Water temperature variability and macroinvertebrate assemblages in subalpine streams

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Water temperature is recognized as one of the most important drivers shaping both aquatic ecosystem structure and functioning but despite that, to date, few studies investigated the effects of different water thermal regimes on macroinvertebrate community, especially in alpine streams. In this study, we studied the response of macroinvertebrates to environmental conditions in alpine streams of Serio River catchment (BG, Italy). Selected streams are characterized by marked differences in annual thermal variability linked to different water sources (snowmelt/stormwater and groundwater-fed streams) and human alterations (presence of reservoirs). At five stream sites, each month for one year, we sampled macroinvertebrates and we measured water temperature continuously providing daily data. In addition, we monitored environmental variables describing physico-chemistry, flood disturbance, and resources availability. Results showed a strong co-inertia between monitored environmental variables and macroinvertebrate assemblages. First floods and secondly temperature mainly drove the temporal pattern while spatial differences were mainly linked to catchment. High annual thermal variability (range 0-15 °C) promoted higher temporal dissimilarity compared to more stable thermal regime. In addition, we observed strong macroinvertebrate responses-environment association with percentage of Plecoptera, significantly related with cold temperatures. Finally, we found a temporal mismatch in the life cycle of certain taxa (*Amphinemurae sp., Serratella ignita*) between individuals captured in different thermal conditions. Our results indicate that different thermal variability influences macroinvertebrate temporal pattern affecting in particular stenothermal taxa, however further studies are needed to properly predict how mountain communities and taxa will be affected by thermal changes due to ongoing thermal alterations.