On Drought Severity-Duration-Frequency Curve Based On Copula Theory

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Abstract. The world is suffering from many natural disasters such as floods and droughts due to climate change. Especially, the drought casts heavy burden on water resource management and planning, thus we may need more research works for preparing for counter measures on droughts. However. we still have lacks of quantitative analysis of drought characteristics and of research works on impact of climate change on droughts. So, this study showed the validation of drought analysis using joint probability which is resulted from drought variable relations, and drought frequency analysis by joint probability was performed according to the copula theory. The study also assessed and predicted quantitatively the impact of climate changes on hydrological droughts for watershed scale. This study used the observed runoff to apply and evaluate hydrological droughts in different levels, and induced drought events to analyze drought frequency in conventional way. Analysis for the relationship between drought variables such as drought duration and drought severity was performed and drought frequency analysis using Clayton copula theory was performed. Then the results from frequency analysis by conventional single variable and copula theory were compared. Also, joint probability was used to analyze return period of droughts and severity-duration-frequency (SDF) curve was constructed.

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