**Combining geostatistics and simulated annealing for rainfall monitoring network optimization over all Tunisia**

Haifa Feki1 and Mohamed Slimani2

1 *Département hydraulique, Ecole supérieure des ingénieurs de l’équipement rural de Medjez el beb, Route du kef Km5, 9070, Tunisie,* e-mail : haifa.fki@gmail.com.

2 *Département génie rural, eaux et forêts, Institut National Agronomique de Tunisie, 1082 Tunis-Mahrajène, Tunisie.*

Rainfall data are an essential input for many simulation models. In fact, these latter have nowadays, a decisive role in the development and application of rational water policies. Since the accuracy of the simulation depends strongly on the available data, the task of optimizing the monitoring network is of great importance. This paper introduces the spatial simulated annealing method to optimize spatial sampling schemes for obtaining the minimal kriging variance. The method given here is based on the theory of the regionalized variables using the well-known geostatistical variance-reduction method. This procedure that involves different analysis methods of the available data such as estimation of the interpolation uncertainty and data cross validation is applied to a case study data set from 101 stations in Tunisia in order to demonstrate the potential of improvement of the quality of the observation network. Root mean square error values were the criteria for evaluating rainfall estimation and network performance is then discussed based on the kriging variance reduction. Based on this study, it was formed that some sites should be dropped to eliminate redundancy and some others need to be added to the existing network essentially in the center and the south to have more informative network.