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## Low-cost framework for hydrological monitoring in developing countries

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The advancement of hydrological knowledge is dependent on observation data (Ex, Blume et al., 2017; Kirchner, 2006). Nevertheless, these needs may become financially unviable due to the high costs of monitoring, especially in developing countries with large territorial extensions as Brazil and scarce financial support for this purpose. Thus, it is not difficult to find large areas in Brazil without hydrological monitoring. Alternatively, satellite-based estimations have been explored to supply these deficiencies due to several advantages like measuring spatial variability, being rapidly and generally freely available on the Internet, and maintaining functionality even during catastrophic situations that can damage or temporarily shut down ground networks (e.g., flooding, overland effects of hurricanes). However, even if to calibrate these remote sensing products, the land-based monitoring is needed. In this light, citizen science where many volunteers can monitor more sites than a typical research team can be an interesting means of creating this information (Buytaert et al., 2014), although even for these volunteers, the cost could be a problem. In this perspective, we present here a low-cost framework developed and field-tested for monitoring hydrological variables (precipitation, humidity, temperature, barometric pressure, and water level) based on the Arduino Platform. The monitoring-set could be self-constructed by volunteers or distributed as assembly kits that, apart from providing reliable measures of the hydrological variables at a very low cost, can boost interest in monitoring and science. Reliability and quality tests showed that measures gathered with the developed monitoring-set are within commercial standards. However, as the Arduino Platform is open, which facilitates its application and diminish the costs, special care with the suppliers should be taken, as not all follow the same quality standards.