead to further improvements of the proposed approach.