Accuracy of different sensors for the estimation of pollutant concentrations (Total Suspended Solids, total and dissolved Chemical Oxygen Demand) in wastewater and stormwater

Mathieu Lepot [1,2] , Jean-Luc Bertrand-Krajewski [1] , Jean-Baptiste Aubin [1]

[1] University of Lyon, INSA Lyon, LGCIE, 34 avenue des arts, F-69621 Villeurbanne cedex, France, mathieu.lepot@insa-lyon.fr, jean-luc.bertrand-krajewski@insa-lyon.fr, jean-baptiste.aubin@insa-lyon.fr
[2] Sepia Conseils, 53 rue de Turbigo, 75003 Paris, France.

ABSTRACT

Many field investigations have used continuous sensors (turbidimeters and/or UV-visible spectrophotometers) to estimate with a short time step pollutant concentrations in sewer systems. Few if any publications compare the performance of various sensors for the same set of samples. Different surrogate sensors (turbidity sensors, UV-visible spectrophotometer, pH meter and conductivity meter) were tested to link concentrations of TSS (Total Suspended Solids), total and dissolved COD (Chemical Oxygen Demand) and sensors' outputs. In the combined sewer at the inlet of a WWTP (Waste Water Treatment Plant), 94 samples were collected during dry weather, 44 samples were collected during wet weather and 165 samples were collected under both dry and wet weather conditions. From these samples, triplicate standard laboratory analyses were performed and corresponding sensors outputs were recorded. Two outlier detection methods were developed, based respectively on the Mahalanobis and Euclidean distances. Several hundred regression models were tested and the best ones (according to the Root Mean Squares Errors of Prediction *RMSEP* criterion) are presented in order of decreasing performances. No sensor appears as the best ones for all three investigated pollutants.

KEYWORDS

Surrogate sensors, comparison, calibration, TSS, COD