Investigating the monthly mean stream temperature dynamics

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Affecting the habitat suitability of many fish species, water temperature is a hydrological factor of great concern in the actual context of climate change. Despite more than 40 years of research on this topic, the impact of landscape on the dynamics of stream temperature is still not entirely understood. In the present study, we analyzed the monthly mean stream temperature measurements collected in 26 medium-sized catchments (3–300 km2) in Switzerland. While selecting the catchments, particular attention was given to cover a large range of different geomorphological conditions, especially regarding altitude, slope and aspect. Despite these differences, it was surprisingly found that the thermal regimes of almost all the investigated streams followed a same annual trend. Only the amplitude and the minimum value of this trend were observed to differ between the individual catchments. These two factors could be successfully related to geomorphological characteristics of the catchments using multi-linear regression. The shape of the annual trend was found to vary from one year to the other. This inter-annual variability was attributed to climate, based on the significant correlation between the annual trend and air temperature. As a result of the present study, we obtained a regression model to estimate the monthly mean stream temperature in ungauged catchments based on country-wide available geomorphological variables and the average of the monthly mean air temperature over Switzerland.