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Simulation of the Climate of Africa Based on the Hydrodynamical System of Equations Governing Atmospheric Flow¹

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Application of the laws of physics is the cornerstone in the development of computer simulation models used for the study and prediction of climate. They involve application of the laws of thermodynamics, fluid dynamics, acoustics, and optics physics, among others. The typical basic formulation of climate models consists of a closed system of time-dependant non-linear partial differential equations, discretized with appropriate numerical forms, executed on high powered gigaflop computer systems, and supported by terabyte disk storage systems. Specific application of a climate computer simulation model and prediction of recent record drought conditions in Africa is discussed. Climatic and hydrologic projection results for the year 2071 through 2100 derived from the computer model show that regional climate will be warmer except for a few areas and major rainfall shifts are expected to occur. As a consequence the levels of large lakes in Eastern Africa will increase. In particular Lake Victoria (source of the Nile) is projected to increase in height by 2 meters thus increasing the potential for hydroelectric power generation for domestic and industrial consumption. These results will contribute to improved planning and management of multi-billion dollar climate-sensitive social-economic functions in Africa.

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