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Modelling Atmospheric Dynamics and Climate Variability in East Africa: A Numerical Approach

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Abstract

Atmospheric dynamics and climate variability in East Africa are influenced by complex interactions between land-sea breezes, topographical features, and global weather systems. This study employs a high-resolution, three-dimensional atmospheric model (e.g., CAM5) to simulate East African climates. Data assimilation techniques are used to initialize the model with current meteorological observations, including temperature, humidity, wind speed, and precipitation data from multiple sources. The model successfully replicates key features of observed climate variability over Angola, such as seasonal transitions in rainfall patterns and persistent high-pressure systems that influence regional weather dynamics. Our numerical approach provides a robust framework for understanding atmospheric conditions and their impacts on East African climates. The model's predictive capabilities offer valuable insights into potential future climate scenarios. Future research should focus on incorporating more detailed data, particularly from remote sensing technologies, to enhance the accuracy of climate simulations over Angola. Atmospheric Modelling, Climate Variability, East Africa, Data Assimilation The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *East African, Land-sea breeze, Topography, Numerical model, Climate dynamics, Weather systems, Geostrophic flow*