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April 27-30, 2020
Broomfield, Colorado, USA

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Lightning Monitoring (Detection and Location) for Critical Facilities

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Abstract

Today, there are many lightning data sources that can be used to analyze and quantify lightning activity at certain locations or geographic areas. Data provided by Earth Networks, the National Lightning Detection Network (NLDN), the Geostationary Lightning Mapper (GLM), and the Global Lightning Dataset (GLD360), among others, can be used when lightning activity or detection/location information is required. These systems provide different resolution, accuracy, coverage area, detection efficiency (DE), etc. While these lightning detection/location networks provide high-fidelity data, they cannot provide 100% stroke detection efficiency (DE) or precision strike location accuracy, particularly for lightning strikes that exhibit multiple ground attachment points. For some critical assets, this level of lightning detection/location performance is required. Since 2016, SLS has been challenged by NASA to provide mission-specific lightning monitoring services at certain launch facilities to provide 100% stroke DE and precise strike location accuracy (including locating all ground attachment points). Operators utilize the data to determine the effects of direct or nearby lightning strikes on the vehicle/payload and to evaluate if re-test criteria thresholds have been exceeded. SLS has provided lightning monitoring services for the following recent missions, among others: GOES-R, GOES-S, TDRS-M, Orion Ascent Abort-2 (AA-2), Ionospheric Connection Explorer (ICON), Cyclone Global Navigation Satellite System (CYGNSS), and Parker Solar Probe (PSP). This paper provides a unique case study to demonstrate the need for site-specific lightning monitoring for critical assets, describes the unique lightning instrumentation used for mission-specific lightning monitoring, and elaborates on other possible applications where this level of DE and strike location accuracy may be required.

Topic Areas

Lightning Detection Systems Technology and Performance

Submission Format

Oral