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Main knowledge gaps in critical zone processes and behaviour: Extracting information from water quality time-series data and models outputs

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In the last few decades, the degradation of water quality and resulting regulations, such as the European Water Framework Directive, the United States Clean Water Act, and the New Zealand Resource Management Act 1991 have promoted water quality monitoring in terms of parameter richness, spatial density and high temporal resolution. Long-term catchment observatories have been strengthened to gain insight into hydrological and biogeochemical processes. New technologies have been developed and deployed to collect more in situ water quality data at higher frequencies. Thus, water quality monitoring around the world has produced a large amount of data from research catchments but also from national monitoring networks. Despite these efforts, water quality data are highly heterogeneous in terms of targeted parameters, measurement methods, sampling frequencies. Also, accessibility to water samples differ from each hydrological compartment (stream, groundwater, soil water and precipitation). Among water quality time-series, higher sampling frequencies are available for stream water where monitoring is relatively easy to carry out generating a high amount of data. However, groundwater data are rare since monitoring and access is relatively difficult. Also, the aim of monitoring network evolved with time. In fact, networks are usually established for a specific purpose which is changing with time and the questions the network is trying to answer? This raise the issue of spatial and temporal flexibility- multi purpose network and the use of network to support model development which could be seen as a “theoretical” monitoring network.

The objective of this talk is to present a review of methods used for analysing temporal water quality signals and models outputs, based on a panel of examples from few but densely monitored environmental research observatories. Such infrastructures also give an insight into critical zone (CZ) research that help to build a transdisciplinary community to identify the main knowledge gaps in CZ processes and behaviour.