Low-cost sensors for water management

Capteurs à bas coûts pour la gestion de l'eau

Gisi M. F. S.[1,2,3], Silva, P. V. R. M. [1,2,3], Zhu Q.[1], Cherqui F.[1, 2, 4], Navratil O.[3], Cassel M. [3], Namour P.[5], Perret F.[3], James R.[2], Bourjaillat B.[4], Russell K.[2], Bertrand-Krajewski J.-L.[1]

[1] Univ Lyon, INSA Lyon, DEEP, EA7429, 69621 Villeurbanne, France
[2] SEFS, The University of Melbourne, Burnley, VIC 3121, Australia
[3] Univ. Lyon, CNRS UMR 5600 Environnement Ville et Société, Lyon, France
[4] Univ. Lyon, Université Claude Bernard Lyon-1, F-69622 Villeurbanne, France
[5] RiverLy INRAE Lyon-Grenoble Auvergne-Rhône-Alpes, 69625 Villeurbanne

RÉSUMÉ

Les systèmes de mesure à bas coûts se développent rapidement dans de nombreux domaines. Dans le domaine de l'eau, ces systèmes vont permettre de repenser le suivi des ouvrages hydrauliques et des masses d'eau. Ces systèmes promettent une forte réduction des coûts, une forte modularité, l'accès à la donnée en temps réel, la maîtrise complète de la chaîne de mesure et l'échange de code open-source. Cependant, ces systèmes requièrent un temps important pour leur assemblage et leur programmation, et ils questionnent sur la fiabilité des mesures et la robustesse. Sans prétendre répondre à toutes ces questions, les auteurs proposent de partager leur expérience à travers un poster et la démonstration en *live* de systèmes de mesure à bas coût qu'ils développent et utilisent.

ABSTRACT

Low-cost measurement systems are developing rapidly in many fields. In the field of water, these systems provide flexibility to improve the monitoring of hydraulic structures and water bodies. These systems promise a strong reduction in costs, a high degree of modularity, access to data in real time, complete control of the measurement chain and the exchange of open-source code. However, these systems require a significant amount of time for their assembly and programming, and they raise questions about the reliability of measurements and their robustness. Without pretending to answer all these questions, the authors propose to share their experience through a poster and a live demonstration of low-cost measurement systems they develop and use.

KEYWORDS

Low-cost, sensors, IoT, monitoring, demonstration, feedback

Low-cost technologies have emerged few years ago in other fields, such as agriculture and air quality. They are emerging now in our water world (Reynolds, 1995). Their advent opens up the potential for entirely new approaches involving more monitoring points and taylor-made monitoring systems. Delivering on this potential will require investigating new challenges and imagining innovative ways of monitoring. Among the other challenges, it will be necessary to consider the reliability of the monitoring system, the skills related to customised hardware and programming and the management of large data sets. Low-cost and connected solutions will, however, improve monitoring possibilities with real-time data acquisition, processing, and alert, along with the increase of spatial resolution. A key challenge is to optimise the use of new technologies, rather than simply replacing the functionality of existing monitoring systems. Low-cost monitoring must be considered within the whole monitoring chain, Figure 1.

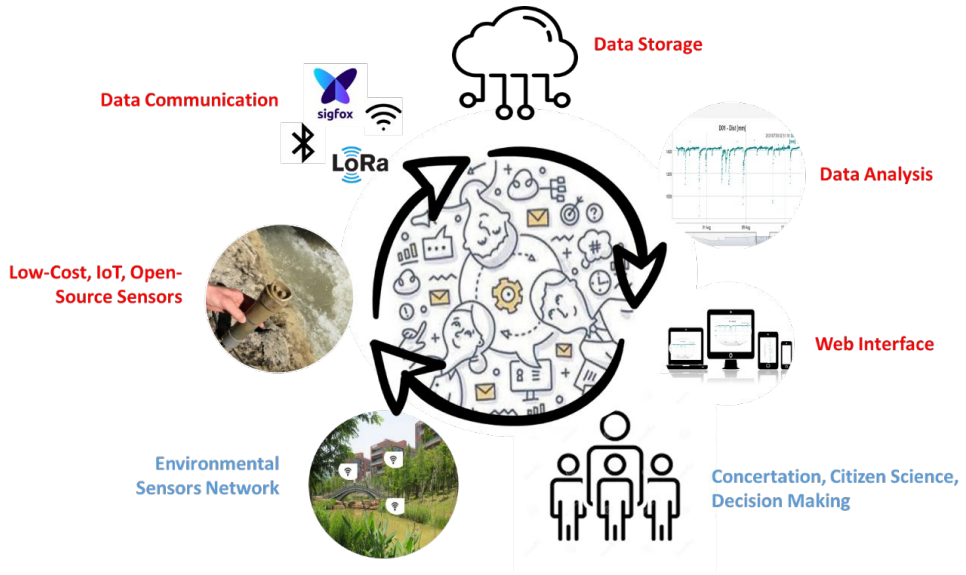

Figure 1. Monitoring chain: from the elaboration of the low-cost monitoring system to the use of the data. The text in red corresponds to the steps currently addressed by the authors.

In this communication, the humble authors intend to share their experience on several low-cost monitoring systems. The authors have tried to investigate a wide range of sensors and configuration. They have developed a web platform to access the data produced in real-time: www.opendataeau.online. Figure 2 and Figure 3 present respectively the online platform and some examples of the low-cost monitoring systems studied.

The authors propose to have an interactive poster during the conference. Some of low-cost monitoring systems will be displayed live in front of the poster and the public will have the opportunity to discover the hardware, and to discuss with the authors on the benefits and limits of such systems.

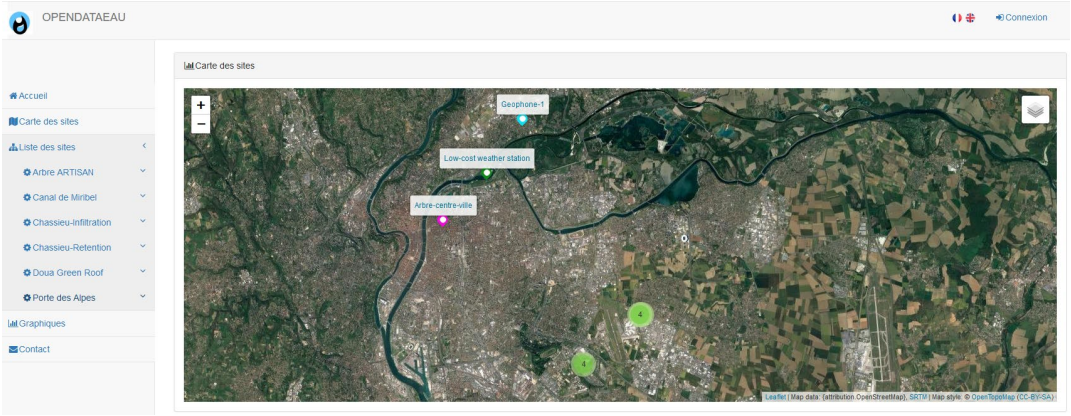

Figure 2. Online platform www.opendataeau.online to access in real-time the data from low-cost monitoring stations.

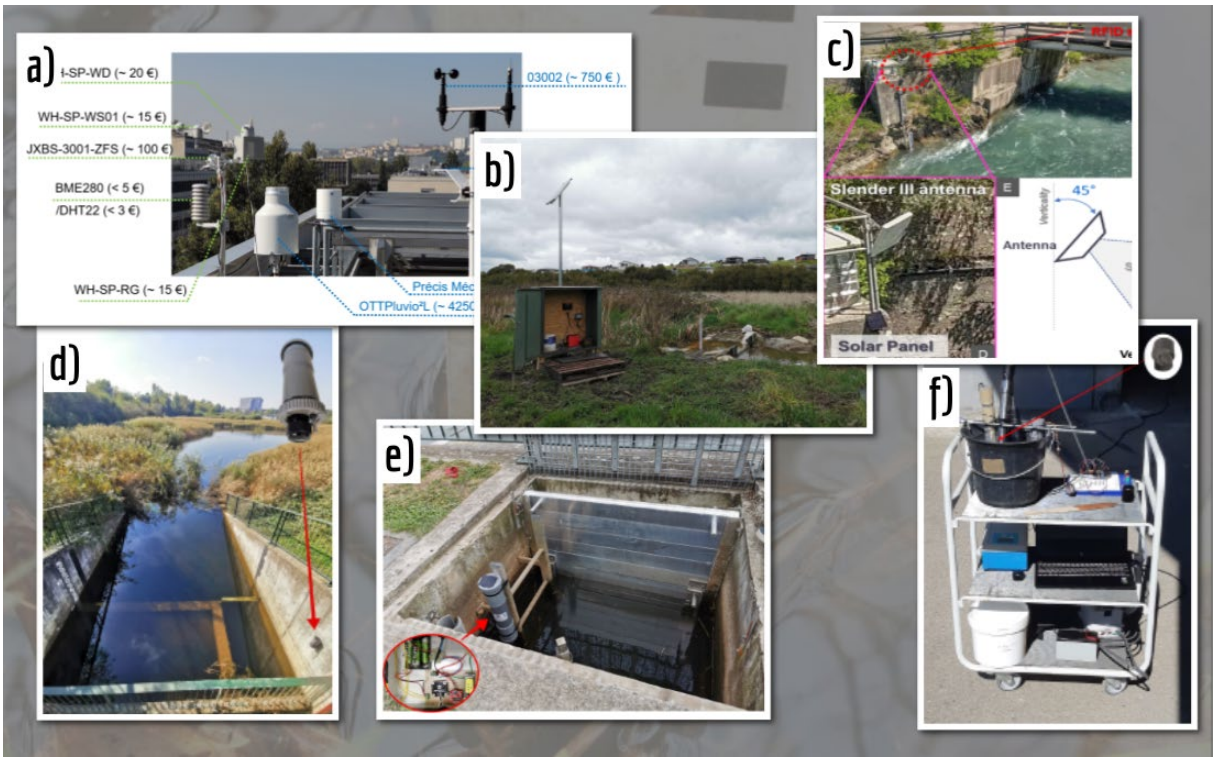

Figure 3. Examples of sensors and configurations tested: (a) low-cost weather station test, Villeurbanne, France (b) volume-based automated sampler, Officer, Australia, (c) sediment tracking using RFID technology, Séveraisse River, France, (d) ultrasonic water level monitoring system, Portes des Alpes, France, (e) water level monitoring with a pressure transducer, Porte des Alpes, France, (f) turbidity sensor development, Bron, France

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