

Project

The aim of this investigation is to find an appropriate discretisation level that represents the processes that are important for the generation of flood events. The hydrological modeling allows us to determine the probable maximum flood (PMF) from the probable maximum precipitation (PMP).

Discretisation

First the basin was divided into 58 subbasins (SB) based on all available discharge measurements in this area.

Secondly, we divided the catchment area into 456 hydrological response units (HRP).

The landscape characteristics of the discretisation units were soil, land use, aspect, hydrogeological characteristics, slope, and elevation.

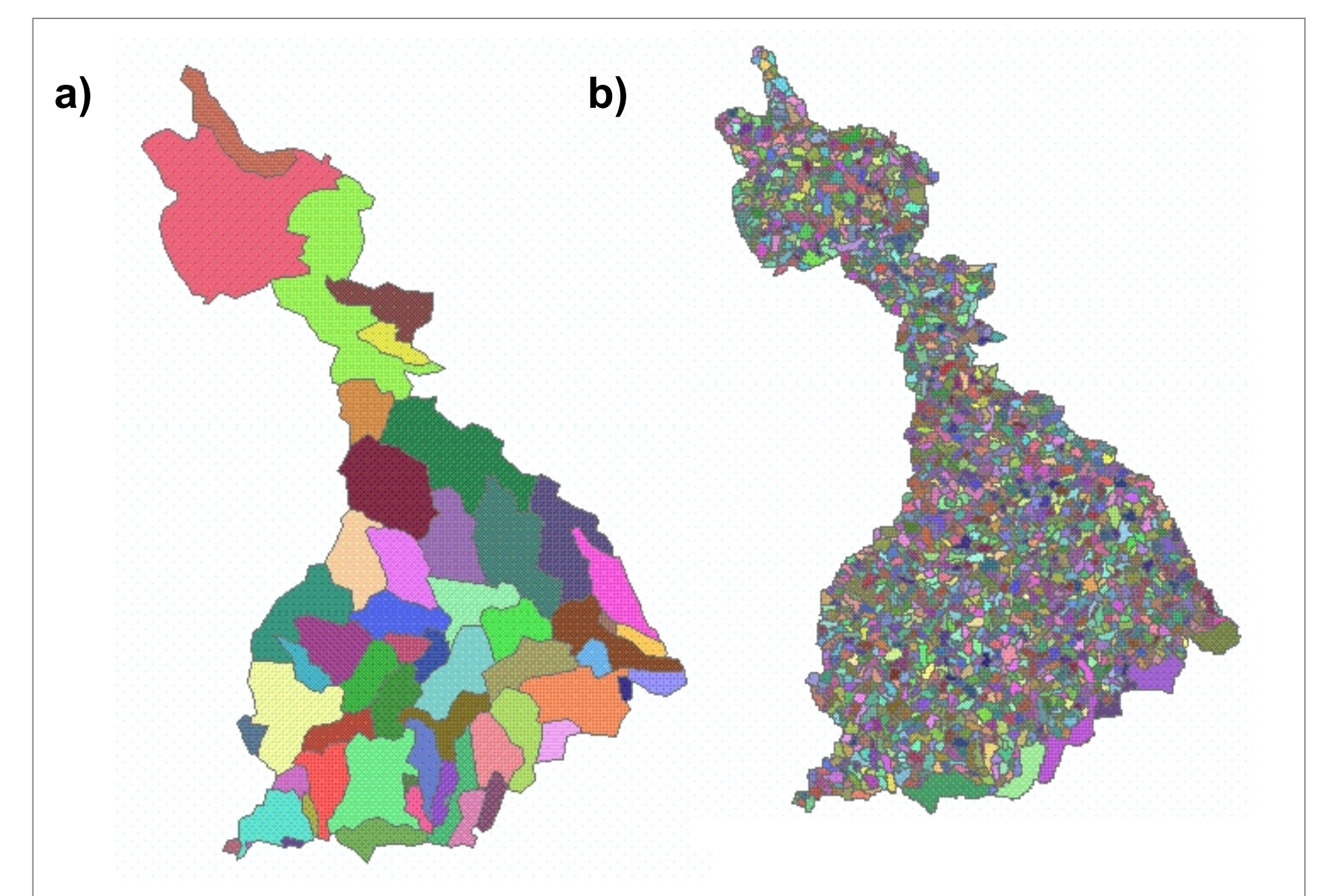


Fig. 1: Different levels of discretisation a) sub-basins b) HRP of the Mulde catchment

Calibration/Multi-site validation

The calibration was based on daily discharge data from the gauge Bad Düben, and the climate data from 51 stations of the DWD. The validation period was the time between 11/1986 and 10/1990 on 34 additional gauges and the flood event 2002. We used the program J2000 [1].

Calibration			
11/1985 – 10/1986	NS	logNS	r ²
SB	71%	77%	0.79
HRP	83%	78%	0.92
Validation			
NS	logNS	r ²	
SB	50%	68%	0.52
HRP	79%	78%	0.88
flood event 2002			
NS	logNS	r ²	
SB	75%	78%	0.76
HRP	64%	76%	0.84

Tab. 1: Results of the Calibration and validation process at gauge Bad Düben. NS: Nash-Sutcliffe coefficient [2], r²: coefficient of determination

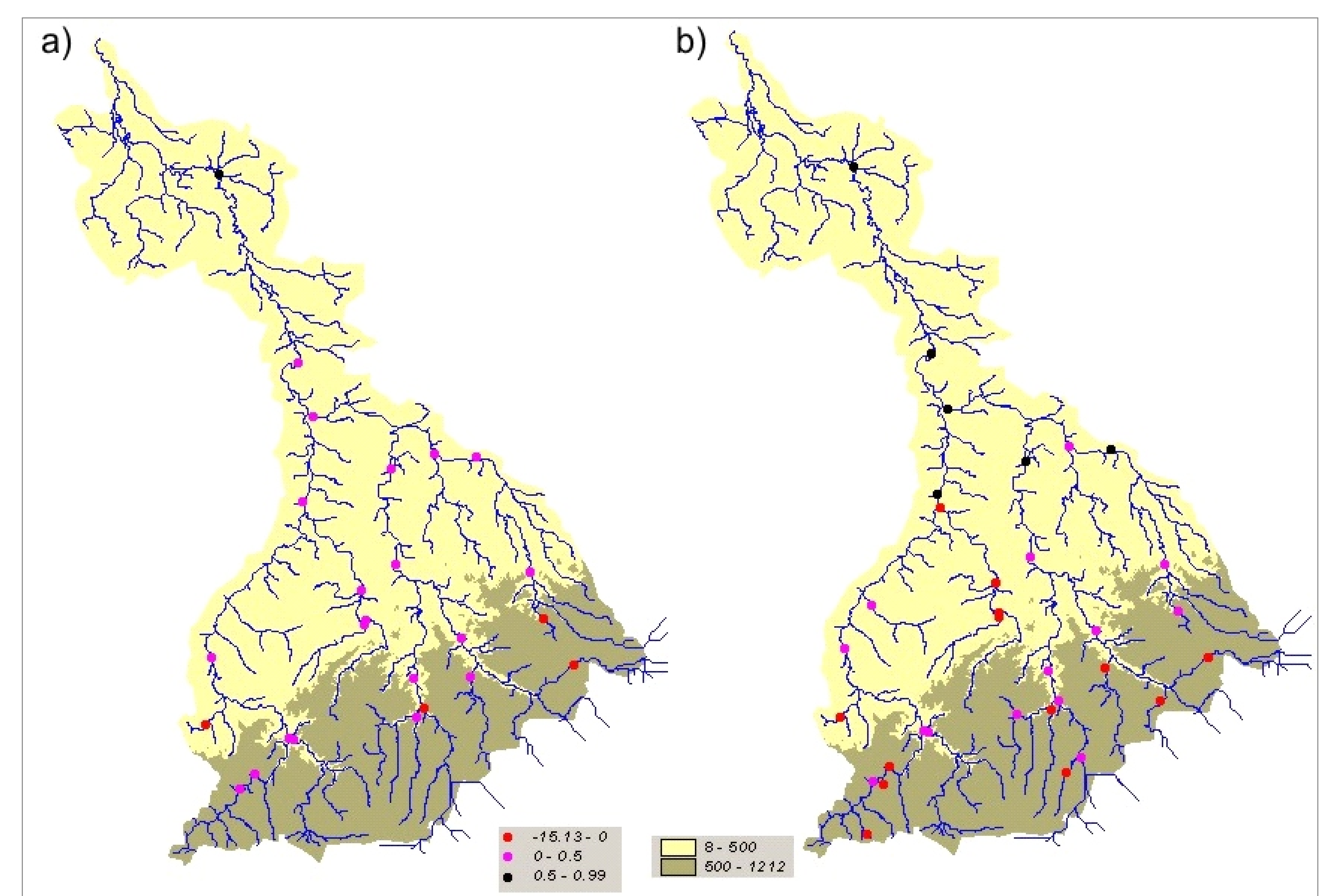


Fig. 2: Results of the Multi-site validation, a) subbasins b) HRP units

The application of the SB and the HRP-approach has been demonstrated to be both useful tools for hydrological modelling of the runoff response of the Mulde catchment (Table 1).

The multi-site validation (Figure 2) shows irregular distributed low NS-coefficients. The validation results are generally better in the lowlands.

The flood event 2002 can be reproduced better with the HRP approach.

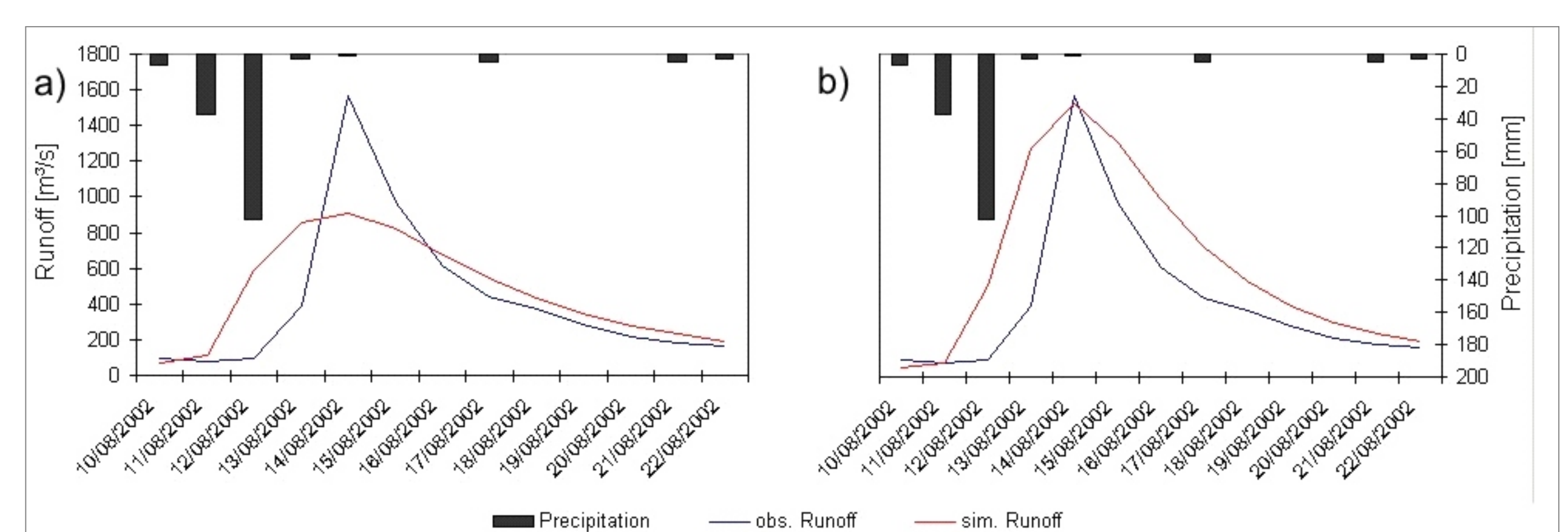


Fig. 3: Modelling of the flood event 2002, a) subbasins b) HRP units

[1] Krause P. 2000. J2000 Ein Modellsystem zur physikalisch basierten Nachbildung der hydrologischen Prozesse in großen Flusseinzugsgebieten. Geowissenschaftliche Fakultät. Dissertation, Freiburg; 212.

[2] Nash J, Sutcliffe J. 1970. River flow forecasting through conceptual models. 1. A discussion of principles. Journal of Hydrology 10: 282-290.