

## Drought Regional Frequency Mapping in Tunisia

Haykel SELLAMI<sup>1</sup>, Slaheddine KHLIFI<sup>2</sup>, Marnik VANCLOOSTER<sup>3</sup>

1: Laboratoire de Géoresources, Centre des Recherches et des Technologies des Eaux, Technopole Borj Cedria, Soliman, Tunisia ([haysellami@yahoo.fr](mailto:haysellami@yahoo.fr))

2: UR-Gestion Durable des Ressources en Eau et en Sol, Ecole Supérieure des Ingénieurs de Medjez el Bab Université de Jendouba, Tunisia

3 : Earth and Life Institute (ELI), Université catholique de Louvain, Croix du Sud 2, 1348 Louvain-La-Neuve, Belgium

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### ABSTRACT

Meteorological droughts are among the most important natural hazards affecting large populations with significant consequences on the environment, economic and societal development, particularly in arid and semi-arid regions in the world.

Both meteorological and hydrological droughts have been extensively studied using a variety of probabilistic models among which the Index Flood Regional Frequency Analysis based on an L-moments procedure (RFA-LM), appears to provide the most robust estimates of meteorological drought frequencies (Hosking et al., 1985a; J.H. Núñez et al. 2011). So far, applications of RFA-LM for regional drought probability studies have been restricted at regional and sub-regional scales while little work has been done at larger scales (e.g., national, continental, sub-continental). The application of the RFA-LM for assessing meteorological drought at larger scale is constrained by the availability of distributed precipitation network and good data quality, making the identification of homogeneous region, in term of common probability distribution, more complex, particularly in arid and semi-arid regions where large temporal and spatial disparity in rainfall distribution exists.

In this work we have applied the RFA-LM to assess drought frequency at national scale in Tunisia using annual mean monthly precipitation records from spatially distributed stations across the country, similarly to the approach developed by Núñez et al. (2011) in north-central Chile. An ensemble of distributions was examined included the Generalized Pareto, Generalized Extreme Value, Generalized Normal, Pearson Type III, Generalized Logistic, and the 4-parameter Kappa distribution (4-p-Kappa) as well as the 3-parameter Gaucho distribution. The latter is a modification to the 4-p-Kappa distribution described in detail in Núñez et al. (2011). The L-moments ratios L-Cv and L-skewness, defined as L-coefficient of variation and L-coefficient of skewness, respectively, were used to identify the best fit regional probability distribution for homogeneous regions. The relationship between L-moments and the mean annual precipitation is used for the quantiles estimates and return period, and for mapping the spatial droughts characteristics in Tunisia.

**KEYWORDS:** Drought, Regional Frequency analysis, Tunisia, L-Moments

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