DIY tools for hydrologic monitoring : An economical way to obtain useable, screening quality data, from ungaged areas.

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Abstract

words

1. Introduction

The need for data, even low-quality DIY (citizen) collected data. Ungaged watersheds description. The economic issue - esp. in re-developing nations.

2. Literature Review

Review of ungaged watersheds methods.
Value of obtaining some gage data
Rainfall data, the easier of the two
Streamflow, the hardest
Evaporation, automating the evaporation pan
The emergence of low-cost system on a chip (SoC) computers – a datalogger with an operating system and multi-threading capability. Field processing of the raw data.
The sensor challenges
Analog-to-digital conversion

3. Methods

words

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3.1. DIY Datalogger using Raspberry Pi SoC Computers

Review of a handful of SoC computers. Odroid HC2, Odroid XU4, Arduino, Raspberry Pi (and a few others).
The value of an operating system on a datalogger.
Raspberry Pi chosen because of availability and support.
Programming the sensor-logger interface – the big decision C++ or Python.
Keeping time – adding a clock for when the computer is disconnected from the internet.

3.2. DIY Sensors

3.2.1. DIY Recording Raingage

Counting events is pressing a button. Adapting code that detects button presses and using it to read a tipping-bucket gage. trying to keep this part digital so can run parallel to the analog inputs. Capturing the correct time of the event.

3.2.2. DIY Recording Stage (Depth) Gage

A resistor-ladder to measure depth. How to use 1023 states to get meaningful depth measurements. An acoustic type gage – field deployment issues. The A/D converter.

3.2.3. DIY Recording Evaporation Gage

Using a resistor ladder to record evaporation from an evaporation pan. Issuing a daily control signal to refill the pan to desired level, then stopping the fill.

4. Prototype Builds

5. Prototype Deployment

6. Results

6.1. Proof-of-Principle

6.2. Comparison with a co-located USGS gaging station

7. Conclusions and Recommendations

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