



Modelling European dry spell length distributions, years 1951-2000

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Daily precipitation records of 267 European rain gauges are considered to obtain dry spell length, DSL, series along the second half of the twentieth century (1951-2000). A dry spell is defined as a set of consecutive days with daily rain amount below a given threshold, R_0 , which are equal to 0.1, 1.0, 5.0 and 10.0 mm/day. DSL series are properly fit to four different statistical models: Pearson type III (PE3), Weibull (WEI), generalized Pareto (GPA) and lognormal (LN) distributions. The parameters of every model are estimated by L-moments, and the goodness of fit is assessed by quantifying discrepancies between empirical and theoretical distributions in the L-skewness-kurtosis diagrams. The most common best fitting model across Europe is PE3, especially for 0.1 and 1.0 mm/day thresholds. Nevertheless, a few stations in southern Europe are better modelled by the WEI distribution. For 5.0 and 10.0 mm/day, the spatial distribution of the best fitting model is more heterogeneous than for the lowest thresholds. Maps of DSL average and standard deviation, and expected lengths for return periods of 2, 5, 10, 25 and 50 years are also obtained. A common feature for all these maps is that, whereas for thresholds of 0.1 and 1.0 mm/day a N-S gradient is detected, especially strong in Mediterranean areas, for 5.0 and 10.0 mm/day a NW-SE gradient is observed in the Iberian Peninsula and a SW-NE gradient in the Scandinavian Peninsula. Finally, a regional frequency analysis based on a clustering algorithm is attempted for the four threshold levels R_0 , being observed that PE3 model is the parent distribution for the groups with the highest number of stations.