



The effect of contrasting discharges on the metabolic activity of a small boreal stream

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The metabolic activity of stream ecosystems can have an important impact on stream water quality and greenhouse gas production. Understanding its temporal and spatial variability is paramount for the successful implementation of mitigation measures. In particular, the short-term temporal dynamics of stream metabolism, such as those induced by storm events or the rapid transition from drought to flood conditions, are not well understood. We analysed the impact of discharge on the metabolic activity of a first-order boreal stream. Constant-rate tracer injections of the reactive tracer Resazurin, under diverse discharge conditions (drought, flood, natural) were conducted and the tracer's reduction due to aerobic metabolic activity was measured. We observed that the absolute metabolic activity, calculated as the amount of tracer reduced between two consecutive sites, was inversely related to discharge. However, when water residence time was taken into consideration, the impact was less clear. In addition, the falling limb of the tracer breakthrough curve was an indication for the importance of transient storage zones. Finally, we discuss the impacts of lateral and hyporheic hydrological exchanges, groundwater inputs, stream bed forms and transient storage zones on the metabolic activity of stream ecosystems.