

Multivariate analysis of maximum water levels in the Great Lakes

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In this study, seasonal maximum water levels in the Great Lakes have been treated in relation with the inflows from one of the rivers draining the system and climatic variables (e.g. Degree-days and rainfall). Two different approaches have been used to identify the range of dependence between the variability of the hydrological extremes of the Great Lakes System and the spatiotemporal contribution of the meteorological phenomena. Frequency analysis using the non-stationary Generalized Extreme Value (GEV) with covariates was applied to Lake Superior and Lake Huron levels. A multivariate method using trivariate copula was applied to identify the effect of the most correlated hydrometeorological variables to the seasonal maximum water level (Summer-Autumn) on Lakes Erie and Ontario. The conditional return periods of the latter was estimated independently of the marginal distributions of each covariable. The results for both methods are promising since they allow selecting appropriate hydrometeorological variables to model maximum water levels in the Great Lakes

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