

Leveraging Remote Sensing Information for Drought Disaster Risk Management

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Abstract : With more than 100,000 orbits during the past 20 years, Terra has significantly improved our knowledge of the Earth's climate and its implications on societies and ecosystems of human activity and natural disasters, including drought events. With Terra instrument's performance and the free distribution of its products, this study utilised Terra MOD13Q1 satellite data to assess drought disaster events and its spatiotemporal patterns over the Free State Province of South Africa between 2001 and 2019 for summer, autumn, winter, and spring seasons. The study also 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 the 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 another. 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. This study emphasizes the strong spatio-environmental impacts within the province and highlights the associated factors that characterise high drought stress risk, especially on the environment and ecosystems. This study contributes to a disaster risk framework to identify areas for specific research and adaptation activities on drought disaster risk and for environmental planning in the study area, which is characterised by both rural and urban contexts, to address climate change-related drought impacts.

Keywords : remote sensing, drought disaster, climate scenario, assessment

Conference Title : ICEM 2021 : International Conference on Ecosystems Management

Conference Location : New York, United States

Conference Dates : August 09-10, 2021