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A comparison of homogeneity tests for regional frequency analysis

A. Viglione (1), P. Claps (1) and F. Laio (1)
(1) DITIC - Politecnico di Torino, Torino, Italy (Email: alberto.viglione@polito.it)

In regional frequency analysis, data samples coming from a number of stations are grouped together to form clusters or regions. Critical points of the procedure are the choice of the approach to form the clusters and the assessment of the plausibility of the obtained grouping. This involves testing whether the proposed regions may be accepted as being homogeneous or not. The hypothesis of homogeneity implies that at-site frequency distributions are the same except for a site-specific scale factor. We present preliminary results regarding the comparison between some commonly used homogeneity tests, including classical rank-based testing procedures (e.g., Kruskal-Wallis and Anderson-Darling tests) and techniques based on the comparison of the L-moments ratios of the samples within a region (Hosking and Wallis test). The performance of these tests is assessed in a series of Monte Carlo simulation experiments. The power of each test is determined in a number of different situations, varying the number of sites belonging to the region, the series length , the hypothetical parent distributions and the degree of their heterogeneity in terms of dispersion and shape of the distributions. The first results show that the Hosking and Wallis testing procedure is generally superior to the others, in particular when dealing with small samples.