

Using Standardized Precipitation-Evapotranspiration Index for Quantification of Drought Events in Queensland, Australia

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Abstract: A drought is a major problem of interest in Australia. The damages caused by droughts has been considered as the costliest compared to other natural hazards. A drought has very slow onset and is a creeping phenomenon. Drought characteristics such as severity, intensity, duration and inter-arrival time is difficult to quantify as every drought event differs in seasonality, location, and spatial extent. Here, we aim to use Standardized Precipitation-Evapotranspiration Index (SPEI) to show its novelty in the drought monitoring process, in Queensland Australia. SPEI is a relatively new and an improved version of the Standardized Precipitation Index (SPI), developed by Vicente-Serrano et al. (2010), and its application in context of Australian droughts remains to be tested. An advantage of SPEI over SPI and other meteorological-based drought indices is that it not only incorporates rainfall as an input variable, but also minimum and maximum temperature, as well as evapo-transpiration to accommodate for water losses more accurately. The application of SPEI for drought monitoring in Queensland will be a novel contribution to studying drought events, as alongside rainfall amount being below average, variations in temperature also results in water to evaporate and droughts to amplify. In this study, a set of study locations within Queensland will be considered for analysis of historical drought events. The present investigation utilises the Australian Water Availability Project (AWAP) rainfall and temperature datasets, which are the gridded products at 5-km by 5-km resolution, for the period 1900 to 2013. Based on time-series of the SPEI, drought events within this period will be analysed and the ability of the index for detection of drought duration, severity and intensity will be tested. The expected outcomes will be the assessment of drought events in Australia, including a closer assessment of historical events such as the Millennium Drought, the World-War II Drought, and the 1982-1983 Drought events.

Keywords: *droughts, SPEI, drought monitoring, drought characteristics*