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# Temperature effects on seasonal streamflow and variation at different spatial scales in cold regions

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**Abstract** A typical permafrost watershed and alpine cold forest watershed in the Qinghai-Tibet Plateau were selected to analyse the effects of soil and air temperature on runoff processes. The primary factors influencing surface runoff processes during different seasons were analysed by Principal Component Analysis (PCA), statistical regression, and the power spectrum fractal methods. The results indicated that regarding hydrological processes, different factors are dominant in different seasons, but temperature is probably the main controlling factor to be considered for runoff processes analysis in permafrost watersheds and cold alpine forest watersheds. Some statistic relationships illustrating the effect of temperature on runoff processes in different season and its variation at different spatial scales were developed in this study. These relationships provide a practical way for estimating the effects of temperature on runoff processes and the variation patterns at different spatial scales.

**Key words** runoff processes; spatio-temporal variability; temperature