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Applications of continuous water quality monitoring techniques for more efficient water quality research and management

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Understanding and taking account of dynamics in water quality is essential for adequate water quality policy and management. In conventional regional surface water and upper groundwater quality monitoring, measurement frequencies are too low to capture the short-term dynamic behavior of solute concentrations. In this presentation, we demonstrate that neglecting the dynamics in water quality leads to inefficient water quality monitoring and inadequate water resources management. In a multi-scale catchment monitoring study, we demonstrated the value of in-situ analyzers for continuous concentration measurements. Our on-site equipment performed semi-continuous (15 min interval) NO_3 and P concentration measurements and recorded the concentration responses to rainfall events with a wide range in antecedent conditions and rainfall durations and intensities. We used these measurements to (1) unravel nutrient transport processes, (2) evaluate and optimize a new passive sampling technique for measuring average concentrations, and (3) to develop and evaluate options to exploit the explanatory strength of commonly available continuous measurements of quantitative hydrological parameters like precipitation, discharge, and groundwater levels for filling in the gaps between low frequency water quality measurements.