Abstract

During the last decade, several high intensity and long duration droughts happened in Southwest China (SWC) and resulted in tremendous socioeconomic losses. Meanwhile, it is well known that soil moisture (SM) plays a key role in land-atmosphere interaction and weather/climate prediction and is a direct drought index. Thus, a general analysis of SM is beneficial to drought research and prediction over this region. Based on the SM data of Global Land Data Assimilation System (GLDAS) V2.0, we examined the temporal variations of SM in SWC during 1961-2012. Results show that significant soil drying trend happened in autumn accompanied by an evident abrupt change in 1991. Moreover, SM exhibits a strong and season-dependent persistence. Particularly, the autumn SM anomaly shows the strongest memory that can be sustained to the next spring. Along with the decadal shift of SM, the memory time of autumn SM can extend from three months before 1991 to six months in recent years. We further used the Standardized Precipitation Evapotranspiration Index (SPEI) at multiple time scales to identify the droughts in different seasons over SWC, and the inter-annual change patterns of autumn SM and SPEIs are generally in agreement with each other, which confirms that SM is suitable for indicating the droughts. Our results suggest that the autumn SM can be a potential predictor of persistent droughts over SWC, especially for those multi-season persistent drought events started in autumn.