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Depiction of global drought by reanalysis and real-time satellite precipitation products

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Reanalysis precipitation is routinely used as a surrogate of observations due to its high spatial and temporal resolution and global coverage, and thus widely used in hydrologic and agricultural applications. The resultant product is largely dependent on the accuracy of reanalysis precipitation datasets. With advances in satellite remote sensing technology, the latest generation of reanalysis systems starts to include real time satellite precipitation estimates as inputs to their assimilation system. In this presentation, reanalysis precipitations datasets and real-time satellite rainfall products are used for the depiction of global drought events by comparing them against an observational reference dataset, namely the Princeton Global Forcing (PGF) dataset, during the period of March 2000 to December 2012. The selected reanalyses are the Climate Forecast System Reanalysis (CFSR), ERA-Interim, and the Modern-Era Retrospective Analysis for Research and Applications, version 1 (MERRA) and 2 (MERRA-2). Three real-time satellite precipitation estimates; namely the Tropical Rainfall Measuring Mission (TRMM) Multi-Satellite Precipitation Analysis (TMPA) 3B42RT, the Climate Prediction Center (CPC) morphing algorithm (CMORPH) and the Precipitation Estimation from Remotely Sensed Information using Artificial Neural Networks (PERSIANN) are included in the study. Our results show that all datasets depict Sub-Saharan African drought events with limited skill, as opposed to mid latitude regions. Reanalyses and satellite real-time precipitation datasets have comparative skill in the low latitudes. Specific drought events are analyzed that demonstrate the drought depiction from the various datasets. In North America, Asia and Europe, drought events are better replicated and inter-dataset variability is significantly smaller. Overall, temporal characteristics of identified drought events are better estimated than their spatial extent.