Analysis of Monthly Lightning Distribution in Nigeria

Publisher: IEEE

Cite This

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Abstract: This is the first time in the literature that lightning distribution maps for Nigeria will be published, particularly on a monthly basis. A lightning dataset from the Global Lightning Dataset GLD360 network was analyzed for Nigeria from 2015 to 2021. The dataset contains over 123 million strokes, that occurred in Nigeria. Vaisala owns GLD360, which can properly detect the majority of lightning discharges throughout the world. The lightning variability on a monthly scale was first addressed for all 36 states and Federal Capital Territory in Nigeria. The monthly lightning stroke densities and occurrences for each state were an-alyzed to show the lightning-prone areas in the country. Analysis of the lightning dataset was performed with Python programming language and ArcGIS. It is expected that knowledge of lightning variability in Nigeria will help understanding of the weather conditions responsible for the lightning occurrence, the effect of lightning on power reliability, help locate severe weather, and when to safely have outdoor events in the country.View less

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I. Introduction

Lightning stroke density maps provide comprehensive in-formation about lightning activities in a given location [1]. Lightning varies in terms of time, location and frequency of occurrence [2], [3]. Thus, understanding these lightning variations can be used to determine

the weather condition responsible for the effect of lightning on power reliability, plan outdoor events, and help locate severe weather in the country. It has been reported in [4] that Nigeria has a large amount of lightning compared with middle latitudes. Unfortunately, no research has been conducted to show lightning frequency and its effects on lives and properties in the most populous country in Africa. Lightning-related human injuries and deaths are quite common in Nigeria, with an estimated 500 deaths each year [5]. Knowledge of monthly variability of lightning strokes in Nigeria will help save lives and property, as well as contribute to power supply reliability.