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Comparitive performance of two quality control algorithms for personal weather station rainfall data in Amsterdam Metropolitan Area

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The accurate estimation of precipitation is still one of the major challenges in hydrology. One fairly new approach to improve rainfall quantification is the use of so-called opportunistic sensors (OS), i.e. sensors that were not designed to provide high-quality rainfall data at a larger scale, but can be used for that purpose. One type of OS are personal weather stations (PWS) that are owned by private users. They typically comprise one or a set of low-cost devices that record meteorological variables such as air temperature and rainfall. The number of PWS has increased over the past years and the high number of rain gauges offers potential to improve rainfall estimates.
OS have also raised scientific interest in the recent years. In October 2021, the EU COST Action CA 20136 “Opportunistic Precipitation Sensing Network” (OPENSENSE) was launched with the aim to bring together researchers in the field of OS and to build a global opportunistic sensing community. Furthermore, EUMETNET recently released a dataset containing data of PWS in Europe for 2020 from MetOffice WOW and Netatmo to support the development of PWS quality control tools.
Compared to traditional rain gauge networks, PWS provide data in high temporal and spatial resolution but with low quality, since they are often not installed and maintained according to professional standards. Therefore, these data require a thorough quality control (QC) and filtering before they can be used for applications such as areal precipitation estimates. Two different QC algorithms have been published by de Vos et al. (2019) and Bárdossy et al. (2021). These are available in the OPENSENSE GitHub environment (https://github.com/OpenSenseAction).
In this study, we apply these two aforementioned QC algorithms on four 24-hour periods, containing convective or homogeneous rain events, from the same PWS dataset for the Amsterdam Metropolitan Area, and validate the outcome using a gauge-adjusted radar product as reference. The characteristics and relative performance of the QC algorithms are presented, thus providing aid for prospective users to decide which of these QC algorithms is best suited for their purpose.

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