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The nature of rainfall variability over Africa on time scales of decades to millenia

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Abstract

This paper begins with an overview of the African rainfall regime, noting in particular the contrast among various regions of the continent, followed by a description of the nature of climatic (i.e., rainfall) variability over Africa on time scales of decades and centuries. The decadal scale is examined using modern data covering the twentieth century. The century scale is examined using historical reconstructions of climate, based on a combination of geologic, geographic and historical information (e.g., lake chronologies, landscape descriptions, archives and diaries).

The presentation includes some results of an analysis of a new historical semi-quantitative data set for Africa covering the last two centuries. It was produced using a combination of historical information, nineteenth century rainfall records, and statistical relationships among various sectors of Africa. Presented here are reconstructions of lake level fluctuations for numerous lakes of eastern and southern Africa

This overview of climatic fluctuations is utilized to uncover inherent spatial and temporal characteristics of the rainfall variability. The dominance over time of various spatial modes is emphasized and the questions of synchronicity of the hemispheres and the abruptness of change are considered. The contrast between the two hemispheres is also surveyed, notably the different time scales of variability and potential causal factors in the variability. One of the most important contrasts is the multi-decadal persistence of anomalies over most of northern Africa. This has implications for the causes of long-term fluctuations, even those historical and paleo-time scales.



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Keywords

rainfall variability; decadal scale; century scale

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