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Long-term temporal analysis of four Pyrenean catchments with a gradient of land-cover

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Land cover and historical land use practices are the leading drivers of the hydrological response in most catchments systems. Timing, periodicity and magnitude of precipitation-discharge feedbacks are thus impacted by such site-specific characteristics. We analysed the long-term precipitation and discharge databases of four experimental catchments located in the Central Spanish Pyrenees and thus similar in their climate. Furthermore, they have a gradient of land cover (from a relatively pristine forested catchment, through an abandoned cultivated catchment with progressive plant recolonization, to an afforested catchment and ending by a bare degraded badland catchment); so, form a solid benchmark to assess such dynamic changes. For the analysis of the long-term precipitation and discharge time-series we use the wavelet transform methodology, which proves valuable to segregate the continuous hydrological response of the catchments in different and non-similar dominant time-scales. Precipitation and discharge events are not just identified and analysed in terms of magnitude or correlation relationships but also the time-localization of each transient precipitation and discharge events is retrieved. We thus no impose any fixed periodicity in the occurrence of hydrological events and ultimately, we are able to infer the real and site-specific temporal variability of each dataset through which we can infer the timing, variability and physical mechanisms of water storage/transport in each catchment. Thereby, this analysis reveals the land-cover-discharge feedbacks that takes place at different time-scales.