Climate Change and Drought Drivers: Identification of drought drivers and climate extreme using regression-based algorithms

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Abstract

Droughts are particularly disastrous in South Africa and other arid regions, that are water-scarce by nature due to low rainfall and water sources. According to some studies, droughts are not uncommon in Africa's drylands and have been rising in dry African terrain. South Africa's provinces were severely affected recently by drought events. This study aimed at evaluating drought disaster and climate trends in the Free State Province of South Africa and to identify drought drivers using regression-based algorithms. The study used high-resolution downscaled climate change projections under three Representative Concentration Pathways (RCP). Three future periods comprising the short (the 2030s), medium (2040s) and long term (2050s) compared to the current period are analysed to understand the potential magnitude of projected climate change-related drought. The study revealed that the year 2001 and 2016 witnessed extreme drought conditions where drought index is between 0 and 20% across the entire province during summer, while the year 2003, 2004, 2007 and 2015 observed severe drought conditions across the region with variation from one part to the other. The result shows that from -24.5 to -25.5 latitude, the area witnessed a decrease in precipitation (80 to 120mm) across the time slice and an increase in the latitude -26° to -28° S for summer seasons, which is more prominent in the year 2041 to 2050. More so, findings from this study showed that agricultural lands, cultivated grasslands, and barren surfaces were influenced or impacted by drought disaster, especially in 2015, one of the drought years in Free State Province. From the feature selection results, the influence of climate proxies and anthropogenic factors on EVI shows the ecological situation within the study area.

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Climate Change and Drought Drivers: Identification of drought drivers and climate extreme using regression-based algorithms

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Abstract

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Keywords: Drought disaster, climate trends; drought drivers; machine learning; regression-based algorithms