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A high-resolution surface water electrical conductance monitoring network built on the citizen science model

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Flowing water is fundamental to human societies, providing water for consumption, transportation, ecological habitat, and many other ecosystem services. Thus, understanding water sources and dynamics of water quality in flowing water is vital to efficient management of the flowing water as a resource. Water electrical conductance can be an excellent tracer of water sources and surface water pollution. We are implementing a new flowing water sensing network in New Hampshire, U.S.A., focused on high temporal resolution water stage, temperature, and electrical conductance measurements at 100 sites. A novel aspect of this network is that it is built on the citizen science model: we are collaborating with a broad group of agencies, high school teachers, and ordinary citizens who collect data for this network. The collaborators are maintaining relatively inexpensive water sensors that log water dynamics at three to ten minute intervals; the collaborators then download and send us the data on a monthly basis. This approach allows us to collect a very large data set with a modest financial investment. The network is one-year-old and beginning to produce novel patterns of electrical conductance variability, demonstrating hydrologic differences between watersheds across New Hampshire. For example, water sensing during the remnants of Hurricane Sandy demonstrated that the level of watershed urbanization influences groundwater contributions to streamflow during large storm events. The growing data set from this sensing network is novel, the method of implementation is novel, and ultimately, we think the network represents the densest spatial and temporal resolution sensing of surface water electrical conductance built. We will discuss the data collection methods, the data structure, and how the data are being used to advance hydrologic science.

Keywords: water tracing, citizen science, electrical conductance, water temperature