

ACCLIP: Earth Networks Total Lightning Network Data

Author:

Earth Networks

1.0 Data Set Description

Cloud-to-ground and intracloud lightning flash data from the Earth Networks Total Lightning Network (ENTLN) for the ACCLIP campaign period and region of interest.

Data Version: 1.0

Release Date: 6 October 2022

Data Status: Final

Time period: 25 July to 4 October 2022

Location: 0E-180E longitude and 0N-60N

Data Frequency: whenever there is a flash

Data source: Earth Networks

Data set restrictions: Data should not be shared with non-ACCLIP affiliated investigators

2.0 Instrument Description

The ENTLN consists of over 1800 sensors deployed in over 100 countries that detect wideband electric field signals emitted by both intracloud (IC) and cloud-to-ground (CG) lightning. (Zhu et al, 2022)

3.0 Data Collection and Processing

The electric field signals recorded by the ENTLN sensors are continuously sent back, in compressed data packets, to the central processor, where the geolocation of lightning is implemented in real-time using the time-of-arrival (TOA) technique. (Zhu et al, 2022)

4.0 Data Format

The data are in hourly files in ENTLN CSV format (see Table 1).

Field	Content
1	Flash Type: 0 = CG, 1 = IC, 40 = WWLLN CG
2	Flash Time: YYYYMMDDThhmmss.sss in UTC (ISO 8601)
3	Latitude: + or - nn.nnnnnnn
4	Longitude: + or - nnn.nnnnnnn
5	Peak Current: + or - xxxxxxxxx (amperes)
6	Reserved: Always 000
7	IC Height: xxxxx (meters)
8	Number of Sensors: xxx
9	Multiplicity: xxx

Table 1: ENTLN CSV format description. Note that Flash Type “40” is not included in this dataset.

The file naming convention is: Earth_Networks_Ltg_YYYYMMDDHH.txt

4.1 Data Element Descriptions

Time in Universal Time Coordinated (UTC). Note that the “time” for a flash is recorded as the time of the major pulse of the flash. We define “major pulse” as follows:

If the flash is an In-Cloud (IC) flash, then the major pulse is the IC pulse with the largest absolute amplitude value.

If the flash is a Cloud-to-Ground (CG) flash, then the major pulse is the CG pulse with the largest absolute amplitude value

Latitude in decimal degrees

Longitude in decimal degrees

Flash Type (aka Classification): Possible values are 0 or 1 (or 40). If a flash contains one or more CG (cloud-to-ground, 0) pulse(s) then the flash will be classified as a CG. Otherwise, it will be classified as IC (intra-cloud, 1).

Peak Current: Peak Current for CG or peak radiated field normalized to 30 km for IC lightning. Please note that the amplitude of a given flash is defined as the amplitude of the major pulse in the flash. For any pulses that do not contain peak current data, the value will be zero.

Number of Sensors: Number of sensors used in locating a lightning flash/pulse.

Multiplicity: A flash can consist of many pulses. Therefore, these values represent the number of IC pulses and CG pulses in each flash.

Height: Applies to IC only. This parameter estimates the height of the IC lightning in meters. This value can be as high as 20,000 meters and it should be noted that it will be most accurate in locations with a high sensor density.

5.0 Data Remarks

These are the real time data from the ENTLN and no additional quality control has been performed beyond that done by Earth Networks.

6.0 References

Earth Networks, 2022: Earth Networks Total Lightning Data Feed Version 4 Interface Control Document. Available online at <https://get.earthnetworks.com/hubfs/Customer%20Success/ENTLN%20Lightning%20Data%20Feed%20v4%20ICD.pdf> as of 6 October 2022.

Zhu, Y.; Stock, M.; Lapierre, J.; DiGangi, E. Upgrades of the Earth Networks Total Lightning Network in 2021. Remote Sens. 2022, 14, 2209. <https://doi.org/10.3390/rs14092209>