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Groundwater and baseflow drought responses to synthetic recharge stress tests

Jost Hellwig et al.

Correspondence to: Jost Hellwig (jost.hellwig@hydrology.uni-freiburg.de)

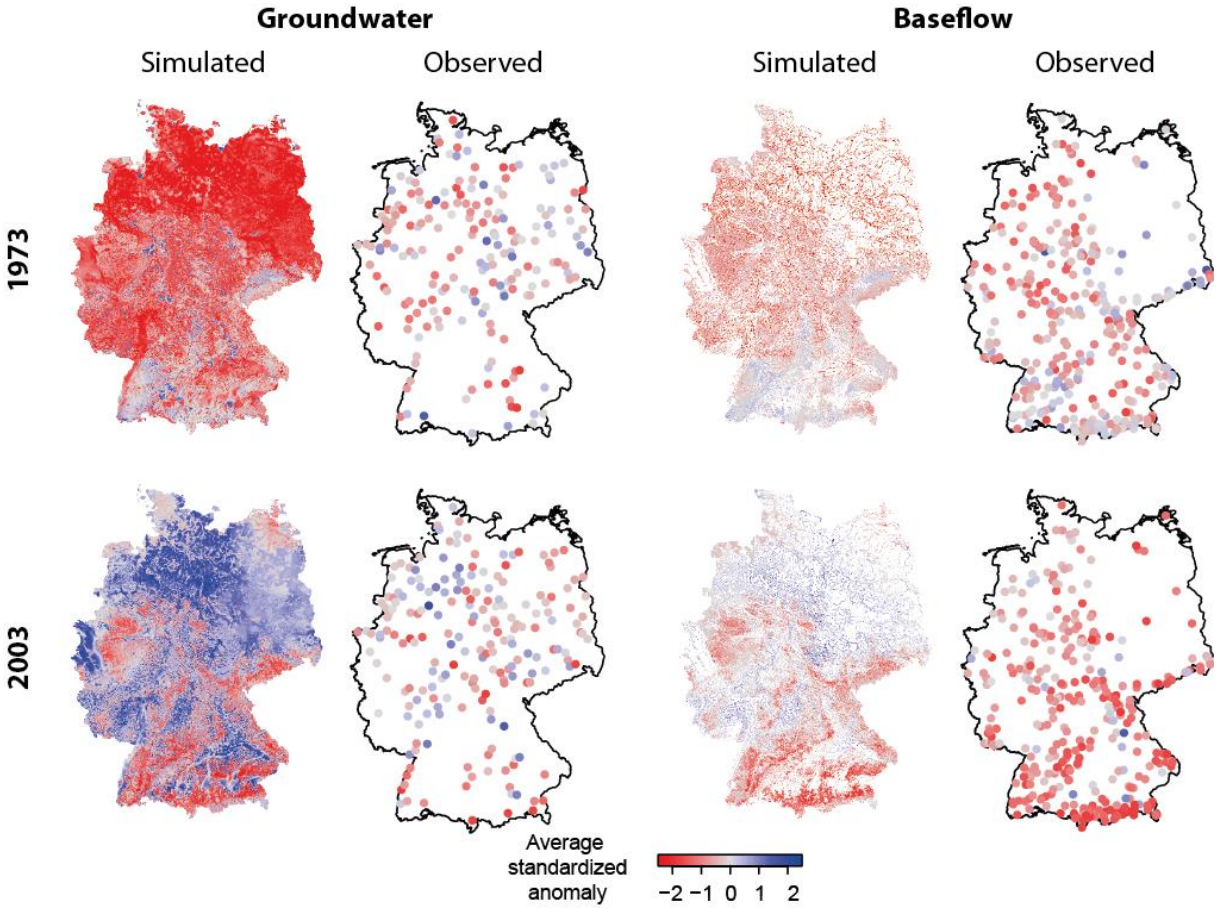

Fig S1: Simulated and observed anomalies averaged for summer months (JJA) of the benchmark drought years 1973 and 2003. Figure based on data taken from Hellwig et al. (2020).

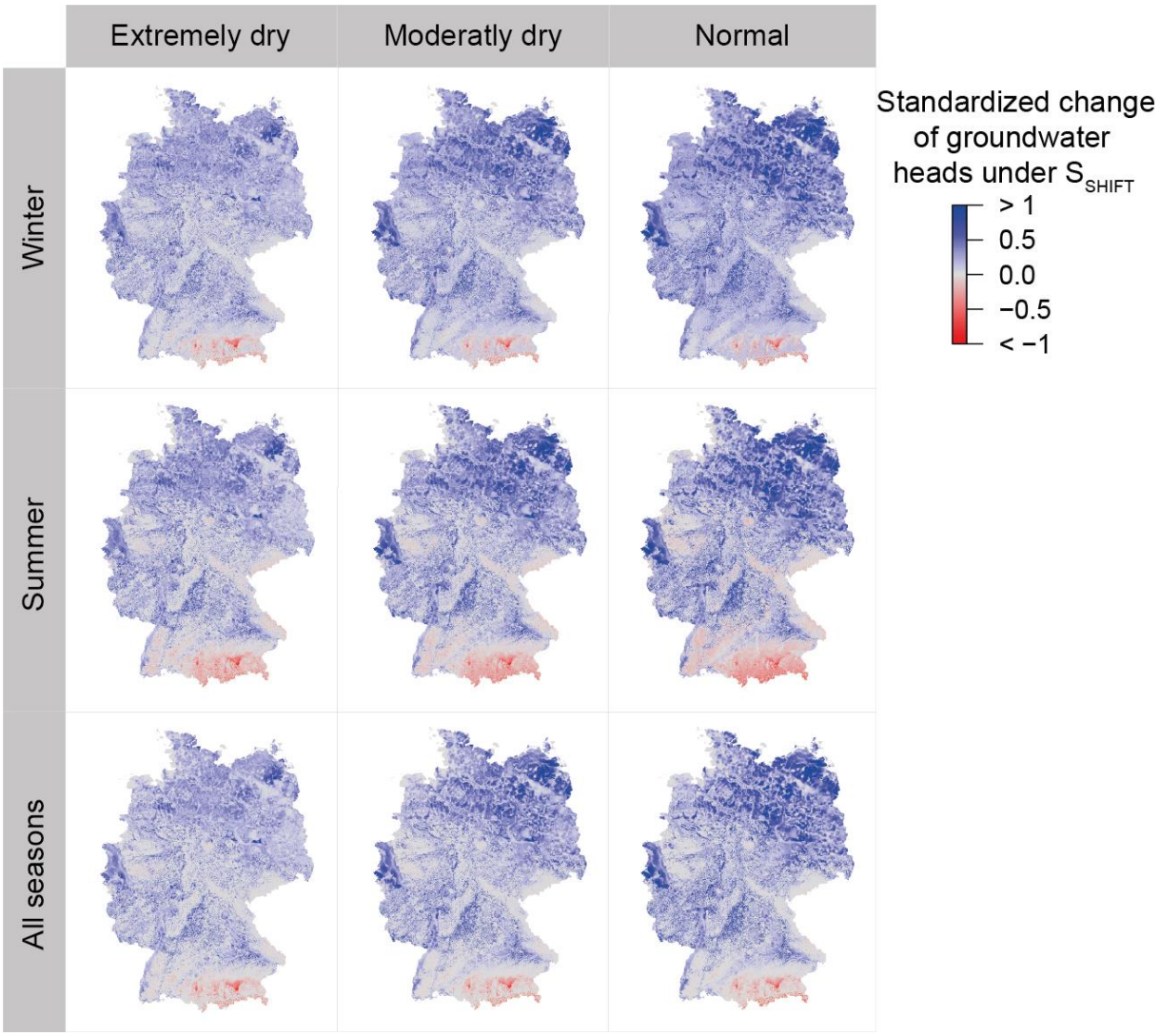

Fig S2: Groundwater head changes standardized by the standard deviation of natural variability for S_{SHIFT} for a shift of 15%.

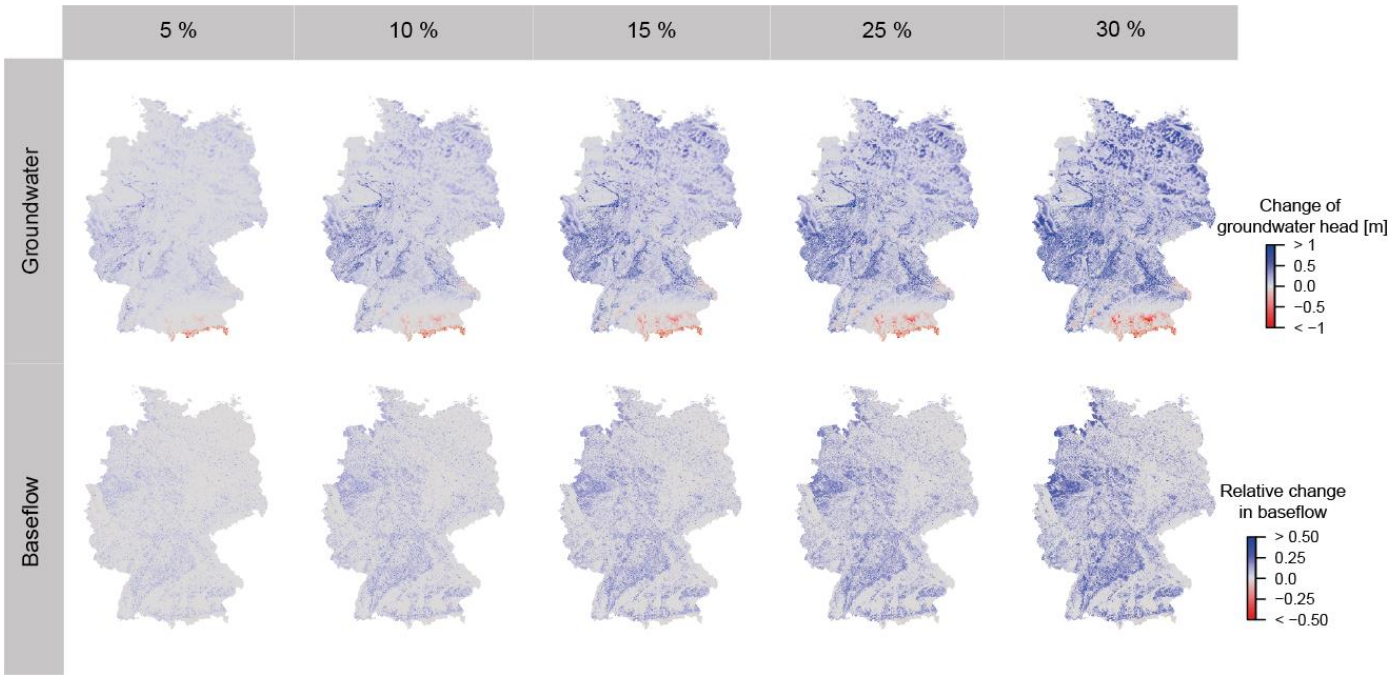

Fig S3: Example for changes of groundwater heads and baseflow (rows) for the different percentage changes in S_{SHIFT} (columns). Changes are shown for winter and moderately dry conditions ($\tau = 0.25$), all other seasons and percentiles similarly differ most of all in the magnitude of change.

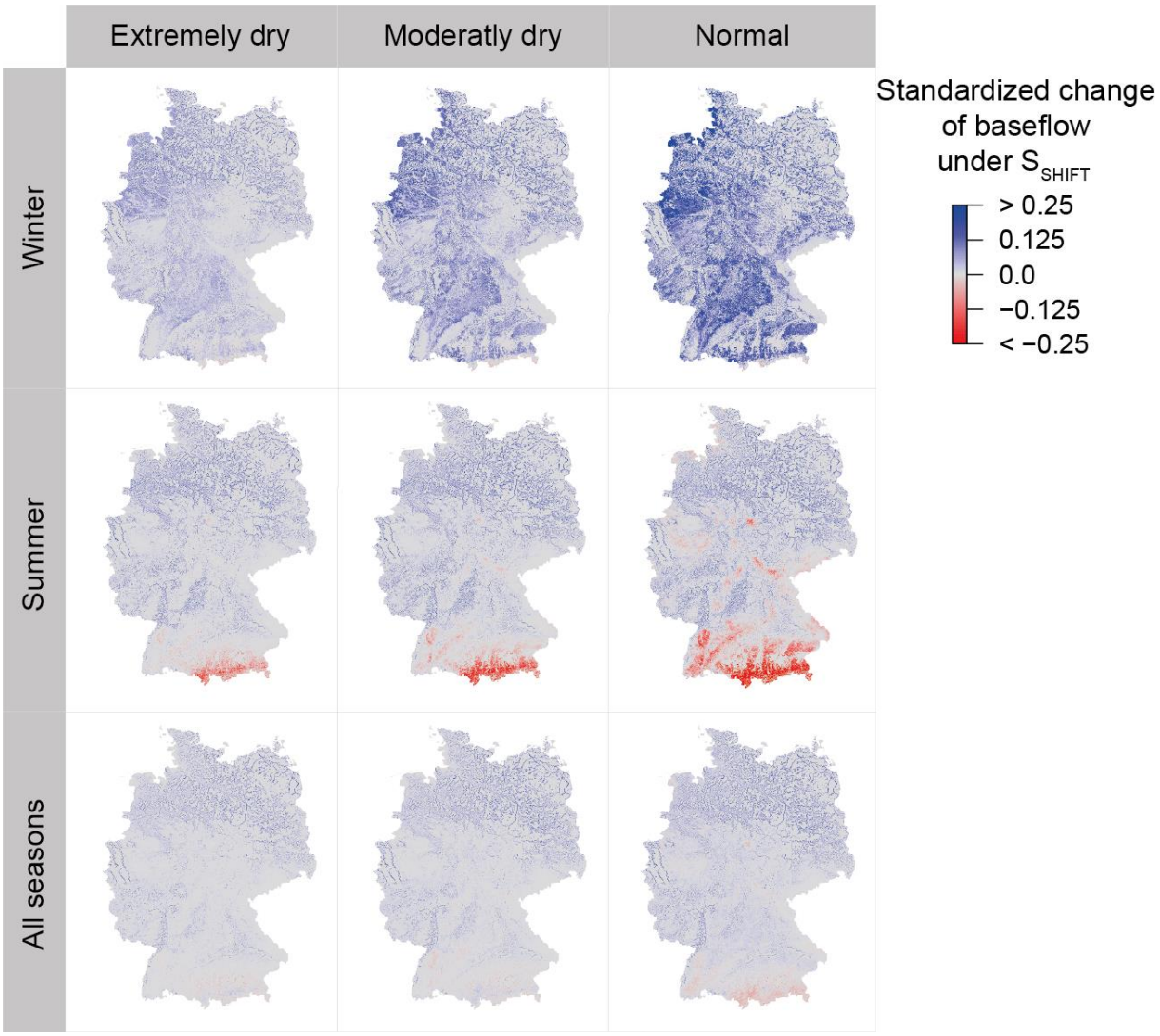

Fig S4: Baseflow changes standardized by the standard deviation of natural variability for S_{SHIFT} for a shift of 15%.

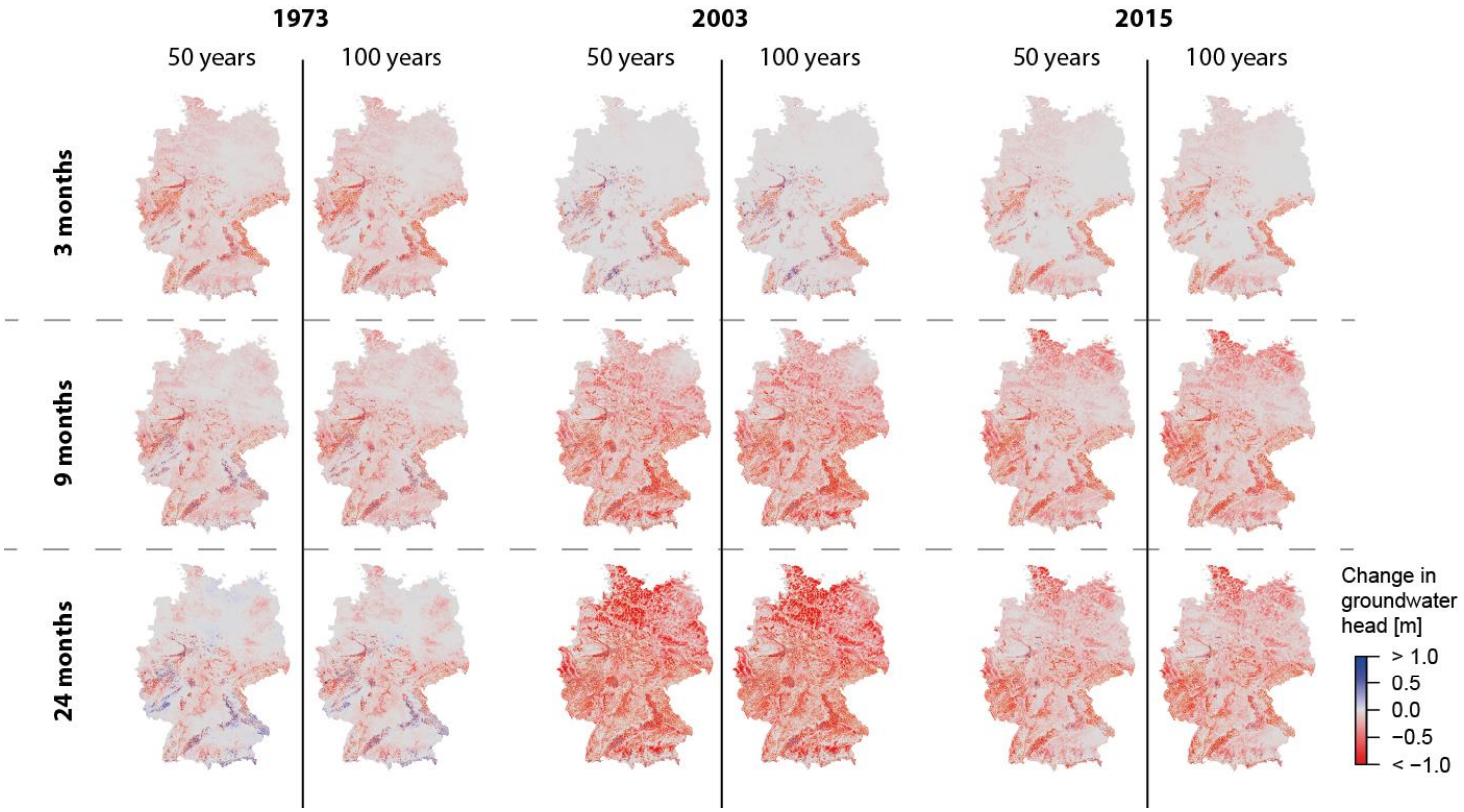

Fig. S5: Average groundwater head changes during drought across Germany for the S_{EVENT} scenarios: response of different events (1973, 2003, 2015), different antecedent recharge reduction time scales (3, 9, 24 months) and two return periods (T_{RP} = 50 and T_{RP} = 100 years).

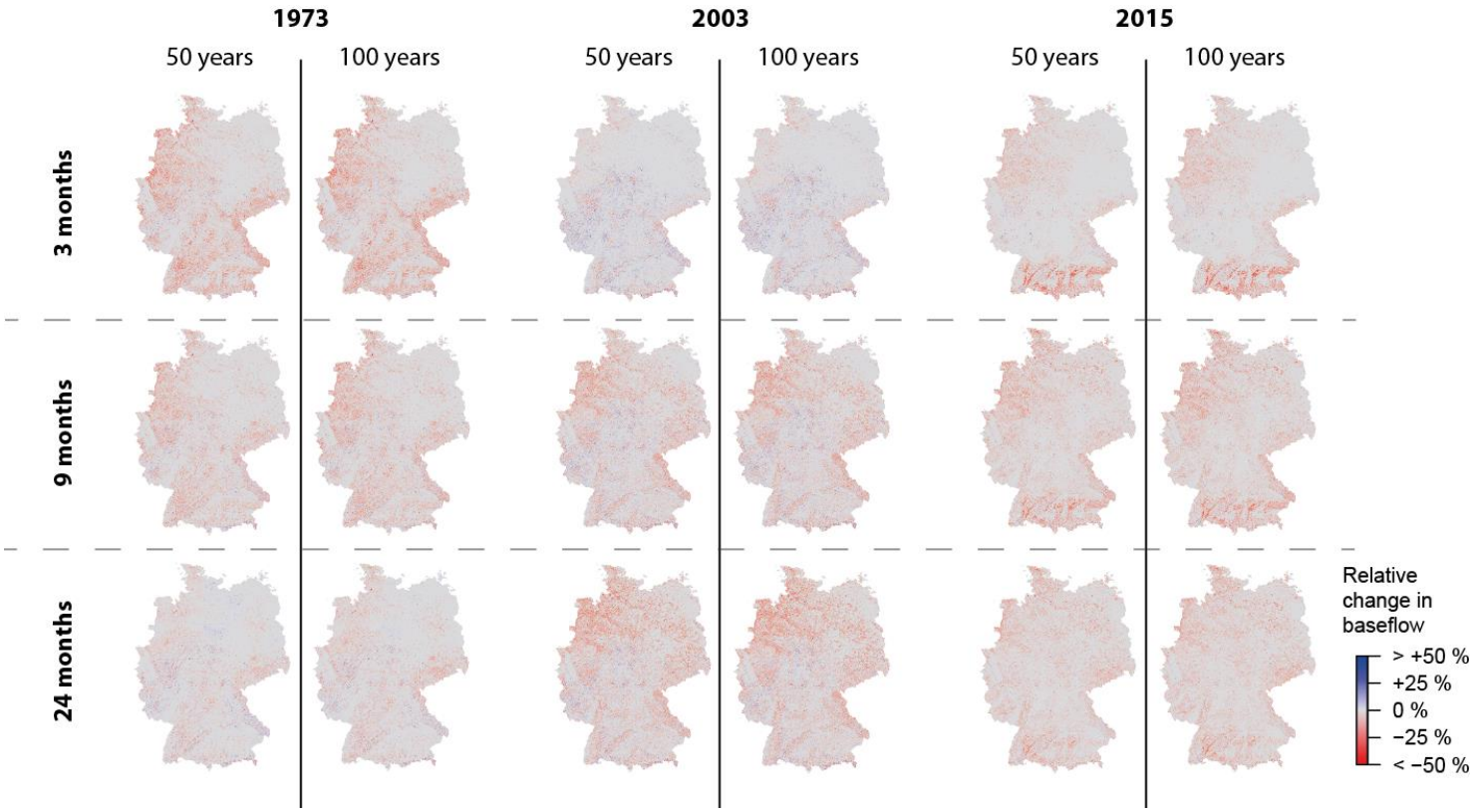

Fig. S6: Average relative changes of baseflow across Germany for different recharge scenarios. Maps are in the same order like in Figure 5.

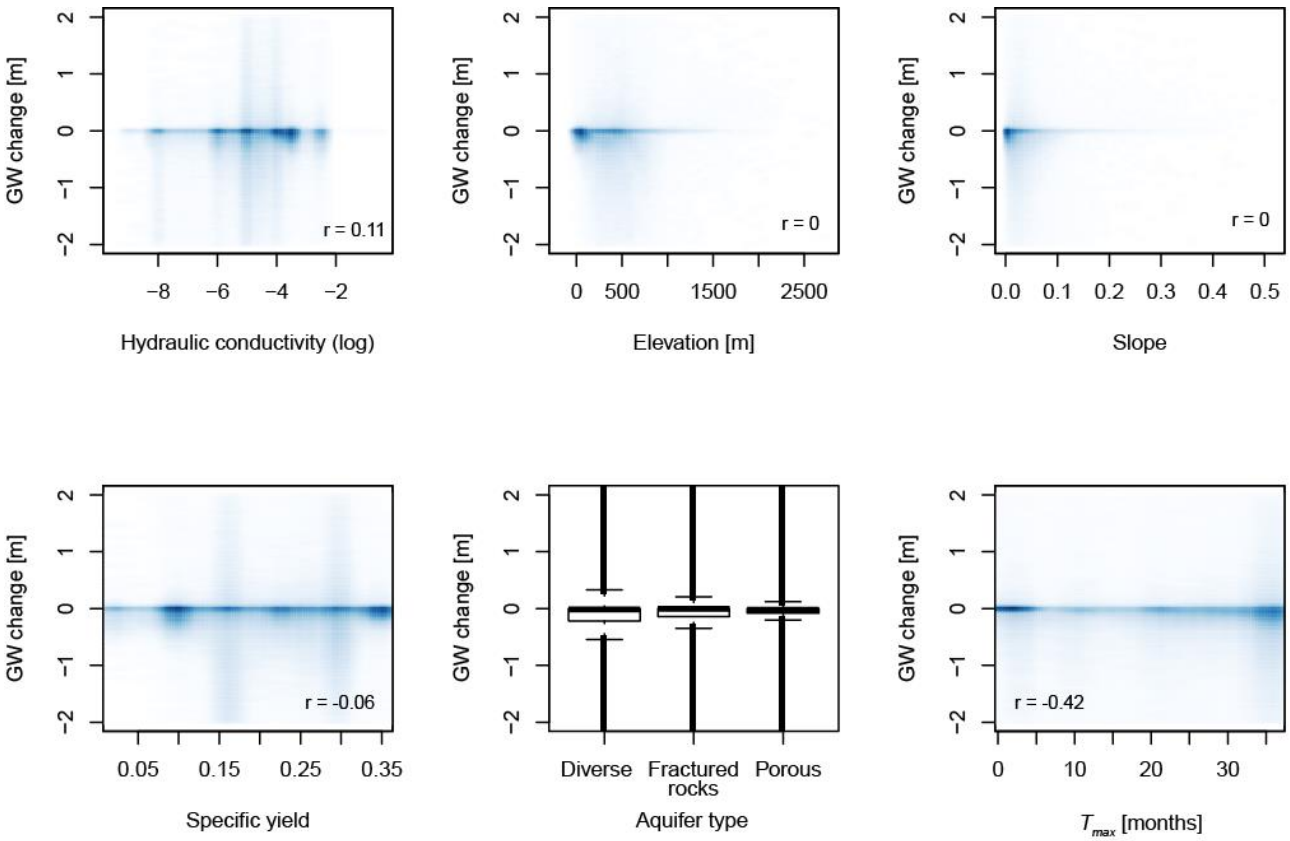

Fig S7: Average groundwater head changes for 24-months antecedent recharge reductions according to T_{RP} = 100y for the 1973 drought event over different factors. Blue colours indicate the smoothed density derived from all model grid cells. Boxes illustrate the distribution of head changes in three different categories of aquifer type. r is the Spearman correlation coefficient for the variables compared.

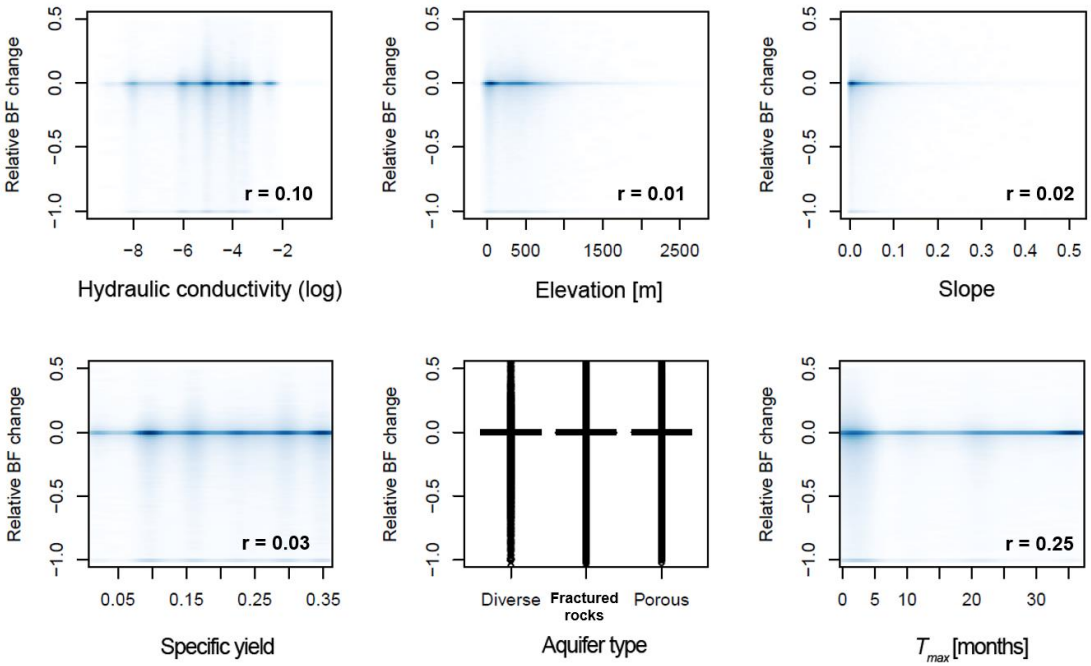

Fig S8: Relative baseflow changes for 24-months antecedent recharge reductions according to T_{RP} = 100y the 2003 drought event over different factors. Figure style according to Figure S7.