Beyond high frequency monitoring: an optimised automatic sampling

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In order to improve the representativity of samples when monitoring a water body, efforts have been made these last years to develop new methodologies to replace grab samples. Passive samplers have allowed to have measurement averaged over several days and represented a first step. High frequency monitoring (usually one measure per hour), either in situ or on-line, led to the observations of daily cycles or transitory phenomena that were not suspected beforehand.

However, such method is usually difficult to implement for some trace analytes (e.g. trace metals or pesticides) or for some specific analysis (e.g. size exclusion chromatography on natural organic matter). Automatic sampling and analysis in the lab can be a solution, but it becomes very labor intensive as soon as the sampling frequency is high. Luck is also needed as a long sampling period can sometimes lead to very few variations if the water system is stable. In order to optimise the automatic sampling, a new methodology has been developed in this project.

A multiparameter probe measuring general parameters (temperature, pH, turbidity, ORP, conductivity, dissolved oxygen and two fluorometers for organic matter) was coupled with an automatic filtering sampler. The data from the probe are processed on-line and an algorithm decides if the geochemical situation in the water body seems new enough to trigger the sampling, based on previously sampled waters. The aim of this device is to collect the right number of samples with the best representativeness of phenomena taking place in the environment.

This method will be tested over a year in 2021 in order to monitor the dissolved organic matter in a small stream with both rural and urban contamination. These high-frequency measurements and samplings could make it possible to better define the sources and dynamics of the organic matter that has a strong impact on the quality of watercourses.