



## Co.Rain: a new semi-automatic procedure for a better assessment of parallel precipitation measurements networks

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Long historical climate records usually contain non-climatic changes that can influence the observed behavior of meteorological variables. The availability of parallel measurements offers an ideal occasion to study the discontinuities as they record the same climate events. This is especially important in the case of precipitation, where the relative statistical homogenization is hampered by low cross-correlations between stations. The instrumental transition from manual to automatic measurements, typical of some regions of the world, produce differences and a spurious change in the precipitation, thus showing the importance of having a homogeneous dataset to identify real climate variations. For this purpose, we adopted a new method, implemented in the free and open source software called Co.Rain, which is written in R language and is available online under GPL license. The program takes in input two series of daily information on precipitation, normally obtained from different networks and starts its elaboration, which is divided in three steps. In the first step, it cleans the input data, removing all values smaller than 1mm/day and setting the same missing values on both series; after that, it computes a statistical analysis on the two series, showing how data will be cleaned and asking the user agreement to proceed. The second step is the comparison between the cleaned series, where different tests are applied, generating a scatter plot of daily values and calculating the minimum and maximum errors. In the final step, it calculates the quantile of the series to identify the thresholds for the classification of the events. For each class, it creates a scatterplot and a summary of useful information. This procedure allowed us to discern the locations with or without differences and evaluate the correctness of joining consecutive time data series obtained from different instruments.