



Toward operational rainfall monitoring with crowdsourced personal weather stations: suggested real-time quality control method

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Automatic personal weather stations owned and maintained by weather enthusiasts provide dense in-situ measurements that can be collected and visualized in real time on online weather platforms. Rainfall observations from these typically low-cost sensors are prone to various types of errors, and often have a systematic over- or under-estimation. This study proposes a quality control (QC) method, designed to identify erroneous crowdsourced rainfall observations in real time, without the need for auxiliary measurements. This study explores all rainfall observations of weather stations connected to the Netatmo Weathermap over 2 years in the Amsterdam metropolitan area, and 1 month nation-wide in the Netherlands. The QC was designed on the first year of the urban dataset and validated by applying the QC on the second year as well as on the nation-wide dataset. The suggested QC is successful in identifying faulty measurements and improves overall accuracy of hourly rainfall with a Pearson correlation above 0.8 and a coefficient of variation of ~ 2.9 . Considerations on how the QC parameter settings relate to network lay-out are discussed to accommodate operational use. The feasibility of using crowdsourced rainfall observations for high resolution real-time nation-wide rainfall monitoring is demonstrated with two nation-wide case studies.