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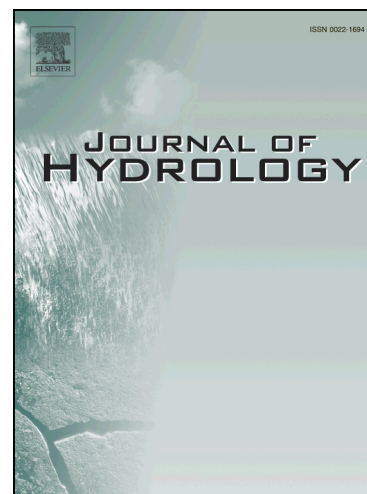
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Geology controls streamflow dynamics

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Key words: streamflow dynamics, catchment controls, geology, hydrogeological properties

Highlights:

- Geological catchment controls on streamflow are explored
- We show that most permeable lithologies are highly relevant for streamflow dynamics
- Geological properties influence the catchment ability to buffer the climate signal
- High- and low-flow surface discharge are highly correlated

Abstract

Relating catchment properties to stream dynamics is essential to anticipate the behaviour of streams subject to changing environmental conditions and to predict flows of ungauged rivers.

Although the importance of subsurface processes in catchment hydrology is widely acknowledged, geological characteristics are rarely explicitly included in studies assessing physiographic controls on catchment dynamics. In this investigation of 22 catchments of the Swiss Plateau and Prealpes, we use a simple linear regression approach to analyze the relationship between streamflow indicators and various geological properties describing the hydrogeological quality of bedrock and quaternary deposits, along with meteorological, soil, land use and topographical characteristics. We use long-term discharge percentiles, as well as dimensionless flow duration curves (FDC, standardized by long-term mean discharge) that allow focusing on the catchment response to climate forcing, inherent to its physical characteristics. We show that, whereas climate conditions dominate the high to medium

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