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Evaluation of Open, Reproducible, Low-cost and Non-conventional Weather monitoring System

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According to the United Nation in a large part of the world there's a lack of critical data for effective policy making. It also identified the poor quality of data, lack of timely information and access to disaggregated data the major challenges [1]. With relation to low income countries and climate datasets, which include in a broad sense meteorology, oceanography and climatology information, this situation is particularly true. The lack of weather monitoring networks capable of providing data with adequate spatio-temporal resolution and quality is of particular concern in setting-up appropriate measures and policies for resource management and hazards mitigation [2]. Missing or in decline monitoring networks are often registered and when existing they seldom are connected in real time and have a sufficient density. The major causes for this situation have been identified in lack of local expertise, rapid deterioration, lack of skilled maintenance, high-priced and non-locally available spare parts with very limited allocated budget.
To try solving this issues, low-cost and non-conventional solutions have been proposed. Nevertheless a number of existing challenges [3] should be addressed before of their full exploitation: data quality, metadata availability (specifically on sensor types and maintenance operations) and interoperability are of primary concern, particularly when taking decisions affecting lives and goods. Additionally, a thorough assessment of costs, durability, and applicability at real case scale, at the authors knowledge, is not yet available in literature to support its adoption.
Considering the above mentioned state of the art and the existing reported challenges, the 4onse project (www.4onse.ch) has been funded within the Research for Development programme (R4D) by the Swiss National Science Foundation to implement a fully open and reproducible monitoring system and evaluate its effectiveness in a watershed scale case study. The proposed 4onse-system includes open hardware (Arduino), software (istSOS), standard (SOS) and data (CKAN).
This contribution intends to present and discuss the results and activities after two years of the project: stakeholder engagement, system design and prototyping, documentation and educational material preparation, implementation and testing of the solution (including hardware, communication and service layers), system deployment and maintenance (30 stations) in the Deduru Oya basin.

[1] United Nations, 2015. Department of Economic, & United Nations. Department of Public Information. The millennium development goals report 2015. United Nations Publications.
[2] Snow, J.T., 2013. Non-traditional Approaches to Weather Observations in Developing Countries. International Finance Corporation. Available online at: https://goo.gl/sAZS6u.
[3] Muller, C. L., Chapman, L., Johnston, S., Kidd, C., Illingworth, S., Foody, G., ... & Leigh, R. R., 2015. Crowdsourcing for climate and atmospheric sciences: current status and future potential. International Journal of Climatology.