

## Nycthemeral variations of river chemistry revealed by in situ high frequency measurements

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Part of the French Critical Zone program CRITEX, we have developed a prototype, called the Chemical House, applying the “lab on field” concept in the Orgeval Critical Zone Observatory, Brie, France. The Chemical House is a fully automated lab, installed directly along the river, which performs measurement of all major dissolved elements such as Na, Cl, Mg, Ca, NO<sub>3</sub>, SO<sub>4</sub> and K every 30 minutes. It also records other river chemical and physical parameters (Temperature, pH, conductivity, O<sub>2</sub> dissolved, Turbidity) of the water every minute. The system is fully automatic and only needs a human intervention every two weeks. The data generated offer a unique opportunity to explore the real time response of the catchment to perturbations with at least hourly timescales.

We will present results from 2015 summer characterized by one of the strongest heat wave over occidental Europe. No precipitation occurred during more than 1 month allowing us to explore the aquifer dynamics. Data from the Chemical House show that slight but significant nycthemeral (day-night) chemical variations only visible because of the high frequency of measurement. The excellent analytical precision achieved (lesser than 1% (2 $\sigma$ ) for all elements) and several complementary analysis point out the origin of this variations are clearly related to the dynamics of the aquifers. Moreover we completed our observations with strontium isotopes measurements used as source tracer. Isotopic results indicate that the high frequency chemical variations are induced by source processes rather than by evaporative processes.