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April 27-30, 2020
Broomfield, Colorado, USA

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The First Lightning Research Infrastructure in Uganda: A New Finding to Promote Mineral Exploration and Mapping of Geological Structures

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Abstract

Abstract— Uganda is prone to lightning strikes. For instance the recent statistics compiled between 2004 and 2011 indicated that lightning killed 156 people and 727 were injured. Between 2012 and 2013, the country lost over 205 primary school children as a result of lightning strikes and in 2014 and 2015 lightning killed 160 pupils. Furthermore, on 6th November 2015 lightning had killed five pupils of Nyakabingo Primary School and left four others injured in Kakanju Sub-county in Igara West in Bushenyi District in Uganda. More lightning strikes continued to occur in in 2018 and 2019 affecting Northern Uganda.

We have built a database on lightning risk based on field measurements, ground-truthing, community vulnerability sensitization and public education. The first lightning incident map of Uganda has been generated. In order to find scientific connection of lightning to geological formation and mineralization, a geophysical investigation was carried out in the field at lightning stricken sites and found that there was mineralized bodies with chargeability of over 100 milliVolt/Volt located at the center of the survey profiles. This finding revealed high chargeability value which is interpreted as a typical mineralized rocks. From the interpretation of ground magnetic surveys, resistivity and chargeability data collected in this study, there are intrusive features and hidden faults which act as ground capacitors that facilitate cloud to ground electrostatic discharge hence lightning strikes reported at the investigated sites.

From the interactions with the local community during the period of the survey, it was noted that there have been a series of lightning and as such, Bushenyi is quite susceptible to lightning strikes. This study found out that lightning data can support exploration of natural resources and geological mapping of structures such as dykes, faults among others. This study gives correlation of zones with high mineralization to high lightning frequency.

Therefore, more work should be supported for lightning data analysis to promote mineral exploration. This is a new finding that has not been realized before. The First Lightning Research Infrastructure in Uganda

Keywords—Uganda; Lightning; Research; Mineralization;

Topic Areas

Lightning Physics, Characteristics and Measurements

Submission Format

Oral