Extended Abstract

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Study on Frequency and Magnitude of Lightning Strike Variations

Lightning is a natural phenomenon that is responsible for a few billion dollars' worth property damage hundreds of human losses yearly in worldwide. Lightning is an electrical discharge that takes place b oppositely charge regions either within a cloud or between two clouds or cloud and ground. The mentioned above is called intra cloud, which is most common type, while the second and third type ar inter cloud and ground discharges (cloud to ground), respectively. In order to understand the risk of lig particular region, proper knowledge on lightning parameters such as frequency, density, magnitude o pattern of lightning activities etc.... should be studied. Unfortunately, for such a study a lightning loca is necessary to be identified. Since there is no such system available in Sri Lanka, in this study, we studie parameters of Swedish lightning activities. In this study, more than 10.7 million of lighting records in last 15 years from 2000-2014 recorded to Lightning Detection Centres of the Lightning Location and (LLP) systems were analysed. The LLP system can provide the information such as striking locati occurrence, polarity, magnitude, and number of flashes per each strike.

Key Word : FN curve, Hazard, Lightning, RNSS,

Wavelet Theory, Time Frequency Analysis and Range Normalization of Signal Strength (RNSS) a analyse the data. The analysis was carried out to achieve several objectives. Lighting patterns were s respect to location, periods, frequency and magnitude.

In this study, it was observed that the lightning strike count increases towards the Equator. In Wavelet was revealed that every year there is a strong lightning activity period and the repeating period of this e from 0.7 to 1.4 years. Every 4.5 – 6.0 year period, the occurrence of lightning strikes has a strong rela increase its magnitude.

2. Introduction and research problem/issue

According to estimates, more than 500 people die every year in South Asia and about 1000 people die SAARC countries. Even in Sri Lanka about 50 or more people die per year (Ahmed and Gomes, 2007 2004) . Annual fatality rates in Sri Lanka are higher more than in the developed countries. However, t to be lower than those expected in terms of the number of deaths reported in anecdotal news reports.

The lightning detecting system adopted in Sri Lanka is capable of registering some lightning param with the location of return strokes, which enable a comprehensive study on statistics related to lightni This system consists of two Direction Finders which have been implemented covering the Sri Lankan te the surrounding area in the Indian Ocean, particularly in observation sites maintained by the Dep Meteorology in Colombo and in Ratnapura, located at 7.3 m and 86.3 m above mean sea level, respec obvious that it require a few stations to predict the location of a lightning stroke accurately. Moder

locating networks, which are consists of number of sensors are capable of recording lightning lo lightning parameters such as current magnitude, number of flashes per stroke, polarity etc. with a c accuracy within a typical range of 600 km(Diendorfer, et.al, 1998, Orville et.al., 2002). Therefore, da by a lightning location system can be used in studying the long-term change of cloud to ground ligh characteristics with a higher accuracy. I n late 1979 a lightning location system was installed in Sweden by the Institute of High Voltage Resea is currently functioning under the Division for Electricity and Lightning Research of Uppsala Uni present, total number of stations in the lightning location network is 33, of which 10 are in Sweden.

3. Research Methodology

1) Identifying the mathematical quantification of lightning flash density: The meth transfer available information into quantitative settings is emphasized by this objective. Th and parameters identified hereafter are conclusive in formulating the mathematical method

2) Describing mathematically specific features of lightning flash dynamics and deve mathematical method by modeling approach: Here , it is focused on the develop ment of equa a model that describe lightning flash occurrence. Then, systems of equations will be deve conceptive representation of collective dynamic integration especially with cloud density g ratings.

3) Validating the mathematical model using available observational data in Sweden validation process is considered with the manipulation of existing and newly developed ma tools and techniques. Reliability of the model as we ll as the applicability of validation tools by achieving this objective.

4) Analyzing the lightning flash dynamics according to different periods of time and pre potential occurrences . Computer simulation package is designed to spatia lly present tim dynamics of lightning flashes over Sweden.

5) Investigating the general applicability of mathematical tools and techniques desig modeling process.

In this situation, it is required to study the lighting strike variation pattern to apply the hazard resilient for buildings, structures and training for people. Main objective of this research study is to assess the of occurrence and variation of CG lightning strikes over the geographical boundary covered by the Location and Protection system of Sweden.

6) The overall model presented in this study is deterministic rather th an stochastic Within the scope of the Climatology, deterministic models are usually based on fu characteristics relevant to natural climatic phenomenon, where intensity, density and frequencies are highlighted as important variables.