Geophysical Research Abstracts
Vol. 16, EGU2014-11256, 2014
EGU General Assembly 2014
© Author(s) 2014. CC Attribution 3.0 License.

Compared analysis of different sampling strategies for the monitoring of pesticide contamination in streams

Lucie Liger, Christelle Margoum, Céline Guillemain, and Nadia Carluer

Irstea, UR MALY, centre de Lyon-Villeurbanne, 5 rue de la Doua-CS 70077, F-69626 Villeurbanne cedex, France (lucie.liger@irstea.fr)

The implementation of the WFD (Water Framework Directive), requests European Union member states to achieve good qualitative and quantitative status of all water bodies in 2015. The monitoring of organic micropollutants such as pesticides is an essential step to assess the chemical and biological state of streams, to understand the reasons of degradation and to implement sound mitigation solutions in the watershed. In particular, the water sampling, which can be performed according to several strategies, has to be closely adapted to the experimental goals.

In this study, we present and compare 3 different active sampling strategies: grab sampling, time-related and flow-dependent automatic samplings. In addition, the last two can be fractionated (i.e. several samples collected, and each one contained in a single bottle) or averaged (i.e. several samples mixed in the same bottle). Time-related samples allow the assessment of average exposure concentrations of organic micropollutants, whereas flow-dependent samples lead to average flux concentrations. The 3 sampling strategies were applied and compared during the monitoring of the pesticide contamination of a river located in a French vineyard watershed (the Morcille River, located 60 km north of Lyon, in the Beaujolais region). Data were collected between 2007 and 2011, during different seasons and for a range of hydrological events. The Morcille watershed is characterized by contrasted hydrological events with a very short-time response due to its small size (5 km^2), steep slopes (20 to 28%) and highly permeable sandy soils. These features make it particularly difficult to monitor water quality, due to fast variations of pesticide concentrations depending on rain events.

This comparative study is performed in 2 steps. At first, we compare the timestamps of each sample composing the weekly-averaged samples and those of the grab samples with hydrological data. This allows us to evaluate the efficiency of these 2 sampling strategies in the integration of flow variations and therefore pesticide concentration variations during the sampling campaign. In a second step, we use the fractionated samples data during flood events to calculate the concentrations of virtual averaged samples of the events. Different time or flow steps were used for the calculation, to assess their impact on the pesticide averaged-concentrations or fluxes. These analyses highlight the benefits and drawbacks of each sampling strategy. They show that the sampling strategy should be carefully chosen and designed depending on the final aim of the study and on the watershed characteristics (in particular its hydrological dynamics). This study may help to design future monitoring on water quality.

Key Words: sampling strategies, surface water, concentration, flux, pesticides.