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Spatio-temporal habitat heterogeneity across an Alpine stream system

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Alpine stream systems provide unique habitats for riverine biota as a result of their dynamic flow, water temperature and suspended sediment regimes. Understanding how these spatio-temporal physicochemical variations influence macroinvertebrate communities could provide insights into how alpine lotic ecosystems are likely to respond to climate change or other more direct human influences (abstraction/regulation). However, detailed year-round data sets are rare for alpine stream systems, yet such knowledge is clearly a prerequisite to obtaining a holistic understanding of how these ecosystems function. This paper reports findings from year-round data collection at the Odenwinkelkees Glacier braidplain, Austrian Alps. Repeat aerial photography showed that the extent of flowing channels varied both diurnally and seasonally primarily as a consequence of meltwater pulses. Analysis of physicochemical data revealed high heterogeneity of flow regimes, water temperature and turbidity both spatially (reach to basin-scale) and temporally. For example the average discharge and turbidity were lower for predominantly groundwater-fed sites compared with meltwater-fed channels but water temperature was higher. This heterogeneity appears to play a key 'filtering' role underpinning spatio-temporal patterns of benthic macroinvertebrates.