

## PAPER (5)

### Optimal selection of rainfall gauges for safe extreme events estimation using a geostatistical approach.

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#### Abstract

This paper's objective is to present a method for optimizing rain gauge network aiming to determine the optimal number of stations and their locations, to achieve an acceptable error in extreme rainfall estimation. The optimization is based on the comparison between the maximum daily rainfall depths at high return periods deduced using the entire rain gauges networks and that was deduced using an optimal number of rain gauges. A latin hypercube sampling (LHS) method is used to generate samples of stations. Each generated sample is analyzed to obtain the optimum set of gauges locations. The optimal number and locations of rain gauges are obtained in two cases: the first one using a regional frequency analysis technique and the second using an at-site frequency analysis technique. The methodology is applied to the existing rain gauges network of the Walnut Gulch Experimental Watershed (WGEW), AZ, USA. The results showed that, a lower number of rain gauges is required based on the regional frequency analysis technique compared to the at-site frequency analysis technique to achieve the same relative error at the high return periods. The study also suggests optimum locations for the rain gauges.