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Full Length Research Paper

Spatial and temporal analysis of recent climatological data in Tanzania

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Recent climate variability over Tanzania is evaluated through the analysis of spatial and temporal distributions of meteorological variables including rainfall, relative humidity (RH), maximum temperature (Tmax) and minimum temperature (Tmin) in an annual and seasonal time scale for 30 years (1971 - 2000) at 45 meteorological stations for rainfall and 27 stations for Tmax, Tmin and RH. Statistical parameters including mean (ME), coefficient of variation (CV) and skewness (SK) are computed and analyzed. These parameters are mapped using Surfer software. Seasonal contribution of each of the four seasons (JF, MAM, JJAS and OND) is assessed. It has been found that, for most of the bimodal areas, nearly 50% of the annual rainfall is contributed by MAM season. In all four seasons, rainfall, in most of the stations is characterized by a slight asymmetrical distribution with stronger spatial and temporal variability. Tmax, Tmin and RH however, exhibit a near normal distribution with significantly less variability.

Key words: ITCZ, statistical moments; coefficient of variation, skewness.

INTRODUCTION

The variability of climatic elements such as rainfall, temperature, evaporation and relative humidity has an effect on agricultural and other socio-economic activities. However, rainfall is the most important climatic element in Tanzania, since extreme interannual, seasonal and monthly variability of rainfall and prolonged drought can lead to serious economical problems and ecological catastrophes (Muriuki, 1998). Recently, in 2003 and 2005 the country experienced severe drought with severe economic implications. The drought of 2005 contributed to serve power shortage in the country leading to severe economic decline. The impact of drought was more pronounced in the first quarter of 2006, whereby the water level at Mtera dam fell below dead storage level, which is 690 m for Mtera dam leading to the decrease in the growth rate of electricity sub activities by - 1.9%. In 2007, electricity generated through the National Grid increased from 1,453.17 GWh to 2,512.83 GWh in 2006, equivalent to an increase of 73%. The increase was due to availability of abundant water in hydro power plants at Mtera and Kidatu, following good rainfall season (Kijazi and Reason 2008).

Having clear understandings of the spatial and temporal variability of rainfall and other climatological elements will facilitate policy and decision makers, and other relevant stakeholders in developing effective strategies in addressing current climate variability and projected climate change in Tanzania. However, very few studies with a shorter period of data set have attempted to describe the current climate variability through the statistical moments of the main climatological elements in Tanzania. In this study, the most recent quality controlled climatological data set with a longer period from 40 meteorological

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Abbreviations: Tmax, Maximum temperature; **Tmin,** minimum temperature; **CV,** coefficient of variation; **SK,** skewness; **RH,** relative humidity; **ME,** mean; **ITCZ,** Intertropical convergence zone; **SSTs,** sea surface temperatures; **M.S.L,** mean sea level; **NE,** north east; **NW,** north west; **SE,** south east; **SW,** south west.