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The characteristics of global droughts and ENSO teleconnections

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Drought is among world's most serious natural disasters which have profound effects on human and environmental activity globally. In recent years, the increase of the frequency and intensity of droughts has aroused wide concern. More intense and longer droughts have been observed over wider areas, particularly in the tropics and subtropics since the 1970s. The SPI (Standard Precipitation Index) based on monthly precipitation is one of the most prominent indices of meteorological drought and soil moisture is a useful indicator of drought because it provides an aggregate estimate of available water from the balance of precipitation, evaporation, and runoff fluxes. Many studies have been conducted aiming to increase the understanding of the drought properties and underlying causes; however, the causes of droughts are complex. Some research has revealed that there is a strong relation between ENSO and drought and flood disasters. In this paper, the global monthly precipitation and soil moisture data are used to monitor the global drought, in particular, we devote ourselves to analyze the relationship between the variation of global drought and ENSO with the main objectives of exploring the spatial distribution and long-term trends of global drought and investigating the influences of ENSO on the occurrence of drought in different areas in the world.

The monthly precipitation and soil moisture data during the period of 1948-2009 are derived from CRU and CPC soil moisture data set, respectively. The results show that the droughts have significantly increasing trends in the world during the past several decades. An obvious drying trend can be found in East Asia, South Asia, North Africa, northern South America, south and central Europe et al. The trends of drought in most areas in the world are correlated well with the variation of ENSO. This research has the potential to help to improve our understanding of changes of global droughts and thus to enhance human mitigation to drought and flood hazards under the changing climate.