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Changes of storm properties and its relationships with large-scale ocean oscillations in the continental United States

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Safety, risk and economic analyses of engineering constructions such as storm sewer, street and urban drainage, and channel design are sensitive to the storm properties. Rainfall-runoff analysis of small watersheds and urban areas is highly affected by storm properties. Thus, design-storm has been used as the dominant design method in hydrologic engineering. Classical design-storm is analyzed based on an assumption that storm characteristics are assumed to be stationary which facilitates estimation of a time-invariant probability density function from observed records. However, substantial anthropogenic change of climate and large-scale ocean oscillations contribute to the non-stationaries in the precipitation. This implies the stationary assumption is a risk and should not serve as the default assumption in hydrological designs. This study aims to investigate how the large-scale ocean oscillations including El Nino/La Nina-Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO), and Atlantic Multi-decadal Oscillation (AMO) would impact on the seasonal storm properties such as storm duration, inter-storm period, storm intensity, and within-storm pattern in the continental United States. Eight locations are selected which represent eight major climate types based on Köppen–Geiger Climate Classification System. Detailed procedure as well as the difference of storm properties during the periods with different climate phases will be presented.