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Investigation of the relation between the return periods of major drought characteristics using copula functions

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Different drought characteristics (e.g. duration, average severity, and average areal extent) often have monotonic relation that increased magnitude of one often follows a similar increase in the magnitude of the other drought characteristic. Hence it is viable to establish a relationship between different drought characteristics with the goal of predicting one using other ones. Copula functions that relate different variables using their joint and conditional cumulative probability distributions are often used to statistically model the drought characteristics. In this study bivariate and trivariate joint probabilities of these characteristics are obtained over Ankara (Turkey) between 1960 and 2013. Copula-based return period estimation of drought characteristics of duration, average severity, and average areal extent show joint probabilities of these characteristics can be satisfactorily achieved. Among different copula families investigated in this study, elliptical family (i.e. including normal and t-student copula functions) resulted in the lowest root mean square error.

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