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Contributions of precipitation and potential evapotranspiration to changes of drought in China

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Drought is one of the recurrent climatic phenomena on Earth and is considered to be the most complex but least understood natural hazard with a major impact on agrosocioeconomic activities. Under the impact of climate change, the extreme meteorological or hydrological events, particularly for drought, occurred frequently and intensively across the globe with larger spatial differences. Drought is closely related to the lack of precipitation and the impact of atmospheric demand of evaporation (reflected by potential evapotranspiration (PET) here). However, the actual contribution of P and PET to the changes in drought was rarely considered. In this study, we analyzed the contributions of P and PET to the changes of meteorological drought in China during 1960-2012 using the Standardized Precipitation Evapotranspiration Index (SPEI). We found that both P and PET play an important role in the changes of SPEI, however, the impact of these two factors exist large spatial variability. Considered China as a whole, the slight decreasing in P (-0.025 mm/year) and significant decreasing in ET0 (-0.458 mm/year) could induce opposite effect on the changes in annual SPEI. The P will result in a dry trend along with a decrease in annual SPEI, while ET0 will cause a wet trend along with an increase in annual SPE. However, ET0 finally dominant the changes and the combined effect of P and ET0 lead to the slight wet trend along with an increase in annual SPEI in the whole China.