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New progresses in the high frequency acquisition of stream chemical data in hydrological observatories: the Orgeval River lab

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River chemistry is a messenger revealing the processes and their timescales at the catchment scale. In establishing a network of hydrological sites, river chemistry is one of the best "windows" to understand the reactive-transport processes at play within the critical zone at the catchment scale. However, our understanding of hydrological and chemical processes at a catchment scale is limited by our capacity to record the full breadth of the information carried by river chemistry, both in terms of sampling frequency and in precision. Here, we present the proof of concept of a new system of water quality monitoring that we called "the River Lab" (RL), based on the idea of installing permanently the laboratory instruments to the field. Confined in a bungalow next to the river, this set of instruments performs an analysis at a 40-minutes frequency of all major dissolved species (Na, K, Mg, Ca, Cl, SO4, NO_3) through continuous sampling and filtration of the river water and using ion chromatographs. The River Lab was deployed in the Orgeval hydrological Observatory, part of the OZCAR research RIs, France, for more than one year. Results show that the River Lab is able to capture the long-term fine chemical variations with no drift and a precision a significantly better than the precision conventionally achieved in the laboratory. The River Lab is thus providing unprecedented, high-resolution, high precision measurements and is opening new perspectives for understanding critical zone eco-hydrological processes and biogeochemical cycles. It also offer a solution for operational agencies to monitor the water quality in quasi real-time as it is offering an integrated response to the different anthropogenic forcings