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Long-term (in)stability of the climate-streamflow relationship

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Land use changes have long been known to alter streamflow production for a given climatic input. Recently, extended shifts in climate were also shown to be capable of altering catchment internal functioning and streamflow production for a given climatic input. This study investigates the stability of climate-streamflow relationships in natural catchments in different regions of the world for the first time, using datasets of natural/reference catchments from Europe, US, and Australia. Changes in climate-streamflow relationships are investigated statistically on the interannual to interdecadal timescale and related to interdecadal climate variability. We compare the frequency and magnitude of shifts in climate-streamflow relationship between different regions, and discuss what any differences in shift frequency and magnitude might be related to. This study draws attention to the issues of catchment vulnerability to changes in external factors, catchment-climate co-evolution, and long-term catchment memory.