

pypwsqc: A new tool for quality control of personal weather station data rainfall data

Wednesday, June 25, 2025 3:15 PM (45 minutes)

The use of so-called opportunistic rainfall sensors like Personal Weather Stations (PWS) and Commercial Microwave Links has gained much attention over the recent year, as they clearly outnumber professional rain gauges which are operated by national weather services and other. However, the data quality of such sensors is typically low and thus their information cannot be used without thorough quality control. Various quality control algorithms for PWS rainfall data have been developed and published within the EU COST Action CA 20136 “Opportunistic Precipitation Sensing Network” (OPENSENSE) in the past years and are available on OPENSENSE’s GitHub (El Hachem et al. 2024).

These QC algorithms are now available in a Python package. The new functionalities of these QC filters include (1) an improved indicator correlation filter which was originally developed by Bárdossy et al. (2019) which now provides a skill score for the accepted PWS to assess quality of the indicator correlation with neighbouring references, (2) an algorithm to correct rainfall peaks in PWS data which may be caused by connection interruptions between the rain gauge and the base station and (3) a Python implementation of the QC algorithms for identifying faulty zeroes, high influxes and station outliers originally developed in R by de Vos et al. (2019).

These new functionalities are implemented in the ‘pypwsqc’ Python package (<https://zenodo.org/records/14177798>) which is currently under development in the OPENSENSE COST Action. In this contribution we present the new features and guidelines for usage.

Bárdossy, A., Seidel, J., and El Hachem, A. (2021), The use of personal weather station observations to improve precipitation estimation and interpolation. *Hydrol. Earth Syst. Sci.*, 25, 583–601.

El Hachem, A., Seidel, J., O’Hara, T., Villalobos Herrera, R., Overeem, A., Uijlenhoet, R., Bárdossy, A., and de Vos, L.W (2024), Technical note: A guide to using three open-source quality control algorithms for rainfall data from personal weather stations, *Hydrol. Earth Syst. Sci.*, 28, 4715–4731.

de Vos, L.W., Leijnse, H., Overeem, A., and Uijlenhoet, R. (2019), Quality control for crowdsourced personal weather stations to enable operational rainfall monitoring. *Geophysical Research Letters*, 46, 8820–8829.

Are you an Early Career Scientist ?

No

Authors: SEIDEL, Jochen (Institute for Modelling Hydraulic and Environmental Systems, University of Stuttgart, Germany); LOUISE PETERSSON WÄRDH, Louise (1) Swedish Meteorological and Hydrological Institute (SMHI), Folkborgsvägen 17, Norrköping SE-601 76, Sweden (2) Division of Water Resources Engineering, Faculty of Engineering, Lund University, P.O. Box 118, 22100 Lund, Sweden); ILLICH, Nicholas (Institute for Modelling Hydraulic and Environmental Systems, University of Stuttgart, Germany); DE VOS, Lotte (Royal Netherlands Meteorological Institute (KNMI), De Bilt, Netherlands); CHWALA, Christian (Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Campus Alpin, Garmisch-Partenkirchen, Germany)

Presenters: SEIDEL, Jochen (Institute for Modelling Hydraulic and Environmental Systems, University of Stuttgart, Germany); LOUISE PETERSSON WÄRDH, Louise (1) Swedish Meteorological and Hydrological Institute (SMHI), Folkborgsvägen 17, Norrköping SE-601 76, Sweden (2) Division of Water Resources Engineering, Faculty of Engineering, Lund University, P.O. Box 118, 22100 Lund, Sweden)

Session Classification: Coffee Poster Session Tuesday

Track Classification: Processing methods