



Spatio-temporal variability of hydrological behavior patterns in meso-scale basins of the Rhineland Palatinate (1972-2002)

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Changes in spatio-temporal rainfall patterns have an effect on the hydrological behavior of river basins, the magnitude of the effects depending among others on the physiographic basin characteristics. To assess the impact of climate fluctuations on the given discharge of 71 basins located in the Rhineland Palatinate, statistical trend tests of hydro-climatological variables with physiographic basin characteristics were combined and pooled into a visualization tool. Results of the statistical trend tests suggested a relationship between rainfall, discharge and mean date of the annual maximum discharge on the one side and lithology, altitude and west to east positioning of the basins on the other side. The visualization tool was able to reflect both the outcomes of the statistical test and the spatio-temporal behaviour of the basins and could therefore be used as an aid in exploratory data analysis. Main conclusions of the study were that the geological and geographical configuration of the area is such that basins with high percentages of impermeable substratum received the highest amount of precipitation and basins with low percentages of impermeable substratum received less rainfall. Furthermore the basins with high percentages of impermeable substratum had generally the highest runoff coefficients and produced floods earlier in the winter season than the basins with low percentages of impermeable substratum. As a consequence, the results of the statistical tests seem to be not only influenced by climate fluctuations but also by the physiographic characteristics of the basins.