



Drought monitoring based on ESA CCI soil moisture products over the Yellow River Basin, China

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The multi-satellite retrieved soil moisture products released from Europe Space Agency's Climate Change Initiative (ESA CCI) program have been widely used in plenty of fields including drought monitoring. In this study, Cumulative Distribution Function (CDF) is applied to match the simulated soil moisture from the Variable Infiltration Capacity (VIC) model for filling the missing records of ESA CCI soil moisture (ESA CCI SM). The weekly Standard Soil Moisture Index (SSI) calculated from ESA CCI SM dataset (ESA CCI SSI) is conducted to monitor the agricultural drought over the Yellow River Basin (YRB) during 2000~2012. The performance of ESA CCI SSI is compared with the Standard Precipitation Index (SPI), the Standard Precipitation Evapotranspiration Index (SPEI), the self-calibrating Palmer Drought Severity Index based on VIC model (VIC_scPDSI) and the anomaly of Normalized Difference Vegetation Index (NDVI). The results show that the interpolated ESA CCI SM is significant ($p < 0.05$) correlated with the observed soil moisture and more than 84% of the grids in the YRB display good correlations with the global reanalysis soil moisture. In terms of drought monitoring (i.e. drought area and drought intensity), ESA CCI SSI presents a similar spatiotemporal pattern with VIC_scPDSI, while exhibits a delayed response to SPI and SPEI significantly. Analysis of the typical drought event in 2002 indicates that ESA CCI SSI could effectively capture the emerge and development process of this event and the drought severity detected by ESA CCI SSI is higher than that of SPI and SPEI. Besides, it is found that spatial characteristics of ESA CCI SSI and the anomaly of NDVI are consistent in some areas of the basin.