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CrowdWater: How well can citizens observe water levels and other hydrological variables using a smartphone app?

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Citizen science observations are potentially useful to complement existing monitoring networks. This is also the case in hydrology, where we often lack spatially distributed observations. Engaging the public might help to overcome the lack of data in hydrology. So far, most hydrological citizen science projects have been based on the use of different instruments or installations. For stream level observations, a staff gauge is installed in the river but it is difficult to scale this type of citizen science approach to a large number of sites because these gauges cannot be installed everywhere (or by everyone). Here, we present an evaluation of the CrowdWater smartphone app that allows the collection of hydrological data without any physical installation or specialized instruments. With the help of a free app, citizens can report the stream level, soil moisture conditions, the presence of water in temporary streams, plastic pollution in streams and on streambanks, as well as general information on streams. The approach is similar to geocaching, with the difference that instead of finding treasures, hydrological measurement sites are set up. These sites can be found by the initiator or other citizen scientists to take additional measurements at a later time. For the water level measurements, a virtual staff gauge approach is used instead of a physical staff gauge. A picture of a staff gauge is digitally inserted into a photo of a stream bank or a bridge pillar and serves as a reference of the water level. During a subsequent field visit, the stream level is compared to the virtual staff gauge on the first picture. In this presentation, we discuss how well the water level class observations agreed with measured stream levels, and in which months and during which flow conditions citizens submitted their stream level observations. We also highlight methods to ensure data quality, and illustrate how these water level data can be used in hydrological model calibration. We also give an update on new activities in the CrowdWater project.