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The impact of the daily weather situation on the spatio-temporal hydrological behaviour of the Mosel river system

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The impact of the temporal variability of the daily weather situation over Midwestern Europe and the eastern part of the North Atlantic, also called Grosswetterlage or GWL (Hess and Brezowski, 1977) on the spatio-temporal variation of hydrological variables of meso-scale river basins, located in the Mosel river basin (Germany) is the subject of this study. The non-parametric Kendall test (Capéràa and Van Cutrem, 1988) was applied to assess possible trends in the hydro-climatological variables. With these hydro-climatological variables, the study area was also tested on regional trends using cross-correlation bootstrapping as suggested by Douglass et al. (2000). To clarify the outcome of both trend analyses on the spatio-temporal hydro-climatological behaviour of the study area, a visual interpretation of the used variables was derived. For this end, the variables were plotted in a matrix, in which each column represents a basin of the study area, ranked from west to east and in which each row represents a year of the study period. The values of the variables were then classified and each class was given a colour, making it possible to interpret occurring patterns. By using antecedent rainfall, fallen 2, 3, 5 and 7 days before the date of maximum yearly discharge and attributing this rainfall to a certain GWL, it became possible to link the maximum yearly discharge to rainfall patterns. A moving average of 5 years was applied to standard deviations and means of yearly sets of the used hydro-climatological values for the basins in order to obtain a more general impression of the behaviour of the study area. The GWL2, or so-called westerly fluxes, dominates rainfall patterns during the winters from 1989 until 1995, which correlates with a positive NAO phase, causing the highest maximum yearly discharges for most of the basins in the study area. The ratio R between rainfall due to the GWL2 and total rainfall, fallen dur-

ing the antecedent period before maximum discharge, diminishes with an increasing antecedent time period and implies a short duration effect of westerly fluxes on the maximum discharge. During the period from 1989 till 1995, most basins of the study area have their maximum yearly discharge on the same date; hence the study area reacts more homogeneous to rainfall than during the remainder of the study period.

References:

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