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Earth Networks Lightning Network Performance

Authors

Dr. Jeff Lapierre - Earth Networks

Mr. Luis Contreras Vidal - Langmuir Laboratory for Atmospheric Research, New Mexico Institute of Mining and Technology

Dr. Yanan Zhu - University of Alabama in Huntsville

Dr. Michael Stock - Earth Networks

Dr. Richard Sonnenfeld - Langmuir Laboratory for Atmospheric Research, New Mexico Institute of Mining and Technology

Abstract

The Earth Networks Total Lightning Network (ENTLN) is a global lightning detection network that has been operational since 2009. The ENTLN sensors are broadband electric field sensors that detect both intra-cloud (IC) and cloud-to-ground (CG) flashes and provide timing, location, classification, and peak current measurements. ENTLN consists of roughly 1800 wideband sensors deployed globally. Since its initial deployment, several improvements were made over the years to enhance its performance and usability. Notable ones are the addition of many new sensors each year to improve detection efficiency and extend global coverage. Firmware improvements have also been made to further increase sensitivity. A multi-parameter algorithm was incorporated to enhance IC and CG classification. To validate these improvements, Earth Networks has sponsored several studies to provide valuable feedback on performance improvements. This presentation will highlight two such studies. The first was performed at the Lightning Observatory in Gainesville (LOG), Florida using a combination of high-speed cameras and electric field sensors. Of the 608 flashes in this study show, a flash detection efficiency and CG classification accuracy of 99% and 97%, respectively, were found. The second study was performed at Langmuir Laboratory in New Mexico. In this study, 546 flashes were analyzed from three separate storms and ENTLN data was compared to simultaneously acquired interferometer (INTF) and electric field change array data (LEFA). Results show a total flash detection efficiency of 97.5% and classification accuracy of 84% for IC flashes and 91% for CG flashes. These study results provide evidence independent from internal ENTLN studies suggesting that ENTLN is effective at detecting and classifying both IC and CG flashes. Furthermore, comparisons with satellite lightning detectors such as the Geostationary Lightning Mapper and the Lightning Imaging Sensor show similar results to the aforementioned studies in terms of detection efficiency, but also illustrate improved performance over several other regions, most notably in Argentina, the Philippines, which recently had large networks installed. This study will quantify these improvements as well as discuss future endeavors to further improve the ENTLN performance and usability.

Topic Areas

Lightning Detection Systems Technology and Performance

Submission Format

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