



Analysis of Spatio-temporal variability and atmospheric drivers of the flash drought over Godavari river basin.

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Flash droughts are generally considered a subset of seasonal drought events. In the present study, we have characterized the flash drought events based on soil moisture index (SMI) using daily ERA5 reanalysis data having a spatial resolution of $0.25^{\circ} \times 0.25^{\circ}$ from 1960 till 2021. Flash drought events were identified when SMI drops below the 20th percentile within less than 3 next pentads, and it terminates when SMI goes above the 20th percentile and stays there for the next 2 pentads. Flash drought time series was prepared and the Mann-Kendall trend test was applied to investigate the evidence of the statistically significant trends. To assess the atmospheric drivers (precipitation, PET) of flash drought, standardized precipitation index (SPI), and standardized precipitation evapotranspiration index (SPEI) were calculated during the occurrence of each flash drought event at each grid pixel. For calculating SPI and SPEI, ERA5 reanalysis data of precipitation and PET (potential evapotranspiration) was used. Seasonal analysis of results showed that the flash drought frequency observed during the pre-monsoon season (March-April-May) shows considerable variation when compared to the monsoon (July-August-September) and post-monsoon (October-November-December) seasons. Results of Mann-Kendall statistics show the increasing trend of flash drought over semi-arid regions like Marathwada and Vidarbha. Both SPI and SPEI shows spatially varying similarity with the flash drought events. When observed on a seasonal scale, it is observed that SPEI shows a higher degree of similarity with flash drought events during pre-monsoon season as compared to SPI as evaporative demand is high during this period.