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Trends of some high quantiles of average and extremes inter-arrival times and rainfall depths at daily scale for an Italian Sub-Alpine area

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Modeling of rainfall statistical structure represents an important research area in hydrology, meteorology, atmospheric physics and climatology, because of the several theoretical and practical implications. The statistical inference of the alternation of wet periods (WP) and dry periods (DP) in daily rainfall records can be achieved through the modelling of inter-arrival time-series (IT), defined as the succession of times elapsed from a rainy day and the one immediately preceding it.

It has been shown previously that the statistical structure of IT can be well described by the 3-parameter Lerch distribution (Lch). In this work, Lch was successfully applied to IT data belonging to a sub-alpine area (Piemonte and Valle d'Aosta, NW Italy); furthermore the same statistical procedure was applied to daily rainfall records to ITs associated. The analysis has been carried out for 26 daily rainfall long-series (≈ 90 yr of observations).

The main objective of this work was to detect temporal trends of some features describing the statistical structure of both inter-arrival time-series (IT) and associated rainfall depth (H). Each time-series was divided on subsets of five years long and for each of them the estimation of the Lch parameter was performed, so to extend the trend analysis to some high quantiles.