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Remote-sensing based model for drought identification

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Drought is one of the least studied and understood natural hazards. It has long and uncertain onset and offset and registered drought events are difficult to identify in many countries due to the lack of databases. Drought affects every year an increasing number of people. In 2017 the Centre for Research on the Epidemiology of Disasters reported 291 drought events, causing about 9000 deaths and almost 150 million people affected. The model here proposed aims at identifying drought events using two triggers: 1-month Standardized Precipitation Index (SPI) as the primary one and Vegetation Health Index (VHI) as secondary. SPI 1-month is computed using the precipitation taken from the CMORPH dataset that has a daily temporal resolution and a 25 km spatial resolution. VHI is provided by the Centre for Satellite Applications and Research with weekly temporal resolution and 4 km spatial resolution. Both the datasets are implemented by the National Oceanic and Atmospheric Administration of the USA. The model is able to identify drought events with a weekly temporal resolution starting from 1998 (starting period of CMORPH precipitation records). Two case studies have been implemented and tested: Haiti and California. No records of historic drought events are available from the local agencies or institutions, therefore the events used to test the model are taken from reports of the humanitarian information source ReliefWeb. In the Californian case, the reported drought events used to test the model have been provided by the US Drought Monitoring institute. The model has been calibrated for the two case studies and the resulting performance have been measured by means of standard indices. In both case the results are very good compared to the available literature. In addition: (1) being the model based on remote-sensing data, it can be applied also on countries without reliable historical ground based data, (2) being the datasets global, the model can be easily implemented over the entire globe at country scale, (3) since the latency time for both the databases is short, the model can be updated in near-real time. We show in this work the developed model could provide useful information to policy makers, governmental agencies, ONGs and farmers.