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Social.Water—an open-source python code for citizen-driven data acquisition

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Remote telemetry has a long history at the USGS and other hydrologic monitoring organizations, enabling real-time hydrologic data presentation on the Web. Citizen volunteers have also long contributed to hydrologic data—Wisconsin’s USGS and Wisconsin State Geological and Natural History Survey (WGNHS) groundwater network has nearly 100 volunteers participating. Ubiquitous short message service (SMS) messaging and email-capable mobile phones mean nearly everyone can provide telemetric data if they know what information to provide and the infrastructure to accept the information exists: this is “crowdsourcing.”

Crowdhydrology.org, a crowdsourcing project originating in New York State, USA, was implemented by posting signs near stream staff gages inviting passersby to send SMS messages reporting the value they read on the gage. Social.Water is a tool developed to automatically accept and interpret these messages, generate data tables and graphical results, and post them on the Web.

Born of crowdhydrology.org, Social.Water is an open-source, object-oriented code in Python. Only open-source codes have been incorporated and the project is available for collaboration on GitHub. The initial Social.Water implementation is based on using Google Voice and Gmail for SMS acquisition. The crowdhydrology.org project is targeted at engaging passersby so strict
SMS formatting cannot be enforced and fuzzy pattern matching in the Social.Water code was necessary. Application with other media that require preregistration open up options that require more specific formatting and can thus accommodate more data than a single measurement. For example, a project is underway using the Social.Water technology to track the North American Osprey migration. In this project, rather than only engaging passersby, users would register \textit{a priori} and then more specificity regarding SMS content is possible. Other SMS platforms than Google can modularly be incorporated to expand the reach of Social.Water beyond the USA, provided APIs are available. Expansion to include interpreting Twitter messages can also be readily implemented.

In the crowdhydrology.org project, one gage generated nearly 150 contributions in the first seven months of implementation. Since then, 42 gages have been deployed in 4 states in the USA resulting in over a thousand measurements with more deployment ongoing. The data were validated at three locations and found to be of good quality. In one case in New York, discrepancies between the Social.Water acquired data and a transducer meant to validate the citizen data were used to identify and correct a problem with the transducer.

While the data obtained using Social.Water may often be of secondary value, citizen engagement is a primary benefit.