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River load estimation of micropollutants: The Importance of event-driven sampling

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Thousands of micropollutants, emitted every day from numerous anthropogenic sources, end up in surface waters posing a risk to human health and the environment. Conventional monitoring approaches for an EQS-based assessment with e.g. monthly grab samples miss situations with high concentrations of total suspended solids (TSS) and associated chemicals. This is a clear shortcoming, especially in the context of load observations. To address this gap, we devolved a monitoring concept with event-driven sampling and applied it for the assessment of persistent micropollutants representative for different pollution sources and pathways in three Austrian rivers, namely the Wulka river and two of its tributaries.

The selected compounds belong to the groups of industrial chemicals with wide dispersive use, pharmaceuticals, herbicides, fungicides, and metals. An online monitoring station at each river measured water level/discharge, turbidity/TSS, and conductivity in 1 min timesteps, for the period of 20 months. Turbidity was measured to capture the river's TSS variability on a high-resolution basis and to trigger automated autosamplers for sampling during specific flow events. Samples from high and base flow periods were analysed for concentration of the selected micropollutants in total and filtered samples.

The research allowed us to gain insights regarding the TSS and the related micropollutant transport dynamics of events and for the entire period. Preliminary results show that without event consideration the annual loads are underestimated for heavy metals and overestimated for pesticides.

The outcomes provide a better understanding of the transport of TSS and related chemicals and quantify the essential relevance of sampling during high-flow events for the assessment of transported loads of some micropollutants in rivers.

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