Toward Earlier Drought Detection Using Remotely Sensed Precipitation Data from the Reference Environmental Data Record (REDR) CMORPH

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This study evaluates the feasibility of using satellite precipitation data from the REDR program (CMORPH-CDR) to detect and monitor drought on a global scale. In this work, we focus on the implementation of the drought indices (SPI, PDSI) and their evaluation over the continental United States. In order to evaluate the relevance of using satellite data for the purpose of early drought detection and drought monitoring, several scenarios have been tested using the rain-gauge adjusted version of the satellite QPE, the near real-time version of the satellite QPE, and a mixed combination of gauge adjusted and near real-time versions of the satellite QPE. The drought indices are evaluated over CONUS for which numerous in-situ data as well as drought products exist. In particular, the difference between indices obtained with the corrected (CMORPH-CDR) and near real-time (CMORPH-RAW) versions of CMORPH is evaluated. Additionally, showcases of selected severe drought events are used for validation. Those four droughts episodes (the 1998-2004 western US drought, the 2006-2007 SE US drought, the 2010-2012 Texas-Mexican drought over the Southern Plains, and the 2012 summer Midwestern US drought) are the drought testbeds selected as case studies to assess the capabilities of drought products to monitor and predict as defined by the Drought Task Force (DTF) Protocol released on April 2013. Those drought episodes, that influenced the development of the NIDIS early warning system, are all within the period of record of the CMORPH-CDR dataset (1998-present). Following the assessment metrics in the DTF Protocol, each drought product is evaluated on the basis of its ability to estimate the onset and recovery, duration and severity, probability of drought condition, and the value given at the observed period. Finally, we present an interactive visualization tool that allows easy comparison of the results for the selected drought events.