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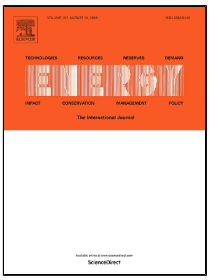

Accurate estimation of T year extreme wind speeds by considering different model selection criterions and different parameter estimation methods

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List of Notations and Abbreviations

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ABSTRACT

Accurate estimation of extreme wind speeds for different return periods is necessary to avoid extensive costs or large damages. To achieve this aim, the probability distribution of the wind speed data should be well defined and its parameters should be more precisely estimated. In this study, the commonly used probability distributions, including Gamma, Generalized Extreme Value, Logistic, Lognormal, Normal and Weibull, are fitted to annual maximum wind speed data in Turkey. Parameters of the fitted distributions are estimated using method of moments (MOM), method of maximum likelihood (MLM) and method of probability weighted moments (PWMs). Based on various model selection criterions (Akaike Information Criterion, Bayesian Information criterion, Anderson-Darling, Cramér-von-Mises, and Kolmogorov–Smirnov tests), the Generalized Extreme Value and Logistic, which provided the best fit for 40% and 30% of the series, respectively, were mostly found to be the most suitable distributions. Additionally, the Lognormal, Normal and Gamma distributions showed the best fit for 15%, 10% and 5% of the series, respectively. Moreover, the MLM and PWMs provided better parameter estimations for 57% and 30% the best fitted distributions, respectively. Furthermore, wind speed quantiles with the standard errors in various return periods were estimated using the best fitted distributions.

Keywords: Wind speed, Probability distributions, Method of moments, Method of maximum likelihood, Method of probability weighted moments, Model selection criterions, Turkey.